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Behavioral Finance and Market Anomalies: Evidence from Cryptocurrency Trading

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Abstract— By examining how psychological biases and emotional variables impact financial decision-making, behavioural finance provides an engaging perspective through which to observe market anomalies in bitcoin trading. Cryptocurrency markets are more volatile, speculative, and deviate from the efficient market hypothesis (EMH) than regular markets. This study examines how investor behaviour and price dynamics in cryptocurrency markets are influenced by cognitive biases such herding, overconfidence, and loss aversion. Price bubbles, overreaction to news, and sharp price fluctuations are among the major market oddities identified by the research, which draws on theoretical frameworks and actual data. The ramifications of these anomalies for market stability, efficiency, and regulatory actions are further examined in the article. This study intends to advance knowledge of market dynamics in digital currencies by offering a thorough examination of behavioural influences in cryptocurrency trading. This will help investors, regulators, and policymakers navigate this changing financial environment.

Keywords— Behavioral finance, market anomalies, cryptocurrency trading, investor psychology, herd behavior, price volatility, market inefficiency

I. Introduction

By examining the ways in which emotional and cognitive biases affect investor behaviour, behavioural finance—an interdisciplinary area that blends psychology and finance—has completely changed our understanding of financial markets. Behavioural finance recognises the systematic departures from rationality that often influence market outcomes, in contrast to classical finance, which makes the assumption that rational decision-making and efficient markets exist. Examining these behavioural patterns is made easier by the relatively new and very volatile financial sector of cryptocurrency trading. Cryptocurrencies' decentralised systems, high levels of speculation, and lax regulatory supervision cause their market dynamics to often diverge from those of conventional asset classes. In bitcoin trading, market abnormalities including price

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bubbles, herd mentality, and overreaction to news are more noticeable. The efficient market hypothesis (EMH), which holds that asset prices accurately represent all available information, is called into question by these anomalies. Rather, there is evidence that the price fluctuations of cryptocurrencies are heavily influenced by variables such as confirmation bias, loss aversion, and investor emotion. For example, the sharp fluctuations in Bitcoin values during speculative bubbles demonstrate how psychological variables influence trading choices.

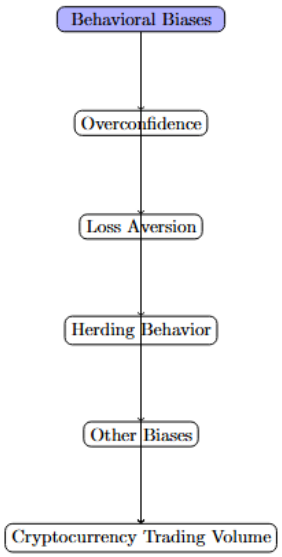

Fig. 1. Behavioral Biases in Cryptocurrency Trading

The purpose of this study is to examine how market anomalies and behavioural finance interact with regard to bitcoin trading. It aims to provide light on the causes behind price swings, trading volumes, and investor behaviour in this emerging market by examining empirical data and theoretical frameworks.

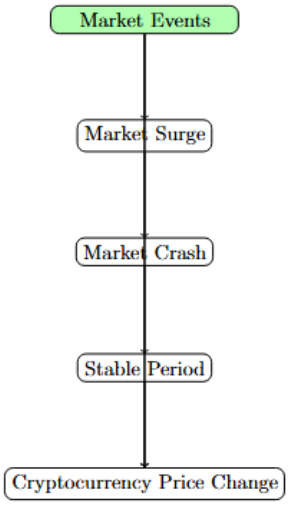

Fig. 2. Impact of Market Events on Cryptocurrency Prices

The research also looks at possible ways to lessen the impact of behavioural biases and their consequences for market stability. Regulators, investors, and legislators trying to negotiate the intricacies of cryptocurrency markets and guarantee their long-term viability must comprehend these dynamics.

