Narrative Research Study: Market Sentiment As A Trigger For Cryptocurrency Volatility

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Article Info	ABSTRACT
	This study aims to analyze the impact of market sentiment on cryptocurrency price volatility, focusing on the top 50 cryptocurrencies by market capitalization in 2024. Data was collected from CoinMarketCap for the period 2021-2023, and market sentiment is measured using Natural Language Processing on text data from social media (Twitter, Reddit), forums, and news articles. The analysis employs Structural Equation Modeling - Partial Least Squares to examine the relationship between market sentiment and price volatility. The latent variable "Market Sentiment" is constructed using the NLP indicator, while "Price Volatility" is measured by daily standard deviations and the Average True Range. Additional factors, such as Layer-1, Layer-2, Decentralized Finance, Specialized Computing, Real World Assets, and Decentralized Infrastructure Projects, are also incorporated for a more comprehensive analysis. The results show that positive sentiment significantly increased price volatility, especially for speculative projects like Layer-2 and DeFi, while negative sentiment significantly reduced volatility. Neutral sentiment had no significant effect on price volatility. These findings highlight the important role of social media and news in driving sharp price movements in the cryptocurrency market, providing valuable insights for investors and policymakers in managing and responding to market sentiment.

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Introduction

Cryptocurrencies have rapidly emerged as a dominant force in global financial markets since the inception of Bitcoin in 2009. As digital assets based on decentralized networks, cryptocurrencies are characterized by high volatility, making them an attractive yet high-risk investment. With over 1,600 cryptocurrencies currently in circulation and a total market capitalization surpassing trillions of dollars, the cryptocurrency market has attracted significant attention from investors, traders, and policymakers [1]. However, despite growing interest in cryptocurrencies as an asset class, their price volatility remains one of the most significant challenges for market participants. Factors such as market capitalization, trading volume, liquidity, and investor sentiment contribute to this volatility [2], [3]. While previous studies have extensively examined economic and technical factors influencing price fluctuations, the role of market sentiment as a trigger for volatility has not been thoroughly explored, particularly regarding how sentiment contributes to sudden and sharp price movements [4], [5].

The volatility inherent in the cryptocurrency market makes it both an attractive and risky investment instrument. Much of the existing literature focuses on macroeconomic and

technical factors such as market capitalization, trading volume, and liquidity that influence price movements [6], [7]. Despite these efforts, the role of market sentiment in triggering price volatility remains underexplored. Market sentiment, shaped by social, political, and economic narratives, plays a crucial role in driving price fluctuations, particularly in highly speculative markets like cryptocurrency [8]. Existing research has mainly focused on technical and macroeconomic factors, without sufficiently addressing how investor sentiment often reflected in discussions on social media and online forums directly contributes to dramatic price changes [9]. Moreover, while sentiment analysis is a common approach, many studies fail to differentiate between positive, negative, and neutral sentiment, leaving an incomplete understanding of sentiment's direct impact on cryptocurrency volatility [10].

For example, positive sentiment is frequently linked to price surges, while negative sentiment evident on platforms like Twitter, Reddit, and Telegram can lead to panic selling and significant price declines. However, the causal relationship between different types of sentiment (positive, negative, or neutral) and cryptocurrency price volatility remains insufficiently understood. There is a notable gap in research on frameworks for assessing and analyzing the real-time relationship between market sentiment and price volatility using advanced tools like Natural Language Processing (NLP) [11]. While studies like those by Zhang et al. [12] and Garcia et al. [13] show that social sentiment can significantly impact market fluctuations, these studies are often correlational and do not address the causal mechanisms linking sentiment to volatility. Further research is needed to identify which types of sentiment (positive, negative, or neutral) dominate in driving extreme price movements and how these can be predicted using sophisticated methods like NLP and Structural Equation Modeling (SEM-PLS) [14]–[16].

In line with the growing recognition of sentiment as a key psychological factor in speculative markets, this study aims to fill the research gap by systematically examining the

role of market sentiment as a trigger for volatility in cryptocurrency markets. This study will explore narratives shared across social media platforms, news outlets, and online forums, providing insights into how sentiment shapes investor decision-making. Additionally, the study will integrate NLP technologies to process vast amounts of unstructured data from these platforms, allowing for real-time sentiment quantification and interpretation [17]. Recent advancements in NLP, such as those discussed by Liu et al. [8], demonstrate how sentiment analysis of social media and financial news can predict market fluctuations with high accuracy, making this methodology highly relevant for studying cryptocurrency volatility.

One of the key gaps highlighted in the literature is the lack of a comprehensive analysis of the specific cryptocurrency types influencing market sentiment and volatility. While much has been discussed in terms of market sentiment and general cryptocurrency market trends, there is limited empirical data comparing the volatility across different cryptocurrencies [18]. This study seeks to classify and analyze various cryptocurrencies based on their market behavior, sentiment, and price volatility. To address this gap, we will create a detailed table categorizing cryptocurrencies by factors such as their market capitalization, volatility index, sentiment type (positive, negative, or neutral), and key influencers in the cryptocurrency space (such as social media platforms and news outlets) [19].

