

# IMPACT OF SOCIAL MEDIA ON CRYPTOCURRENCY INVESTING DECISIONS – A BEHAVIORAL FINANCE PERSPECTIVE

Khanh DN, Hien NTT and Danh LTM

*Department of Multimedia Communications, FPT University, Ho Chi Minh City, Vietnam*

---

**Abstract:** In Vietnam, many people are investing in cryptocurrency due to the hype on social media and Bitcoin's rapid growth. However, new investors often lack the necessary financial knowledge and skills to make wise decisions during times of extreme market volatility. This is where Behavioral Finance comes in. This field of study examines how traders and investors expose themselves to cognitive biases, leading to inefficiencies and anomalies in financial markets. To better understand the behavior and decision-making processes of cryptocurrency investors on social media, this research paper will use data mining and text-based analysis along with behavioral finance theory. By analyzing tweets, on Twitter related to cryptocurrency using Orange 3, we hope to uncover how investors react to information they receive from their peers and the market in general. This will provide guidance and essential information to help investors make wiser decisions and avoid emotional investing behavior. The implications of our findings will be especially helpful for short-term investors who need to gain knowledge and skills to navigate the market. Our research will also show that the principles of cryptocurrency investing do not necessarily follow traditional finance principles.

**Keywords:** Cryptocurrency, Bitcoin, social media, herding theory, prospect theory, heuristic theory, LUNA, Twitter

---

## Introduction

The recent strong volatility in the financial market, especially after the COVID-19 pandemic (Seungho Baek, Sunil K, Mohanty, Mina Glambosky ,2020), has made investors look out for new opportunities. Apart from traditional finance products, such as gold, stocks, bonds or real estate, the cryptocurrency market is a new platform that has gained a lot of investors attention, as well as institutions, as a good addition to their portfolio (Kristoufek, 2015; Khan et al, 2020)

From the past, Bitcoin prices have had price changes that are similar to a “financial bubble” . (Garcia et al, 2014), suggested that Bitcoin is considered a “financial bubble” due to the deviations between Bitcoin's intrinsic value and its exchange rate. It takes only a minor amount



of overreactions from investors to trigger an aggregation of information. Since the cryptocurrency market is filled with inexperienced traders, their reaction can cause a “bubble” effect for Bitcoin prices. Kristoufek (2015) has recognized several behavioral factors that cause the Bitcoin prices to move unexpectedly, including imitation viral, current trends and herding behavior. Because of this, irrational investors and traders are being affected by behavioral factors such as: emotion, heuristics (CFA Institute, 2020)

Based on the researcher's actual experience, the cryptocurrency market often appears and is frequently discussed frequently on social networking platforms such as Twitter, Facebook, Reddit and Telegram (Tiran Rothman, Chen Yakar., 2019). This is an advantage but also a disadvantage for investors. While there is a lot of information, a lot of it is adapted from other individuals with many different psychological factors, leading to many different perspectives in the market. This can help investors plan their own directions better, but it can also make investors more susceptible to market information on social networks with unpredictable consequences in terms of investment.

Information about investment advice in the cryptocurrency market can be easily collected over different social media platforms. There is a great presence of irrational traders in the cryptocurrency market, which may partly imply an error in the probability assessment, which will lead to unpredictable fluctuations in the price of Bitcoin and market liquidity may also increase sharply (Rogojanu & Badea, 2014). Uncertainty, greater risk, a lack of control, and anonymity in the market will result from this.

In this research, the case of Terra Luna will be used, as a mean to concrete our hypotheses, such as whether investors are very likely to rely on any advice they found online before considering its credibility, Poor quality investment advice affects investment decisions, Investors are very likely to rely on any advice they found online before considering its credibility.

### ***Pre-understanding***

There are various possibilities that may be employed in research papers, and they all require the researcher to have expertise and knowledge, or both, in the intended topic of research. All research papers require explanation throughout the research process (William, 2007).

The researchers of this study is a students and his co-author in the major of Multimedia Communication of a University in Ho Chi Minh city, Vietnam. One of the researchers has had experience in the field of investment and trading in the cryptocurrency market. Since the experience and knowledge of the authors in this field is still very limited, this research paper

will be very little influenced by their previous knowledge, thereby preserving the purpose of the study. However, the design of this paper, and the analysis of the data, will be shaped by the author's perspective and what fits the purpose of the paper.