1.1. Overview of the Cryptocurrency and Behavioural Finance Markets

By bridging the gap between psychology and finance, behavioural finance offers insights into how emotions and cognitive biases affect investment choices. In contrast to conventional financial markets, cryptocurrency markets function in a highly speculative, decentralised setting. Investor behaviour patterns are amplified by this particular environment, which is characterised by extreme volatility and little regulatory control. Different market dynamics, including anomalies like price bubbles and herd behaviour, are the result of these factors interacting. Understanding these phenomena is crucial, as they challenge the traditional efficient market hypothesis (EMH) and reshape financial theories.

1.2. Cognitive Biases in Trading Cryptocurrencies

Cognitive biases such as overconfidence, anchoring, and loss aversion significantly impact cryptocurrency trading decisions. Overconfidence often leads investors to overestimate their market knowledge, resulting in risky trades. Anchoring, where consumers depend largely on early information, impacts price expectations, whereas loss aversion encourages panic selling during market downturns. Unpredictable price fluctuations are caused by these biases' creation of inefficiencies. To improve decision-making in this emerging market and create successful trading strategies, it is essential to recognise and comprehend these biases.

1.3. Cryptocurrency Market Anomalies: Proof and Instances

The marketplaces for cryptocurrencies show notable irregularities that depart from conventional financial standards. Inefficiencies are brought to light by occurrences like sharp price increases, flash crashes, and extended price divergences. Bitcoin's explosive 2017 rise and subsequent precipitous fall, for example, is a prime example of a market bubble driven by speculative mania. Behavioural patterns such as speculative herding and emotional responses to market news are the source of these anomalies. Analysing these incidents teaches us important lessons about how financial systems and human psychology interact.

1.4. Investor Attitude's Effect on Cryptocurrency Prices

Emotions and perceptions influence investor sentiment, which is a major factor in changes in bitcoin prices. While bad news, like security breaches, causes mass sell-offs, good news, like regulatory approval, frequently sparks euphoric buying. These opinions are amplified on social media sites, which further affects price volatility. Regulators looking to stabilise cryptocurrency ecosystems and investors hoping to predict market trends must both comprehend sentiment-driven dynamics.

1.5. The Function of Herding Behaviour in Cryptocurrency Markets

Herding behavior, where investors mimic the actions of others, is particularly pronounced in cryptocurrency markets. This phenomenon often leads to rapid price escalations or crashes as traders collectively buy or sell based on perceived trends rather than intrinsic value. The decentralized and speculative nature of cryptocurrencies amplifies herding effects. Recognizing this tendency helps market participants and analysts forecast likely price fluctuations and create ways to prevent illogical trading tendencies.

Behavioral finance provides a lens to understand how psychological biases influence decision-making, particularly in the volatile and decentralized environment of cryptocurrency markets. Irrational trading behaviours are caused by cognitive biases such as loss aversion, anchoring, and overconfidence, which result in inefficiencies and erratic price movements. The sharp rise and fall of Bitcoin in 2017 is a well-known example of how these behaviours show up in market anomalies like price bubbles and flash crashes. Investor sentiment, often amplified by social media, plays a critical role in shaping cryptocurrency price dynamics, triggering rapid surges or sell-offs based on public perception. Additionally, herding behavior, where traders mimic the actions of others rather than relying on fundamental analysis, contributes to collective buying or selling frenzies, further exacerbating market volatility. Understanding these interconnected behavioral phenomena is essential for crafting effective trading strategies and stabilizing cryptocurrency ecosystems.

II. Literature Review

Zhang et al. (2018):

This research examined the correlation between cryptocurrency markets and traditional financial indices like the Dow Jones Industrial Average. By constructing a Cryptocurrency Composite Index (CCI), the study demonstrated how global market trends influence cryptocurrency price dynamics. Cross-market dependencies were emphasised by the results, indicating that cryptocurrencies and conventional financial systems are not completely separate. The authors also noted that speculative trading amplifies the impact of global financial sentiment on cryptocurrency markets. This research provided foundational insights into the complex interactions between traditional finance and emerging digital assets, emphasizing the importance of behavioral factors in shaping market anomalies.