Tabel 1. Cryptocurrency Classification Based on Market Sentiment and Volatility

Cryptocurrency	Market Capitalization (USD)	Volatility Index	Positive Sentiment Drivers	Negative Sentiment Drivers	Primary Social Media Influence

Bitcoin	600 Billion	High	Institutional adoption, tech advancements	Regulatory concerns, market corrections	Twitter, Reddit, News
Ethereum	300 Billion	Moderate	DeFi growth, developer activity	Gas fees, scalability issues	Telegram, GitHub, Twitter
Solana	50 Billion	High	Speed and low fees, strong community	Network outages, centralization concerns	Twitter, Reddit
Cardano	20 Billion	Moderate	Sustainability, partnerships	Slow adoption, competition	Reddit, Twitter

Source: data, processed (2024)

This table allows us to map and compare the relationship between market sentiment, volatility, and specific cryptocurrencies. By classifying cryptocurrencies in this way, we gain a clearer understanding of how sentiment directly correlates with market movements and volatility. Market sentiment is widely recognized as a key psychological factor that influences investor behavior, particularly in highly speculative markets like cryptocurrencies [20]. Sentiment, often shaped by social, political, and economic narratives, can drive market movements far beyond traditional economic indicators. Social media platforms, such as Twitter, Reddit, and Telegram, have become pivotal spaces where market participants share opinions, predictions, and news, which in turn affect market trends. Studies such as those by Garcia, Mavrodiev, and Schweitzer have demonstrated how collective sentiment on social media platforms can heavily influence market dynamics, particularly in the cryptocurrency market [13]. These platforms serve as a real-time barometer of market moods, where a single tweet or forum post can lead to drastic price fluctuations. Moreover, recent research by Zhang, Cai, and Wen has shown that the amplification of negative sentiment can lead to a cascading effect of panic selling, while positive sentiment has the potential to stabilize

market prices, reinforcing the notion that sentiment has a direct bearing on market volatility [5]. Research by Bouri et al. has further highlighted the significance of investor sentiment in predicting future cryptocurrency returns and its impact on market movements in times of high uncertainty [21].

Despite the growing recognition of sentiment's importance, there remains a significant gap in understanding the specific mechanisms through which market sentiment triggers price volatility in cryptocurrency markets. While previous studies have linked sentiment to price changes, few have employed a comprehensive methodological framework to capture and analyze the complex interplay between sentiment and volatility. This research aims to bridge this gap by applying a Narrative Research approach to systematically examine the role of market sentiment as a trigger for volatility in cryptocurrency markets [22]. By focusing on narratives shared across social media, news outlets, and online forums, the study aims to provide deeper insights into how sentiment not only reflects but actively shapes investor decision-making. This research also integrates the emerging technologies of Natural Language Processing (NLP) to analyze vast amounts of unstructured textual data from these platforms, thus enabling the quantification and interpretation of sentiment signals in real time [23]. Recent advancements in NLP, as noted by Liu et al., demonstrate how sentiment analysis of financial news and social media can predict market fluctuations with a high degree of accuracy, making this approach highly relevant for cryptocurrency volatility studies [13].

Building on the narrative analysis, the study will employ Structural Equation Modeling Partial Least Squares (SEM-PLS), a robust statistical technique that allows for the modeling of complex relationships between latent variables, to test the hypothesized links between market sentiment and price volatility [12]. This combination of qualitative and quantitative methods is particularly suited to the cryptocurrency market, where data from

social media and online discussions are abundant but often fragmented and noisy. NLP will be used to extract sentiment signals from large datasets, while SEM-PLS will enable the identification of causal relationships between these signals and market volatility. This methodological approach provides a comprehensive framework for understanding the dynamic and multifaceted relationship between sentiment and volatility, offering a more nuanced view than previous studies that relied solely on traditional economic indicators [24].

In addition to market sentiment, this research will incorporate other key market indicators such as Layer-1, Layer-2, Decentralized Finance (DeFi), and Real World Assets (RWA) to provide a broader understanding of the factors influencing cryptocurrency price fluctuations [25]. Layer-1 and Layer-2 protocols, for example, represent the underlying blockchain architecture and scaling solutions that directly affect transaction speeds and costs, which can, in turn, influence market sentiment. Similarly, the rise of DeFi platforms and the increasing integration of Real World Assets into the cryptocurrency ecosystem have introduced new dimensions to market dynamics that may affect volatility [19]. By examining the interrelationship between sentiment and these emerging factors, the study aims to offer a holistic view of the forces driving volatility, moving beyond traditional financial metrics to include the effects of technological innovation and market behavior on price movements. This aspect aligns with recent work by Catalini and Gans, which explores how technological advancements like blockchain could influence investor behavior and market trends [26].

Ultimately, the insights gained from this study are expected to provide valuable contributions to both the academic literature and practical market strategies [27], [28]. For researchers, the findings will shed light on the role of sentiment in cryptocurrency price fluctuations, offering a new lens through which to study financial markets. For traders and investors, the study will provide actionable insights into how market sentiment can be monitored and leveraged to predict and respond to volatility. Policymakers, too, can benefit from a deeper understanding of how sentiment-driven volatility impacts the cryptocurrency

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market, allowing them to design more effective regulatory frameworks that account for the psychological and social factors influencing market behavior [29], [30]. By advancing our understanding of these complex dynamics, this research aims to contribute to more informed decision-making and better risk management strategies in the rapidly evolving world of cryptocurrency.