## **Literature review**

### ***Signpost***

The concept of this research paper is to point out the correlation of social media with the cryptocurrency market. In this research paper, the case of the Terra Luna stablecoin project will be discussed and applied as a case study to point out how social media sentiment reflects the psychology of investors.

### ***Introduction to cryptocurrency***

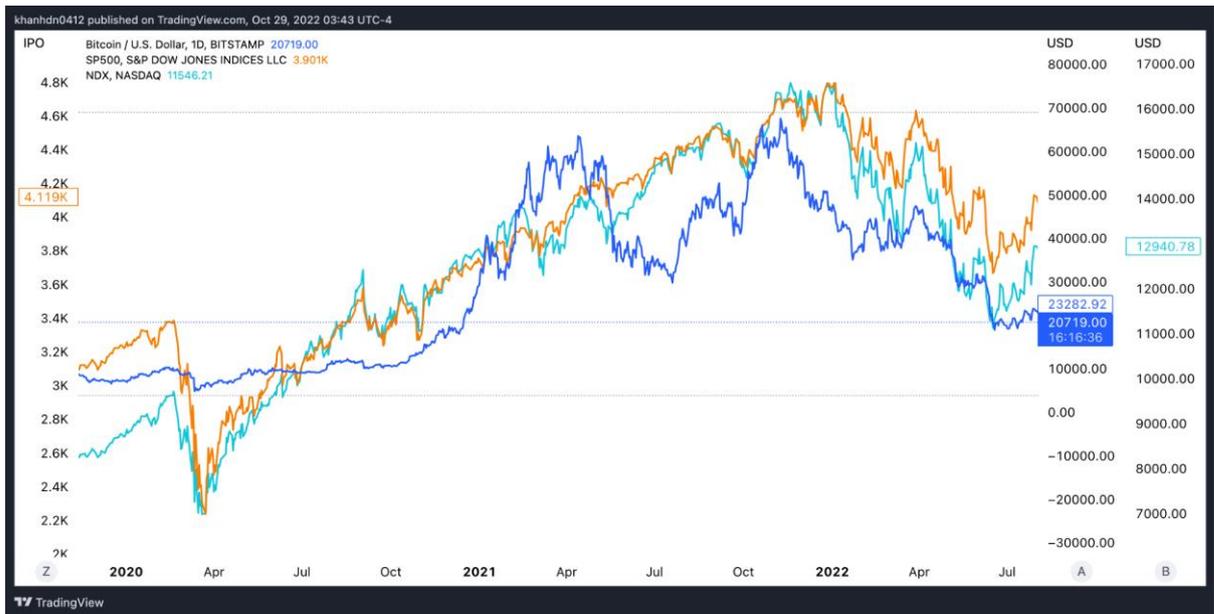
Over the past few years, the popularity of cryptocurrencies has gained significant ground. Cryptocurrencies transactions is often carried by a network and is secured by digital cryptographic technology. The first cryptocurrency product on the market to use public encryption for transactions is called Bitcoin. Every transaction will be recorded on the blockchain, which acts as a ledger, and the blockchain is a shared network of computers, where Bitcoin's database is evenly distributed (Böhme et al. 2015). Each Bitcoin transaction generates a challenging math challenge that must be solved in order for the "miners" to earn Bitcoin rewards (Kjaerland, Meland, Oust, and Yen, 2018).

In November 2021, the total market capitalization of cryptocurrency reached more than \$3 trillion, which is a huge step forward since its initial launch in 2009. A large contribution to such a huge leap in trading volume is COVID-19 as cryptocurrency trading platforms and products have accelerated during these times. While having a better economic background, the United States is not among the top of cryptocurrency adopting nations (Cryptohead, 2021)

### ***Correlation between stock market and cryptocurrency market***

There was increased interest as Bitcoin developed into an asset class. Investment firms and brokerages gained regulatory approval to offer investment options such as 401(k)s and ETFs linked to Bitcoin. This move was well-received by regulators and investors, who began to feel more comfortable with cryptocurrencies as traditional financial institutions began incorporating them into their offerings. This allowed investors to use familiar tools when investing in digital assets, leading to increased adoption of cryptocurrencies.