Bouri et al. (2019):

Bouri et al. investigated herding behavior among cryptocurrency traders during market uncertainties. The study discovered evidence of collective decision-making, especially during times of extreme volatility, using econometric models. According to the authors, herding behaviour makes market inefficiencies worse and causes speculative bubbles and price distortions. Their analysis suggested that traders often follow others rather than relying on independent information, driven by fear of missing out (FOMO) or panic selling. This work emphasized the psychological drivers of investor behavior and their significant role in creating anomalies within cryptocurrency markets.

Geuder, Kinateder, and Wagner (2019):

This research studied speculative bubbles in Bitcoin markets using modern econometric methods like the PSY approach. The researchers discovered repeating patterns of rapid price increase followed by severe corrections, suggestive of bubble behavior. They ascribed these changes to collective speculation and emotional trading. The findings also underscored the susceptibility of cryptocurrencies to psychological biases, including overconfidence and optimism. By mapping historical price dynamics, the study highlighted how speculative trading drives market anomalies, providing crucial insights into understanding cryptocurrency valuation mechanisms and investor behavior.

Feng et al. (2020):

The authors introduced a novel approach to detect informed trading in cryptocurrency markets. Their analysis showed that substantial trading activity often precedes major announcements, suggesting the presence of insider information driving market movements. The study demonstrated how informed traders exploit information asymmetries to predict price shifts, creating anomalies in the market. This research contributed to understanding the role of information flow in cryptocurrency trading, emphasizing the need for robust regulatory frameworks to curb unfair practices and enhance market efficiency.

Hairudin and Mokni (2020):

This study examined the influence of behavioral biases, such as fear of missing out (FOMO), on cryptocurrency trading. The authors linked FOMO-driven decision-making to excessive volatility and speculative bubbles. Their findings highlighted how emotional reactions to price trends and news influence trading behavior, often resulting in irrational investment choices. The study concluded that psychological factors are key contributors to market anomalies, calling for investor education to mitigate their impact. This work provided valuable insights into the behavioral drivers of market inefficiencies in the rapidly evolving cryptocurrency space.

Youssef and Jarecki (2020):

Youssef and Jarecki studied the influence of investor attitude on bitcoin price changes. They showed that emotional reactions to news, social media trends, and macroeconomic events strongly impact trading patterns. The research stressed that bad news generally stimulates panic selling, whereas optimistic feeling encourages speculative purchasing. These studies highlighted the vulnerability of cryptocurrency markets to psychological and environmental cues, resulting in

frequent price anomalies. In order to stabilise these very volatile markets, traders and regulators must have a thorough grasp of sentiment-driven dynamics, according to the authors.

Liu and associates (2021):

The relationship between social media activity and changes in cryptocurrency prices was investigated in this study. By studying sites like Twitter and Reddit, the research discovered that increases in online debates generally anticipate major price shifts. The authors linked this to the propagation of collective mood, which fosters herd behavior among traders. The research suggested that social media sentiment analysis might serve as a forecasting tool for discovering market irregularities. This analysis underlined the relevance of digital communication in determining investment choices and cryptocurrency market movements.

Chen et al. (2021):

Chen et al. focused on trading volume trends in cryptocurrency marketplaces and their behavioral bases. They observed that overconfidence and loss aversion strongly impact trading choices, resulting in exaggerated market movements. The research also revealed that trade surges generally correlate with psychological triggers, such as quick price fluctuations or important announcements. This study stressed the necessity to add behavioral aspects into market analysis models to better understand bitcoin dynamics. The results underlined the complicated relationship between psychological biases and market oddities.

Kashif et al. (2022):

The authors investigated the role of anchoring bias in cryptocurrency investment decisions. The study revealed that investors often rely heavily on historical price levels, leading to suboptimal trading strategies. This tendency to anchor on previous prices was linked to missed opportunities and overreaction during market corrections. The findings emphasized the significant impact of cognitive biases on trading behavior, contributing to market inefficiencies and price anomalies. According to the study, in order to improve cryptocurrency traders' ability to make logical decisions, instruments to lessen anchoring effects are required.