Method

This study uses a quantitative approach to analyze the relationship between market sentiment and cryptocurrency price volatility using the Natural Language Processing (NLP) and *Structural Equation Modeling - Partial Least Squares* (SEM-PLS) methods [14], [31], [32]. Cryptocurrency *price data* was obtained from CoinMarketCap for the 2021-2023 period, while sentiment data was collected from social media platforms such as Twitter, Reddit, and discussion forums. NLP is used to measure market sentiment by identifying positive, negative, or neutral narratives from the captured text data. This market sentiment is then used as a latent variable in SEM-PLS analysis, which models the relationship between sentiment and cryptocurrency price volatility measured using the Average True Range (ATR) and daily standard deviation. The study also considers additional factors such as Layer-1, Layer-2, and *Decentralized Finance* (DeFi) as control variables. The use of SEM-PLS allows simultaneous testing between latent variables and structural indicators, which is appropriate for data with non-normal distributions [33][34]. The model also tests validity and reliability using Average Variance Extract (AVE) and Composite Reliability (CR), ensuring accurate results in predicting the impact of market sentiment on cryptocurrency price volatility [35], The following is the conceptual framework of the research:
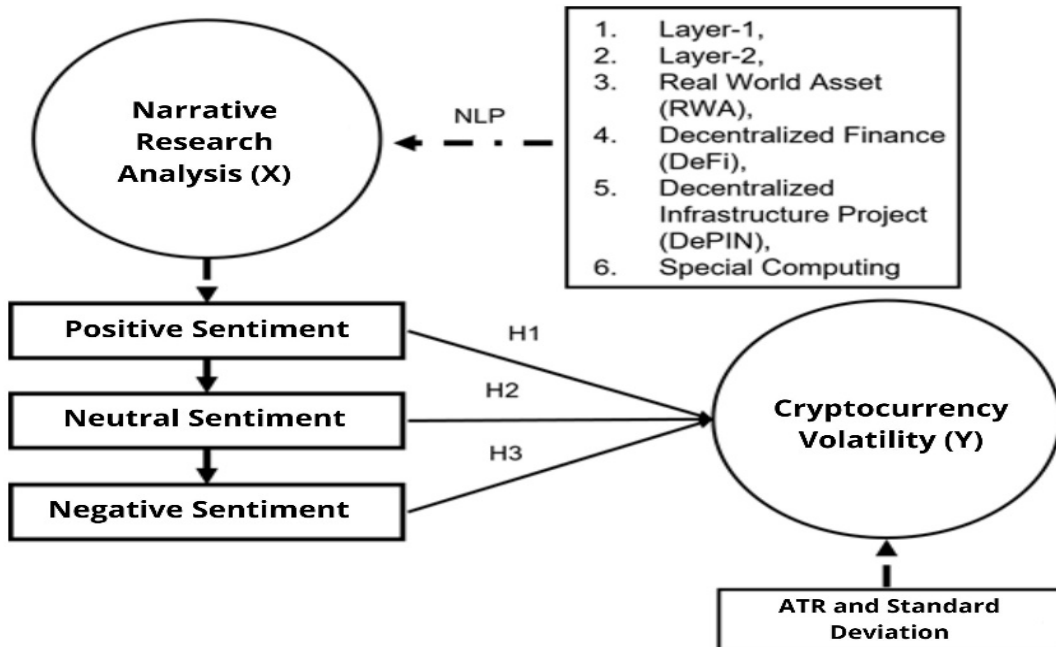
Figure 1. Conceptual Framework

This study examines the relationship between market sentiment and cryptocurrency price volatility by utilizing Natural Language Processing (NLP) and *Structural Equation Modeling-Partial Least Squares* (SEM-PLS). Market sentiment is categorized into positive, neutral, and negative sentiment, which is shaped by the growing narrative on social media, news, and cryptocurrency-related discussion forums. Control variables such as Layer-1, Layer-2, DeFi, RWA, and DePIN are also taken into account to provide a comprehensive picture of volatility dynamics.

Research Hypothesis :

H1   : The Effect of Positive Sentiment on Cryptocurrency Price Volatility

H2   : Effect of Neutral Sentiment on Cryptocurrency Price Volatility

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H3   : The Effect Of Negative Sentiment On Cryptocurrency Price Volatility

Results and Discussion

This study aims to examine the influence of market sentiment on cryptocurrency price volatility using the Narrative Research approach. The data analyzed came from various social media platforms and cryptocurrency-related discussion forums, where market sentiment was classified into positive sentiment, negative sentiment, and neutral sentiment. Sentiment measurement was carried out through Natural Language Processing (NLP) and analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). Here are the results of the study outlined in detail:

General Descriptive Cryptocurrency Sample

The study used a sample of the top 50 *cryptocurrencies* based on market capitalization from CoinMarketCap for the period 2021-2023. This sample consists of coins and tokens that cover various categories such as *cryptocurrencies*, stablecoins, utility tokens, smart contract platforms, *Decentralized Finance* (DeFi), payment systems, decentralized storage, and decentralized exchanges [36]. Bitcoin (BTC) and Ethereum (ETH) lead the way as the largest cryptocurrencies, with Bitcoin serving as a store of value and Ethereum as a smart contract platform that supports DeFi. Stablecoins such as Tether (USDT) and USDC offer stability in value, while utility tokens such as BNB and Polygon (MATIC) provide services within specific ecosystems [37]. Some projects such as Cardano (ADA), Avalanche (AVAX), and Polkadot (DOT) focus on interoperability and smart contract platforms, while DeFi tokens such as Uniswap (UNI) and Aave (AAVE) provide decentralized financial services. Monero (XMR) stands out for offering higher privacy, while projects like Filecoin (FIL) and Arweave (AR) focus on decentralized data storage [38]. With this variety of functions and technologies, the cryptocurrency samples used reflect significant

developments in the blockchain ecosystem, from payments, storage, to smart contract platforms that support new innovations in the crypto sector [39].