Between the end of 2021 and middle of 2022, the value of cryptocurrencies experienced fluctuations that were reminiscent of those seen in traditional stocks. The graph depicted below illustrates the price correlation of Bitcoin (BTC) in comparison to the S&P 500 (SPX) and Nasdaq 100 (NDX) during this time period. (Investopedia, 2022)



Correlation of BTC-USD spot price and SP500, Nasdaq 100 index (Chart: TradingView,2022)

### **Range of volatility**

Based on research by Mariana Durcheva and Pavel Tsankov (2019), the researchers had modeled 16 different networks one after another to show the similarity in the volatility of crypto products compared to stocks listed on the NASDAQ Stock Exchange\*. The obtained results are as follows:

The geometric structure of the networks built from cryptocurrency products is not much different from the geometry of the stock networks extracted from the data of the NASDAQ exchange.

The economic model of cryptocurrencies also has many correlations with stocks of the NASDAQ exchange

Cryptocurrency products with large market capitalization such as Bitcoin (BTC), Ethereum (ETH), Monero (XMR) have a very dense network of connections with stocks such as Microsoft (MSFT), Google (GOOGL). , Amazon (AMZN)



*Bitcoin price history chart and NASDAQ 100 IT stock average (Source: Reuters Refinitiv, Corporate Finance Institute)*

\*: Stocks that are used to build the networks includes: Google (GOOGL), Microsoft (MSFT), Amazon (AMZN)

### ***How products are traded***

One similarity between cryptocurrencies and stocks is the way in which they are bought or sold. Platforms like Robinhood, Wealthsimple or SoFi are trying to bridge the gap between digital and traditional assets. Users of these platforms can simultaneously purchase both cryptocurrencies and stocks on the same platform (CFI, 2022)

### ***Scams***

Similar to stocks, the cryptocurrency market also has many scam models with different large and small scales, the most common of which can be mentioned is the "Pump and Dump" scheme. By using social media to entice inexperienced investors into buying coins that are outright scams or an impersonation of a certain project, once the price has reached a certain level (Pumping Process), the scammer will not allow investors to sell and drain the liquidity pool, causing investors to lose everything (Dump Process).

Farhang Rouhi, JT Hamrick, Neil Gandal, Arghya Mukherjee, Marie Vasek, Amir Feder and Tyler Moore conducted a study in 2021. The result is that the vast majority of the above scam models appear on social networking channels such as Discord, Telegram and Twitter.

According to data from Chainalysis (2022), the total value of crypto assets coming from illicit addresses in 2021 is \$14 billion, up by \$7.8 billion from 2020.

### *Similarities of investors appearing in the market*

Despite the nascent nature of cryptocurrencies, more and more investors are coming from financial institutions, investing in areas such as digital assets, blockchain or DeFi (Decentralized Finance). These investors will have more specific requirements for transparency, liquidity and control over digital asset investments, which is a boon for the market.

And because of similarities between cryptocurrency assets and traditional finance assets, investors can diversify their portfolios by incorporate both traditional assets and digital assets, which can help maximize their returns. However, traditional finance investors should also acknowledges some of the additional factors when participating in this market are:

**Education and Research:** Gain a comprehensive understanding of cryptocurrencies, blockchain technology, and the dynamics of the cryptocurrency market. Educate yourself on key concepts, risks, and investment strategies specific to cryptocurrencies.

**Choose a Cryptocurrency Exchange:** Select a reputable cryptocurrency exchange that aligns with your requirements in terms of security, regulatory compliance, user experience, available cryptocurrencies, and trading features. Conduct due diligence to ensure the exchange has a good reputation and safeguards for investors.

**KYC and Account Setup:** Complete the necessary Know Your Customer (KYC) process and set up an account on the chosen cryptocurrency exchange. This typically involves verifying your identity and providing relevant documentation as required by the exchange.

**Secure Digital Wallet:** Set up a secure digital wallet to store your cryptocurrencies. Wallet options include hardware wallets, software wallets, or online wallets. Research the different wallet types and choose the one that suits your security preferences.

**Investment Strategy:** Develop an investment strategy that aligns with your financial goals, risk tolerance, and time horizon. Determine your investment allocation, entry and exit strategies, and risk management techniques. Consider factors such as diversification, long-term versus short-term investments, and periodic portfolio rebalancing.

Ongoing Monitoring and Research: Continuously monitor the cryptocurrency market, stay updated on industry news and regulatory developments, and conduct ongoing research to make informed investment decisions. Stay vigilant about cybersecurity best practices and be cautious of potential scams or fraudulent activities in the cryptocurrency space.