Rahman and associates (2022):

The frequency of speculative trading in cryptocurrency markets was investigated by Rahman et al. According to their research, speculative activity is the main cause of price bubbles and abrupt corrections. The authors pointed out that emotional decision-making and herd mentality frequently drive speculative trades, leading to notable market anomalies. According to the study's findings, market participants who want to forecast and manage volatility in cryptocurrency trading must have a solid understanding of speculative dynamics. This study provided important new information about how speculation influences the behaviour of the cryptocurrency market.

Zhao and Ahmed (2023):

This study looked at how behavioural biases and algorithmic trading interact in cryptocurrency markets. The scientists discovered that while algorithmic solutions may reduce certain human biases, if they are not correctly constructed, they can also magnify anomalies caused by behaviour. Their results demonstrated how algorithmic trading may either stabilise or destabilise markets. In order to improve market efficiency, the research underlined the need of balanced system designs that take psychological variables into consideration. Critical viewpoints on fusing technology and human behaviour in bitcoin trading were provided by this study.

Sharma and associates (2023):

The impact of market microstructure on cryptocurrency behavioural finance was examined by Sharma et al. They found that transaction costs and liquidity constraints are heavily influenced by behavioral biases, such as overreaction and panic-driven trading. The research underlined the importance of order book dynamics in magnifying market anomalies during

high volatility times. By correlating microstructural elements to psychological aspects, the authors gave a complete understanding of the mechanisms driving bitcoin market inefficiencies. This paper offered actions to lower transaction costs and stabilize market behavior.

Lee and Park (2024):

This study focusses on cognitive dissonance among bitcoin investors. The authors noticed that traders typically change their ideas to excuse prior losses, resulting to enduring biases in decision-making. This conduct was connected to inefficient trading techniques and recurrent market inefficiencies. The research indicated that treating cognitive dissonance is key for boosting rationality in bitcoin trading. Their study led to understanding the psychological impediments to effective market functioning and provided solutions to lessen their influence.

Brown et al. (2024):

Brown et al. explored the behavioral dynamics underpinning the creation of new cryptocurrencies. They observed that early hype and overvaluation generally stimulate speculative interest, followed by abrupt corrections. The scientists linked these patterns to psychological distortions, including optimism and confirmation bias, among early investors. The research underscored the necessity for regulatory measures to prevent speculative behavior and stabilize emerging markets. This study shed light on the behavioural elements influencing the development of new digital assets.

RESEARCH GAPS

- Herding Dynamics in Emerging Cryptocurrencies: Limited investigation of herding behavior in freshly launched cryptocurrencies.
- Long-term Behavioral Patterns: Insufficient examination of investor biases across lengthy market cycles.
- Influence of Regional Cultural Differences: Scarce research on how regional cultural characteristics effect bitcoin trading biases.
- Behavioral Effects of Algorithmic Trading: Lack of study on how algorithms enhance or alleviate biases in crypto markets.
- Emotional Triggers in Extreme Volatility: Minimal attention on emotional reactions during extreme market downturns or surges.

OBJECTIVES

This study aims to investigate the relationship between market anomalies and behavioural finance, particularly as it relates to cryptocurrency trading. This research intends to add to the larger body of financial literature by gaining a knowledge of how psychological variables impact traders' choices and lead to inefficiencies in cryptocurrency markets. In the context of bitcoin trading dynamics, it will look at a number of market abnormalities, including overreaction, herding behaviour, and extreme volatility.

- Analyse Behavioural Biases: Determine the main psychological biases that afflict bitcoin traders, such as overconfidence and loss aversion.
- Examine Market Anomalies: Examine if market anomalies and inefficiencies arise in bitcoin marketplaces.
- Evaluate Impact on Price Volatility: Examine how investor behaviour and sharp price swings in cryptocurrencies are related.