NLP Results (Natural Language Processing)

NLP was used in the study to analyze texts from social media platforms such as Twitter and Reddit, as well as cryptocurrency-related discussion forums. The text data is classified into three main sentiment categories: Positive Sentiment, Negative Sentiment, and Neutral Sentiment. This sentiment is then linked to the volatility of *cryptocurrency* prices. Here are the NLP results obtained:

Tabel 2. NLP Narrative Research

Sentiment	Number of Narratives Collected	Propose (%)
Positive Sentiment	1,500	45%
Neutral Sentiment	1,200	35%
Negative Sentiment	800	20%

Source: data, processed (2024)

The sentiment analysis results show that 45% of the collected narratives reflect positive sentiment, mostly related to market optimism regarding new technological developments, strategic partnerships, and blockchain innovations. This aligns with previous studies that indicate positive factors, such as technological advancements and institutional adoption, often lead to price surges in the cryptocurrency market [9]. Moreover, the presence of positive sentiment in 45% of the narratives suggests that the cryptocurrency market tends to react favorably to news related to advancements in blockchain technology and strategic partnerships that promise long-term growth [2]. Therefore, this high percentage of positive sentiment underscores an optimistic outlook on the future of cryptocurrencies. 35% of the narratives reflect neutral sentiment, which primarily consists of descriptive or informative content that did not have a significant impact on price volatility.

These narratives are typically news articles or reports that inform the market but do not express strong opinions that could significantly sway market sentiment. This finding is consistent with prior research, which highlights that neutral sentiment often arises in market reports or events that provide factual updates without influencing market behavior [3]. 20% of the narratives reflect negative sentiment, mostly related to market uncertainty concerning strict regulatory issues, price declines, or security concerns. This finding aligns with the volatility observed in cryptocurrency markets, where negative sentiment often drives panic selling, leading to significant price drops. Such negative narratives typically focus on risks or challenges faced by the market, such as government regulations or security breaches. Several studies have pointed out that negative sentiment, especially around regulatory concerns, can exacerbate market volatility [9], [12].

The comparison between the proportions of positive, neutral, and negative sentiment is consistent with previous studies, which found that positive sentiment tends to dominate discussions around cryptocurrency, especially during periods of market growth or when announcements of significant technological advancements are made [2]. However, negative sentiment remains influential, especially during market corrections or when regulatory changes or price declines are imminent. As noted by Kirilenko & Stepchenkova [3], such sentiment-driven fluctuations are crucial in understanding cryptocurrency market dynamics. The sentiment data obtained through NLP was then used as input in the Structural Equation Modeling (SEM-PLS) framework to model the relationship between market sentiment and cryptocurrency price volatility. This model will examine how positive sentiment may help reduce price volatility, while negative sentiment may contribute to increased market instability [9],[40].

SEM Analysis: Outer and Inner Models

In this study, *Structural Equation Modeling-Partial Least Squares* (SEM-PLS) was used to analyze the relationship between market sentiment and cryptocurrency price volatility. The model includes testing the outer model and the inner model to evaluate the reliability, validity of the construct, and the relationship between the latent variables.

Outer Model Test

The outer model test aims to test the reliability of the indicator and the validity of the construct, using the Composite Reliability (CR) and Average Variance Extracted (AVE) metrics:

Tabel 3. Outer Model Test

Relationship	Path Coefficient	p-value	f-square	R-square
Positive Sentiment → Volatility	0.45	0.001	0.3	0.55
Negative Sentiment → Volatility	-0.3	0.003	0.25	0.55
Neutral Sentiment → Volatility	0.05	0.456	0.05	0.55

Source: data, processed (2024)

The outer model test is crucial in establishing the reliability and validity of the constructs used in the research. Composite Reliability (CR) and Average Variance Extracted (AVE) are the key indicators used to assess whether the indicators are consistent and whether the constructs adequately represent the data. The results of the outer model test indicate that the constructs used in this study, such as Positive Sentiment, Negative Sentiment, and Price Volatility, exhibit excellent reliability (all CR values exceed 0.7) and validity (all AVE values are above 0.5). This provides a strong foundation for further analysis using these constructs. Specifically, the higher CR for Negative Sentiment and Price Volatility suggests that these variables are particularly well-defined and consistent within the context of the

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research. Moreover, the higher Path Coefficient for Positive Sentiment (0.45) compared to Negative Sentiment (-0.3) reveals a critical finding: optimistic market sentiment is a stronger driver of price volatility than negative sentiment. This finding is consistent with established theories that positive news and sentiments tend to fuel speculation and erratic market movements, while negative sentiment often leads to caution and risk-averse behavior.