Some of the major investment funds in the crypto market include the Bitcoin hedge fund MicroStrategy, Grayscale Bitcoin Trust ETF, ProShare Bitcoin Strategy ETF, and many others.

*Correlation of Equity and Crypto market*

According to the International Monetary Fund (IMF) ‘s research, the movement between cryptocurrency and the equity market has become more correlated. Therefore, the intra-day changes of two major assets, Bitcoin and Ethereum, is about 4 to 8 times more correlated to some of the US main equity indices, such as S&P 500, Nasdaq 100 and Russell 2000. From 2020 to 2021, the price volatility correlation of TetherUS and US indices has increased significantly, from near-zero in 2017-2019, to 0.3 - 0.4 in 2020-2021. Additionally, Bitcoin and MSCI Index correlation has increased by four times between pre and post pandemic periods.

**Figure 3. Rising Crypto-Equity Correlations**

<b>a. Volatility correlations</b>				<b>b. Return correlations</b>			
Crypto	Equity Index	2017–19	2020–21	Crypto	Equity Index	2017–19	2020–21
BTC	S&P 500	0.11	0.46	BTC	S&P 500	0.01	0.36
	Nasdaq	0.09	0.46		Nasdaq	0.02	0.38
	Russell 2000	0.07	0.48		Russell 2000	0.03	0.36
	MSCI EM	0.12	0.48		MSCI EM	0.02	0.34
ETH	S&P 500	0.08	0.25	ETH	S&P 500	0.06	0.37
	Nasdaq	0.06	0.24		Nasdaq	0.07	0.38
	Russell 2000	0.03	0.25		Russell 2000	0.07	0.36
	MSCI EM	0.08	0.25		MSCI EM	0.10	0.36
TTH	S&P 500	-0.02	0.35	TTH	S&P 500	0.02	-0.10
	Nasdaq	-0.02	0.34		Nasdaq	0.02	-0.07
	Russell 2000	0.01	0.28		Russell 2000	0.06	-0.06
	MSCI EM	-0.01	0.31		MSCI EM	0.02	-0.08

Sources: CryptoCompare; Yahoo Finance; author’s calculations.

Notes: Correlations of returns and volatility are calculated using daily prices, excluding non-trading days, over the periods Jan 2017–Dec 2019 and Jan 2020–Nov 2021. Returns are defined in log difference terms, and volatility is based on intra-day prices. BTC = Bitcoin, ETH = Ether, TTH = Tether.

H1: The similarities between stocks and cryptocurrencies can help investors from these two fields easily communicate with each other to discuss and exchange information.

***Risk perception***

Humans encounter uncertain situations every day. Their frequent occurrence has led researchers to learn about how people perceive risk. Every day, we all struggle to take different kinds of risks, but all we can do is guess. The simple reason is that if we could capture uncertainty, we wouldn’t have to worry about risk factors either (Adams, 1995).

Risk, according to Rosa (2003), is an uncertain circumstance in which the value of the person (including the person) is at risk. This exemplifies the risk that ambiguity brings with it in all of its guises. Uncertainty is a key moderator of people's responses to circumstances with unclear outcomes in many behavioral and psychological theories. Essentially, uncertainty is a fundamental aspect of the human mind. It permeates every idea since there wouldn't be any if one's knowledge were absolute (Windschitl & Wells, 1996).

Osborne (2018) investigated how people and companies' attitudes toward technology are changing. This study examines a wide range of elements that affect market trust in cryptocurrencies, some of which include: security, data privacy, ease of use, knowledge gaps, and external agents like news or other people's opinions.

This document identifies the lack of knowledge, news, and opinions of others that have pervaded trust in cryptocurrencies. For this, social media elements will be analyzed, as they are the source of knowledge, news and opinions of others.

### ***Social Networks***

A social network is described as a networking tool where content, opinions, views, and multimedia products are widely shared. It facilitates relationships, connecting individuals and organizations with each other. Some of the famous websites that shape the face of social media include Twitter, Facebook and YouTube (Nair, 2011, p.165).

Another viewpoint holds that social networks have significance that goes beyond simple communication. According to the definition, it is "a trend where customers and companies connect in a space free from structure, discovery, or information flow. Because of its significance in organizational change, organizations respect this complex synthesis of sociology and technology (Nair, 2011, p.50).