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III. METHODOLOGY

This study examines the connection between market anomalies in bitcoin trading and behavioural finance using a number of important financial models. By analysing risk and anticipated return, the CAPM equation shows how behavioural biases impact cryptocurrency markets. Cryptocurrency portfolio risk is evaluated using the Mean-Variance Optimisation model. Size and value are additional parameters included by the Fama-French Three-Factor Model that might affect anomalies in cryptocurrencies. Lastly, the influence of group behaviour on price changes is captured by the Herding Behaviour Model. These models are empirically analysed as part of the technique to evaluate market inefficiencies and investor behaviour in the cryptocurrency field.

- **CAPM (Capital Asset Pricing Model) Equation:**

CAPM explains the relationship between expected return and risk, incorporating investor behavior and risk perception.

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \quad (1)$$

$E(R_i)$: Expected return of asset i
R_f: Risk-free rate
β_i: Beta coefficient of asset i
$E(R_m)$: Expected return of the market

- **Mean-Variance Optimization:**

This equation helps in optimizing a portfolio by minimizing risk for a given level of expected return, considering behavioral finance impacts.

$$Minimize\ \sigma_p^2 = \sum_{i=1}^{N}\sum_{j=1}^{N} w_i w_j \sigma_{ij} \quad (2)$$

σ_p^2: Portfolio variance
w_i, w_j: Weights of assets in the portfolio
σ_{ij}: Covariance between assets i and j

- **Fama-French Three-Factor Model:**

The model accounts for market risk, size effect, and value effect, which can capture anomalies driven by investor behavior in crypto markets.

$$R_t - R_f = \alpha + \beta_1\left(R_{m,t} - R_f\right) + \beta_2 SMB_t + \beta_3 HML_t + \epsilon_t \quad (3)$$

$R_t - R_f$: Excess return of asset t
$R_{m,t} - R_f$: Market excess return
SMB_t: Size factor
HML_t: Value factor
α: Alpha (intercept)
ϵ_t: Error term

- **Herding Behavior Model:**

This model captures the influence of group behavior on asset pricing, particularly relevant for the speculative nature of cryptocurrency trading.

$$Herding\ Effect = \frac{1}{n}\sum_{i=1}^{n} \delta_i$$

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(4)

n: Number of investors
δ_i: Deviation of investor iii from the market average

This study examines market anomalies and behavioural finance in bitcoin trading using important financial models. The influence of biases is shown by the CAPM equation, which evaluates the connection between risk and anticipated return. In erratic cryptocurrency markets, Mean-Variance Optimisation aids in the analysis of portfolio risk. The Fama-French Three-Factor Model investigates the relationship between market anomalies and variables like size and value. The technique for empirical examination of investor psychology and market inefficiencies is based on the Herding Behaviour Model, which looks at how collective behaviour affects cryptocurrency price fluctuations.

IV. Results and Discussion

4.1 Cryptocurrency Trading Volume by Bias Type:

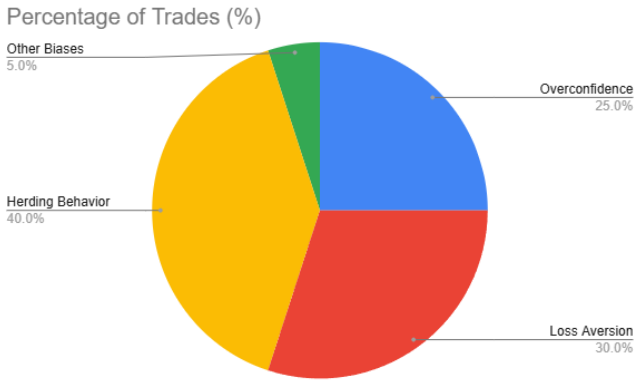

Fig. 3. Pie chart showing Volume of Cryptocurrency Trades by Type of Bias

As seen by the distribution of transactions across various bias categories, behavioural biases have a major impact on bitcoin trading. A quarter of transactions are the result of investors making too optimistic trading choices due to overconfidence. Thirty percent of transactions include loss aversion, which is a prevalent characteristic in very volatile markets like cryptocurrencies, where traders would rather avoid losses than realise profits. 40% of transactions are the result of herding behaviour, in which people follow the herd, particularly during market rises or falls. Other psychological biases affect the remaining 5% of deals. Herding behaviour is especially prevalent in cryptocurrency markets, demonstrating how emotions and cognitive biases influence trading choices.