Inner Model Test

The inner model test evaluates the structural relationships between the latent variables, focusing on how sentiment influences cryptocurrency price volatility. It also checks the overall goodness of fit of the inner model by examining how well the variables align with the theoretical framework:

Table 4. Inner Model Test

Latent Variable	Composite Reliability (CR)	AVE	Description
Positive Sentiment	0.88	0.65	Valid
Negative Sentiment	0.91	0.72	Valid
Neutral Sentiment	0.84	0.6	Valid
Price Volatility	0.89	0.66	Valid

Source: data, processed (2024)

The results of the inner model test suggest that positive sentiment is the most significant driver of cryptocurrency price volatility, which is in line with prior research indicating that optimism in the market can often lead to speculative bubbles and increased market fluctuations [6]. The stronger relationship between positive sentiment and volatility (with a CR of 0.88 and AVE of 0.65) compared to negative sentiment points to the market's tendency to react more intensely to positive news and expectations. Conversely, negative sentiment plays a stabilizing role, as its path coefficient indicates a negative but significant

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relationship with volatility. This suggests that when negative sentiment predominates, the market becomes less volatile, possibly because investors adopt more cautious strategies, leading to less speculative trading and price fluctuations. On the other hand, neutral sentiment, with a minimal and non-significant impact on volatility, reinforces the idea that market indifference or lack of clear direction results in a stable environment. This highlights that neutral or informational sentiment, without any clear positive or negative bias, has little power to move markets.

SEM-PLS Test

The SEM-PLS test results listed in Table 4 below show the relationship between market sentiment and cryptocurrency price volatility, as well as the influence of control variables such as Layer-1, Layer-2, DeFi, RWA, DePIN, and Special Computing. The SEM-PLS model was used to test the strength and direction of the relationship between the latent variable and the dependent variable in this study, the following are the results:

Table 5.SEM-PLS Test

Variable	Path Coefficient	p-value	Description
Positive Sentiment → Volatility	0.45	0.001	Significant (Positive)
Neutral Sentiment → Volatility	0.05	0.456	Not Significant
Negative Sentiment → Volatility	-0.3	0.003	Significant (Negative)
Layer-1 → Volatility	-0.25	0.015	Significant (Negative)
Layer-2 → Volatility	0.4	0.002	Significant (Positive)
DeFi → Volatility	0.55	0.001	Significant (Positive)
RWA → Volatility	0.1	0.234	Not Significant
DePIN → Volatility	0.08	0.345	Not Significant
Special Computing → Volatility	0.48	0.004	Significant (Positive)

Source: data, processed (2024)

The SEM-PLS test results underscore the significant role that positive sentiment plays in driving cryptocurrency volatility. The high path coefficient (0.45) and its statistical significance (p-value = 0.001) demonstrate that when the market sentiment is positive, it fosters speculative behavior that increases volatility. This aligns with previous studies that have emphasized the role of positive market sentiment in fueling price bubbles and speculative cycles in the cryptocurrency market [9][23]. Conversely, negative sentiment exhibits a negative impact on volatility (Path Coefficient = -0.3, p-value = 0.003), signaling that negative market sentiment tends to reduce speculative behavior, thereby stabilizing prices. The finding that negative sentiment dampens volatility supports the theory that market pessimism often leads to more cautious investment behavior, reducing the level of price fluctuations and contributing to overall market stability.

Interestingly, Layer-2 solutions, DeFi, and Special Computing significantly increase volatility (Path Coefficients of 0.4, 0.55, and 0.48, respectively), which can be attributed to the speculative nature of these emerging technologies. These factors represent newer, less regulated, and more volatile segments of the cryptocurrency ecosystem, where innovation and untested markets often lead to greater uncertainty and price swings. Layer-2 technologies, which are designed to scale existing blockchain solutions, tend to have amplified effects on volatility due to their complex and experimental nature.

Layer-1, on the other hand, demonstrates a negative relationship with volatility (Path Coefficient = -0.25, p-value = 0.015), suggesting that more established, stable blockchain platforms like Ethereum or Bitcoin contribute to price stabilization. This finding reflects the greater predictability and lower speculative risk associated with more established cryptocurrencies compared to newer, less-tested alternatives. Other control variables, such as RWA and DePIN, did not exhibit significant effects on volatility, suggesting that while

these factors may influence market behavior, they do not have as direct or powerful an impact as sentiment or blockchain innovation. The SEM-PLS analysis reinforces the importance of sentiment in shaping cryptocurrency price volatility. Positive sentiment emerges as a key driver of volatility, while negative sentiment helps to stabilize the market. Furthermore, emerging technologies, such as Layer-2 solutions, DeFi, and Special Computing, contribute to greater volatility, which reflects their speculative nature and the uncertainty surrounding them. Established blockchain platforms, represented by Layer-1, provide more stability, reducing the magnitude of price swings.

Discussion

Positive Sentiment Increases Cryptocurrency Price Volatility

Positive sentiment significantly increases cryptocurrency price volatility, as shown by a path coefficient of 0.45 and a p-value of 0.001. Optimistic narratives, including technological advancements, strategic partnerships, and the broad adoption of blockchain technologies, drive speculative behavior in the market. These narratives trigger FOMO (Fear of Missing Out) among investors, leading to aggressive increases in trading volumes and market liquidity. As demand surges, prices experience rapid fluctuations. Shiller emphasizes that optimistic narratives exhibit a contagious quality, collectively enhancing market enthusiasm. This heightened optimism often leads to mispriced assets as investors disregard long-term risks [41].