Over the years, social networks have grown significantly, and hundreds of millions of people now use them. According to estimates, more than 500 million individuals utilize social media sites like Facebook and Twitter (Forbes, 2013, p.107).

Due to the different nature of social media from typical communication channels, as it is an information-rich communication channel, individuals with internet access can freely express their opinions on the activities of the Internet. businesses, decide to trade or share their predictions about the future price of a stock (Cade, 2018, p.65). Consumers implicitly

understand that they should choose large and reputable businesses, ultimately having to read through a lot of information received from many different sources to confirm (Zanon et al., 2019, p. 29).

Twitter is a commonly used social media platform where users can create an account and share their thoughts through short messages called "tweets". These tweets are limited to 140 characters and are quickly shared with the user's followers, making it an effective way to spread news and information. (Cade, 2018, p. 65).

### ***The link between social media and crypto investment environment***

Many investors think that a number of variables will interact to affect the market's direction. Investors frequently refer to the way the market is perceived as "market sentiment." Market sentiment reflects the general attitude of the financial markets and trader sentiment. It enables investors and traders to determine if a market, such as a stock or currency, is feeling upbeat or downbeat. (IG, n.d)

Investors in the financial markets understand that the information they perceive is valuable and will often gather information from publicly traded individuals/entities as it will help them make informed decisions. However, people with broad knowledge still often make wrong decisions, and will still have their own opinions that are contrary to the crowd and may also disagree with the values of other entities (Tetlock, 2015).

Retail and institutional investors are also increasingly focusing their attention on examining the remarks and viewpoints expressed on various social media platforms, because doing so can help them learn more about the market and market mood. However, they also have an impact on market sentiment because they have access to these platforms and communicate their ideas about the financial markets (Baker et al., 2017, p. 202-203). Because of this, more traders are now analyzing market mood to determine the performance of the market.

Moreover, because it is a "digital" market, the cryptocurrency market. Investors' and traders' decisions are greatly influenced by social media. The ability to reflect on their choices and use social media as a source of knowledge about the financial market in general and the cryptocurrency market in particular can aid them in this regard. This study can be utilized by lawmakers to create regulatory frameworks for social media since it can be used to deceive traders and investors.

Cryptocurrencies is a highly volatile asset class that is extremely sensitive to economic news released in the financial markets. Thereby, many investors and traders also often make decisions

in parallel with information spread across social networks. Reddit is a social media platform that includes many different large and small forums created, the name of each forum will have the prefix "r/", representing a topic. Cryptocurrency forums, for example r/Bitcoin, r/Cryptocurrency, r/Ethereum, and other cryptocurrency forums, are some of the many places where investors discuss and share their personal views on the market. In school, Telegram is also a large social channel often used for communication purposes, here many large and small discussion groups were created,

Social networks allow investors to quickly and easily access information and get advice from a variety of sources. With just a phone or a computer, regardless of experience, everyone can share their investment advice. As a result, the quality of information often fluctuates and is uneven across social networking platforms (Drake et al., 2017; Wang et al., 2015). However, advice from amateur investors often lacks predictive value (Wang et al., 2015), and relying on this information can be costly (Hackethal). et al., 2019).

To add to this research paper, the SEC has repeatedly warned about investors' reliance on poor value social media investment advice (SEC 2016, 2017a, 2018, 2020a, 2021). Despite the warning, there is little to no evidence to explain why so many investors still rely on poor advice on social media.

In Vietnam, the trend of crypto investment and adoption ranks 5th globally (TripleA, 2022). Young Vietnamese are very interested in this form of investment, with the hope of getting rich quickly despite the lack of legal support and high risks (VNExpress, 2021). However, in the social networking environment, where the cryptocurrency market is most noticed and mentioned. In addition to the uncontrolled and decentralized nature of the market, there have been numerous instances of sophisticated scams or poor quality crypto investment advice on social media platforms, these types of information are often lacking. inaccurate, incomplete or misleading. Social media can give a false impression of quantity or accuracy, making it appear that the investment is being widely anticipated when it is not. (SEC, 2022).

### ***Social networks and investor decisions***

Social networking platforms like Facebook, TikTok, YouTube, Twitter, Telegram, Reddit all have a lot of different personal opinions about the cryptocurrency market. Social networks are networking applications that allow users to create, share and exchange personal content (Kaplan & Haenlein, 2010). Many investors participate and use this advice in their investment work (Bernard, 2018; Bloomberg News, 2018; Hicks, 2018; LaMagna, 2018; Clor-Proell et al., 2020) . For example, the Coffee Crypto Facebook group with over 9,000 members, the Coin98

Insights group with over 120.9 thousand members, Rap Xiec Pho Wall chat group with 15,000 members, the Pho Tai Chinh (PTC) chat group with over 33 thousand members. These are all examples of the overwhelming response to this form of investment.