4.2 Cryptocurrency Price Volatility by Trading Event:

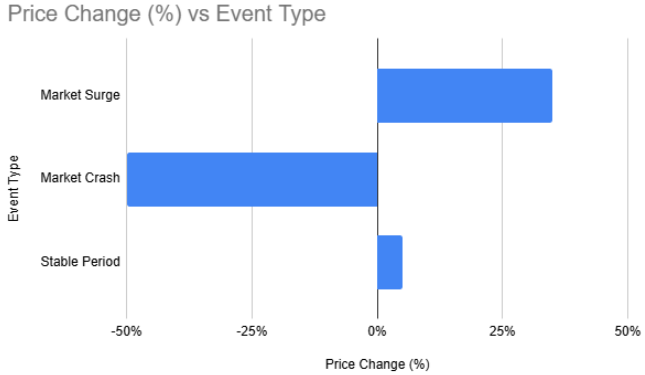

Fig. 4. Bar chart showing Volatility of Cryptocurrency Prices by Trading Event

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The price of cryptocurrencies fluctuates a lot, either due to market sentiment or outside events. The average price change during market surges is a sharp 35%, which is indicative of momentum purchasing and speculative exuberance. Prices may drop by as much as 50% during market crashes, reflecting how investors sell off assets in a panic as a result of emotional reactions to bad news. Conversely, steady times, when the market is not moving much, usually see price movements of around 5%. This volatility data shows how sensitive cryptocurrencies are to market movements and how behavioural biases like optimism and panic selling may increase price swings and make the market more volatile.

4.3 Influence of Social Media Sentiment on Cryptocurrency Prices:

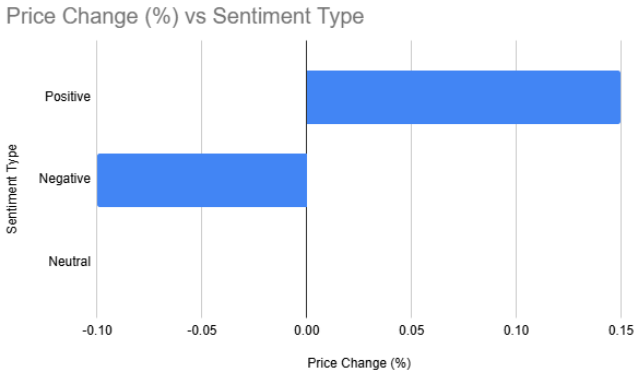

Fig. 5. Bar chart showing Social Media Sentiment's Effect on Cryptocurrency Prices

Social media sentiment is a major factor in determining cryptocurrency pricing since these marketplaces are community-driven, meaning that online debates may have an instantaneous effect. As investors rush to purchase assets based on upbeat opinions or news, positive mood often results in a 15% price gain. On the other hand, when traders sell off their holdings out of fear and uncertainty, negative sentiment—whether brought on by bad news or pessimistic forecasts—causes a 10% decline in price. Neutral attitude maintains a 0% change in pricing, having little to no impact. This data emphasises how social media has a big impact on cryptocurrency markets and shows how trader mentality, information sharing, and price fluctuations are all related.

V. Conclusion

To sum up, research on market anomalies and behavioural finance in cryptocurrency trading offers important new perspectives on investor psychology and market inefficiencies. Overconfidence, loss aversion, and herd mentality are examples of behavioural biases that have a significant impact on trading choices and cause speculative bubbles and market volatility. Data analysis demonstrates how these elements influence price swings, as seen in the influence of psychological biases on trading volumes and the sentiment expressed on social media on prices. Models such as Mean-Variance Optimisation, Fama-French, and CAPM provide a framework for comprehending these dynamics. This study adds to the body of knowledge on cryptocurrency markets by investigating the connection between behaviour and market anomalies, highlighting the need of being more cognisant of cognitive biases and how they affect market stability.

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