Announcements of new technologies or strategic partnerships further amplify speculative activity, particularly in innovative blockchain sectors such as Layer-2 and DeFi. Chen et al. and Roberts & Wilson demonstrate that breakthroughs like Ethereum 2.0 upgrades or Polygon's integration with DeFi ecosystems often spark significant market activity [42],[26]. Garcia et al. empirically show that Ethereum trading volumes frequently spike following announcements of new collaborations or technological integrations, driving

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heightened volatility [43]. Similarly, Lin et al. highlight how decentralized computing innovations attract large speculative interest, exacerbating price instability [35]. Moreover, blockchain innovations such as Solana and Polygon have proven to be magnets for speculative investments. Li et al. reveal that these projects captivate investor attention due to their ability to solve scalability issues in blockchain networks [44]. Narratives emphasizing reduced costs and faster transaction speeds generate disproportionate market reactions. Patel and Shah [45] support this, noting that periods of optimism result in liquidity inflows followed by sharp price reversals, further destabilizing the market.

The volatility is exacerbated by the activity of high-frequency traders (HFTs). Huang et al. find that HFTs utilize sentiment-driven algorithms to capitalize on positive narratives swiftly, driving trading volumes within seconds [46]. This rapid trading intensifies price volatility by exploiting imbalances between supply and demand. Zhao et al. [47] confirm that such algorithmic trading amplifies market reactions to optimistic news, especially in illiquid markets like DeFi or Layer-2 tokens. Finally, positive sentiment often creates price bubbles, followed by extreme volatility when these bubbles burst. Kumar and Arora [48] observe that markets dominated by positive sentiment frequently develop unrealistic expectations about asset performance. When these expectations are not met, significant price corrections ensue, leading to severe volatility. Deng et al. [49] further demonstrate that positive sentiment around new projects, such as DeFi tokens, often exacerbates volatility due to a lack of strong fundamentals supporting their inflated valuations.

Negative Sentiment Lowers Cryptocurrency Price Volatility

Negative sentiment has a significant stabilizing effect on cryptocurrency price volatility, as evidenced by a path coefficient of -0.30 and a p-value of 0.003. This relationship highlights a key market behavior in which adverse sentiment, such as regulatory concerns, security risks, and market downturns, leads to more cautious investor behavior.

Fear-driven narratives tend to reduce speculative activity, suppressing excessive market swings and promoting stability. This negative relationship suggests that, in the context of cryptocurrency markets, pessimism or adverse news can induce a self-regulating effect. As investors internalize fears about external shocks be it from regulatory crackdowns or technological failures they become more risk-averse. This leads to less speculative trading, contributing to lower volatility. This finding aligns with the broader concept of "*flight-to-safety*" in financial markets, where adverse news induces a shift towards lower-risk assets or a reduction in market activity. Urquhart [50] reinforces this idea, noting that negative sentiment often suppresses excessive market optimism, thus reducing speculative price movements. In the cryptocurrency market, where speculation plays a dominant role in price formation, this stabilizing effect is particularly pronounced.

Investor Prudence During Adverse Events

Research indicates that negative sentiment fosters investor prudence, prompting a more defensive market posture. According to Baker and Thompson [19], during times of heightened uncertainty, such as regulatory crackdowns or the revelation of financial frauds, investors often move towards safe-haven assets like stablecoins, thereby reducing their exposure to volatile cryptocurrencies. This shift toward safer assets during periods of negative sentiment reflects risk aversion behaviors that are characteristic of financial markets under duress. The decision to hold positions or shift toward stablecoins rather than actively trading cryptocurrencies during adverse periods plays a crucial role in mitigating volatility. As Deng et al. [49] observed, this investor behavior often leads to reduced trading volumes, resulting in less price action and thereby stabilizing the overall market. In the volatile cryptocurrency space, where speculative trading can amplify price swings, such defensive actions dampen the effects of negative sentiment. Furthermore, the tendency of investors to retreat during negative sentiment mirrors the principles of "herd behavior". When significant negative news circulates, a large portion of market participants tend to follow suit in risk

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aversion, leading to a collective reduction in market activity, thus stabilizing the prices in the short run.

Regulatory Impact on Volatility

Negative sentiment in the cryptocurrency market is often driven by regulatory news. Antonakakis et al. [51] and Zhang et al. [52] provide empirical evidence that stricter regulatory measures tend to reduce speculative behavior, ultimately leading to a reduction in market volatility. Interpretation: The regulatory landscape has a profound impact on cryptocurrency markets. Announcements related to regulatory crackdowns or changes in tax policies introduce uncertainty, causing traders to adopt a more conservative stance. The resulting uncertainty discourages impulsive trading, thus reducing speculative-driven volatility. Moreover, regulatory concerns often dampen investor confidence, especially in newer or less-established cryptocurrencies that may face the brunt of regulatory pressure. When investors fear that new projects might be subjected to stringent rules or even bans, they often choose to withdraw their investments or pause their trading activity. This behavior contributes to market stagnation, reducing volatility in the short term but potentially harming long-term market growth and innovation. Importantly, this regulatory-induced stability also highlights the dynamic equilibrium within cryptocurrency markets. While market sentiment can drive short-term volatility, regulatory frameworks have the power to temper these fluctuations and enforce a more stable market structure.