In addition to adding a new communication channel to the traditional form of information, social networking platforms aggregate information from a new source - other investors (Cade, 2018, Elliot et al., 2018a; Lee et al., 2015). Social networking platforms such as Seeking Alpha, StockTwits, and the other discussion forums mentioned above, allow users to provide information and investment advice, regardless of their knowledge of the business or product. The results show that it is not surprising that these platforms often have poor quality returns (Antweiler & Frank, 2004, Drake et al., 2017; Wang et al., 2015).

Seeking Alpha is considered the social media platform with the most poor quality investment advice (Chen et al., 2014; Drake et al., 2017). However, even on Seeking Alpha, where some content has predictive value, there is variation in the quality of the contents (Robinson, 2016; Wang et al., 2015). Furthermore, Bartov et al., (2018) found that even though tweets refer to predicting future earnings of businesses (or in the case of the cryptocurrency market, predicting the future price of crypto products), tweets containing unpopular opinions do not. Likewise, Studies in discussion groups have found that the general sentiment of the discussion group predicts future trading volume but not potential profits (Tumarkin & Whitelaw, 2001; Antweiler & Frank, 2004; Das & Chen, 2007; Kim & Kim, 2014). Taken together, these studies suggest that investors will still trade on the investment recommendations on these platforms even if they have no conjecture value. Before continuing to dive into the possible reasons behind investor confidence in those tips. We will confirm this belief by testing the following hypothesis: These studies suggest that investors will still trade on the investment recommendations on these platforms even if they have no predictive value.

***-> H2: Poor quality investment advice affects investment decisions.***

Investors have always had access to bad investment advice (whether it be from an amateur neighbor or family member), but social media has created an unprecedented amount of poor quality investment advice. Conventional economics-based decision models suggest that investors will process information rationally. In other words, these patterns imply that investors will value high-quality investment advice on social media and will ignore contrarian opinions. However, investors will not always operate rationally as rational agents assume in neoclassical

financial models (DeBondt et al., 2008), and psychological theories can help identify the reasons behind suboptimal decisions.

In terms of social networks, considering investors' behavior to follow investment advice from social networking platforms. The concept behind the predictive value is the "wisdom of the crowd," which is a sort of intuitive feeling that people experience on a daily basis (Surowiecki, 2004). Furthermore, since most of the information received during the day is perceived as common sense (Brushier and Marsh, 2020). Investors will often assume that the information they receive is true. This can be especially true for investors whose financial knowledge can be used to distinguish between good and bad advice. Lack of financial literacy can also contribute to a lack of awareness in biased advice. Although there have been many widely disseminated examples of biased advice on social media (eg, Kesmodel and Wilke 2007; Wasik, 2013; Robinson, 2017; Garcia, 2018), some investors are still unaware of these events and believe them to be isolated cases.

Theories in psychology suggest another way to explain investors' reliance on bad advice on social media: investors may mistakenly believe they aren't affected by those advice. In reality, investors can correctly identify whether an advice is bad advice but still cannot completely ignore the information when making investment decisions. For example, Gilbert (1991) uses Spinoza's philosophy about methodological commitments to argue that understanding an idea requires at least an acceptance of the idea. Applying the above theory to the research paper, when investors refer to investment advice, they will subconsciously agree with the advice as soon as they process the information. They then have to go through a cognitive process to self-assess whether they should heed or ignore this advice.

Previous studies have shown that removing the element of poor quality from investment advice is difficult, especially in a social media environment (Brashier & Marsh, 2020). If investors perceive the predictive value of advice to be low and will not use it, they will often not be able to adjust their sentiment to remove their influence on their judgment. e.g Wilson and Brekke, 1994). The findings suggest that investors who are aware of the weakness of the advice will still be affected by them. Thereby we can draw the following hypothesis:

***-> H3: Investors decision can still be affected by bad decisions even if they believe they are not influenced by it***

Understanding why investors are being swayed by poor quality investment advice is important as it implies the effectiveness of risk mitigation strategies. Financial regulators are focusing on alerting investors to the predicted or inaccurate value of various investments appearing on social

media (SEC, 2016, 2017a, 2018, 2020a, 2021). Educating investors about the emergence of bad investment advice can improve decision making. However, it is very difficult to change decisions, even for investors who can distinguish good advice from bad advice, they will still unconsciously use it because they will instinctively accept it.