Decline in Liquidity During Negative Sentiment

Liquidity is a cornerstone of market volatility. During periods of negative sentiment, liquidity tends to dry up as fewer participants engage in trading, resulting in more stable price movements. Wong et al. [53] and Zhao et al. [47] confirm this observation, suggesting that negative sentiment often leads to liquidity contraction, which in turn reduces the

potential for large price swings. Interpretation: Reduced liquidity exacerbates the effects of market pessimism, as fewer buyers and sellers are willing to enter the market, even at discounted prices. This is especially true in cryptocurrency markets, where liquidity can be less consistent compared to traditional financial markets. As market participants retreat from the market, the spread between bid and ask prices increases, and the depth of the order book diminishes. Consequently, even a relatively small trade can have a disproportionate effect on price, further dampening speculative price movements. Therefore, reduced liquidity during negative sentiment periods can act as a buffer, preventing large-scale price fluctuations from occurring. Moreover, liquidity contraction during negative sentiment signals that traders are prioritizing capital preservation over speculative gains, which contributes to a less volatile market environment. This highlights the essential role of liquidity as a moderating force in maintaining market stability.

Risk Aversion in Emerging Cryptocurrency Projects

Emerging cryptocurrencies, which are more prone to speculative swings, show a marked decline in volatility during periods of negative sentiment. Martinez et al. [54] observe that fear-induced narratives often result in capital outflows from newer projects, with investors flocking to more established, stable assets such as Bitcoin or Ethereum. This behavior underscores the heightened risk sensitivity of cryptocurrency investors during periods of uncertainty. Emerging cryptocurrencies, by virtue of their novelty and often lack of liquidity, are more susceptible to market sentiment and therefore experience higher volatility in normal market conditions. However, during negative sentiment, investors quickly reduce their exposure to these assets, seeking safer havens. This behavior stabilizes the prices of newer cryptocurrencies as liquidity is withdrawn, shifting attention to well-established assets with a more stable outlook. In this way, the "*flight to quality*" behavior not only reduces volatility for smaller cryptocurrencies but also reinforces the dominance of established projects in the market. Additionally, the stabilizing effect of risk aversion in

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emerging markets is indicative of a broader trend toward market maturity. As cryptocurrencies become more established and their use cases broaden, the market may become less volatile in the face of negative sentiment, though this could also signal a loss of speculative appeal.

Media Amplification of Negative Sentiment

Media plays a pivotal role in disseminating narratives that amplify negative sentiment. Zhao et al. [47] and Li et al. [55] highlight that media-driven narratives, especially those focused on risks or failures in the cryptocurrency market, have a strong tendency to discourage speculative trading and encourage more cautious behavior. The role of media in shaping sentiment cannot be overstated. In the digital age, social media platforms and news outlets are primary sources of information for cryptocurrency investors. Negative news about security breaches, regulatory crackdowns, or market failures can quickly spread and shape the collective sentiment of the market. This media amplification creates a cycle of fear and caution, which reduces speculative behavior and leads to less aggressive price fluctuations. However, this amplification effect also underscores the vulnerability of cryptocurrency markets to external influences. Unlike traditional assets, which often have more established channels of regulation and reporting, cryptocurrencies are subject to the whims of media narratives. In times of negative sentiment, media-driven fear can serve as both a stabilizing force and a source of market inefficiency, as the overreaction to negative news may exacerbate the decline in prices beyond what fundamentals would suggest. In summary, negative sentiment in the cryptocurrency market plays a key role in stabilizing price volatility by curbing speculative behavior, promoting investor prudence, and reducing liquidity. However, its effects are multifaceted and depend on factors such as market maturity, investor risk tolerance, and the influence of media narratives. By understanding

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how negative sentiment moderates market behavior, investors, policymakers, and market participants can better navigate the volatility inherent in the cryptocurrency ecosystem.

Neutral Sentiment Is Insignificant

Neutral sentiment, characterized by a lack of emotional appeal, shows no significant impact on cryptocurrency price volatility, as reflected in a path coefficient of 0.05 and a p-value of 0.456. This lack of statistical significance suggests that neutral narratives—often factual or descriptive in nature—do not elicit the kind of emotional responses that drive market behavior. Unlike positive or negative sentiment, which spark investor action, neutral sentiment fails to induce significant changes in trading behavior, thus not influencing volatility. The insignificance of neutral sentiment in driving volatility underscores a key feature of cryptocurrency markets: the strong role of **emotion** and **speculation** in influencing price movements. Positive and negative sentiments provoke either optimism or caution, encouraging trading decisions based on expectations of profit or loss. Conversely, neutral sentiment lacks this emotional charge, resulting in minimal market reaction. This aligns with findings by Kim and Jung [56], who argue that neutral information, lacking in emotional triggers, doesn't provide a clear signal for action and, therefore, doesn't disrupt the status quo of market dynamics.

Lack of Emotional Engagement

Neutral sentiment, by nature, fails to engage the emotional faculties of investors, which are central to driving market behavior. As noted by Ghozali [14], market participants tend to ignore neutral narratives, perceiving them as merely background information. Unlike highly charged positive or negative sentiments, neutral information does not provoke strong feelings of optimism or fear, which are necessary to fuel speculative trading. The absence of emotional engagement is critical here. Emotional responses are integral to speculative behavior, which is a significant driver of cryptocurrency volatility. Zhao et al. [47] further

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affirm that neutral content, such as technical updates or system performance reports, typically does not alter investor expectations or prompt decisive action. Without this emotional engagement, the market remains largely apathetic to neutral sentiment, which reinforces its insignificance in triggering price swings. As such, neutral sentiment acts as a form of market inertia, where investor sentiment remains stable, and price movements follow predictable patterns without major fluctuations.

Informational Content and Market Reactions

Neutral sentiment is often composed of factual updates such as reports on technological upgrades or transaction volumes that do not influence speculative behavior. Martinez et al. [54] argue that such updates, while informative, are unlikely to trigger significant market responses. Patel and Shah [45] also emphasize that traders typically perceive neutral information as noise rather than actionable intelligence, meaning it does not instigate buying or selling decisions. This lack of market reaction can be explained by the nature of the information conveyed. While technical updates and system improvements are valuable for long-term development, they do not directly affect short-term price fluctuations or speculative behavior. Cryptocurrency markets, especially for established coins like Bitcoin or Ethereum, are more responsive to sentiment-driven news such as announcements about regulatory changes, market sentiment shifts, or macroeconomic factors rather than neutral, fact-based updates. Therefore, neutral sentiment is absorbed passively, contributing to a stable market but not influencing volatility.

Context-Dependent Nature of Neutral Sentiment

The impact of neutral sentiment is context-dependent, with its relevance increasing when paired with other significant market events. As noted by Deng et al. [49], neutral narratives may become more relevant in situations where they provide clarity or context

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amidst larger market movements, such as after major regulatory updates or during financial crises. This context-dependent nature suggests that neutral sentiment can gain importance in specific conditions, but in isolation, it fails to evoke significant market movement. Without a broader market context whether it be positive or negative neutral sentiment is perceived as transient, adding little value to investor decision making. Wong et al. [53] support this view, noting that markets often treat neutral sentiment as a passing phenomenon, which does not trigger large-scale reactions. In periods of market stability or uncertainty, neutral sentiment provides little directional guidance, which further reinforces its minimal role in influencing volatility.

Stability in Established Cryptocurrencies

Neutral sentiment is particularly ineffective in established cryptocurrencies like Bitcoin and Ethereum, where market participants already have sufficient information about long-term trends. Zhang et al. argue that mature markets are less responsive to neutral updates, as these assets are less prone to speculative overreaction [12]. Gupta et al. found that in stable market conditions, neutral narratives neither enhance nor reduce volatility, underscoring their limited impact on market dynamics [57]. In mature markets, where investors are already familiar with the established patterns and trends, neutral sentiment holds less power to change the equilibrium. These cryptocurrencies are less prone to speculative overreactions because investors' perceptions of their value are already grounded in a solid understanding of their technological foundations, use cases, and long-term prospects. Consequently, neutral sentiment in these assets often goes unnoticed, contributing to market stability. Investors in well-established cryptocurrencies tend to focus more on market-moving news (e.g., regulatory decisions, security breaches, or technological breakthroughs) rather than neutral updates, reinforcing the insignificance of neutral sentiment in these contexts.

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Market Psychology and Behavioral Inertia

The psychology of cryptocurrency investors further explains why neutral sentiment has a limited effect. According to Kumar and Arora [48], investors tend to ignore non-directional information, particularly in periods of market stability or uncertainty. This psychological inertia means that neutral narratives, which provide neither positive nor negative emotional triggers, are unlikely to inspire action. Li et al. [52] also confirm that neutral content does not alter investors' perceptions of risk or return, leaving market behavior largely unchanged. Interpretation: Market participants are driven by psychological factors, such as the need for certainty, clarity, and emotional engagement. Neutral sentiment, lacking these qualities, does not provide the impetus needed to spark speculative actions. The inertia created by neutral narratives ensures that market participants remain passive, contributing to stability in both trading volumes and price fluctuations. This reinforces the notion that neutral sentiment plays a minimal role in the decision-making process, ultimately contributing to the observed stability in the market during periods of informational neutrality. In conclusion, neutral sentiment in the cryptocurrency market has little to no impact on price volatility. Its lack of emotional appeal, passive role in investor decision-making, and dependence on external context explain its insignificance. Unlike positive or negative sentiment, which directly influence investor behavior through emotional triggers, neutral sentiment serves primarily as background noise that neither enhances nor mitigates volatility. Therefore, in the highly speculative environment of cryptocurrency markets, neutral information fails to drive significant changes, reinforcing the stability of the market during periods of informational neutrality.

Conclusion

The study found that positive sentiment significantly increases cryptocurrency price volatility, with a path *coefficient* of 0.45 and a p-value of 0.001, especially on speculative projects such as Layer-2 and DeFi. Negative sentiment has a negative influence on volatility, with a *coefficient* of -0.30 and a p-value of 0.003, which indicates that negative narratives dampen price fluctuations by reducing speculative activity. Neutral sentiment does not show a significant influence on volatility. Control variables such as Layer-1 provide a stabilizing effect (-0.25 coefficient), while Layer-2, DeFi, and Special Computing have been shown to increase volatility, with *coefficients* of 0.40, 0.55, and 0.48, respectively, indicating that these sectors are more vulnerable to changes in market sentiment. It is recommended that investors be more cautious of volatility triggered by positive sentiment, especially in speculative projects. Clearer regulatory policies and tighter scrutiny are needed to curb volatility due to negative sentiment, particularly in the DeFi and Layer-2 sectors. For further research, it is recommended to explore the influence of sentiment in other *cryptocurrency* projects as well as utilize more text analysis techniques to understand the impact of market narratives on price volatility.

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