If investors make decisions based on poor quality advice immediately after it is received, timely intervention is crucial (Begg et al., 1992; Henkel and Mattson, 2011; Brashier et al. 2020). More specifically, we encourage investors to assess the credibility of a source of information before they refer to low-quality advice that will later reduce their confidence in such advice. Our study predicts that investors considering information credibility will reduce their reliance on poor quality advice not because it helps them identify reputable sources of information that have bad credibility, but because it will make the source of the information more prominent to investors, thereby reducing the possibility of unknowingly accepting foreign information. Therefore, investors need to be informed about checking the credibility of information sources before or after consulting advice that can assess their credibility, but also to help them reduce their risk of relying on prior advice while they consider credibility before, rather than after consulting it.

***H4: Investors are very likely to rely on any advice they found online before considering its credibility.***

#### *Media Literacy*

Media literacy is also another factor to account for when it comes to the matter of factors that may interfere with investors decision-making process in the cryptocurrency market. Paul Mihailidis has made significant contributions to the field of media literacy. His insights and discoveries on “algorithms and platforms” which consists of:

**Algorithmic Bias and Filter Bubbles:** Mihailidis and other scholars have highlighted concerns about algorithmic bias, which refers to the potential for algorithms to perpetuate existing biases and inequalities. Algorithms, designed to personalize content recommendations, can inadvertently create filter bubbles, limiting users' exposure to diverse perspectives and reinforcing their existing beliefs.

**Power and Control:** Mihailidis emphasizes the concentration of power in the hands of platforms and the influence they wield over information dissemination. Platforms curate content, set algorithms, and control access to information, raising questions about their accountability and the implications for democratic processes.

**Gatekeeping and Media Pluralism:** With the rise of platforms, traditional gatekeepers such as news editors and broadcasters have been disrupted. Mihailidis argues that platforms have become new gatekeepers, shaping the information landscape and influencing the visibility and reach of different voices, potentially impacting media pluralism and diversity.

**Privacy and Data Surveillance:** Mihailidis raises concerns about the privacy implications of algorithmic systems. Platforms collect vast amounts of user data, enabling targeted advertising and content personalization. This data collection raises questions about user consent, data ownership, and the potential for surveillance and manipulation.

**Ethical Considerations:** Mihailidis and other scholars emphasize the need for ethical considerations in the design and implementation of algorithms and platforms. They argue for transparency, accountability, and public scrutiny to ensure that algorithms serve societal interests rather than perpetuating harmful effects or reinforcing existing power structures.

Media literacy is an essential skills that every social media users in general, and investors, in particular should have when being in an era where information is abundant is very likely to be “drown” in the information highway. Some of the tips can be found below:

**Evaluating Credibility:** Media literacy empowers investors to assess the credibility and reliability of the information they encounter on social media platforms. It helps them distinguish between trustworthy sources, such as reputable news outlets or experts, and potentially unreliable or biased information. By developing skills to assess the credibility of sources, investors can make more informed decisions.

**Recognizing Bias and Manipulation:** Media literacy enables investors to recognize biases and potential manipulation techniques employed within social media platforms. They can identify sensationalism, clickbait, or emotionally-driven content designed to manipulate investor sentiment. Understanding the motivations and interests behind the information shared on social media helps investors critically analyze the potential biases and make more objective decisions.

**Verifying Information:** Media literacy encourages investors to verify the information they encounter on social media before making investment decisions. Fact-checking claims, cross-referencing information from multiple sources, and seeking reputable sources for confirmation are essential practices. Media literacy equips investors with the skills to identify misinformation, rumors, or fraudulent schemes prevalent in the cryptocurrency market.

**Understanding Influence and Herding Behavior:** Media literacy helps investors recognize the influence of social media on market sentiment and investor behavior. It enables them to critically evaluate the impact of herding behavior, where investors follow the crowd based on information shared on social media platforms. Media literacy empowers individuals to think independently and make decisions based on objective analysis rather than being swayed solely by social media trends.

**Ethical Considerations:** Media literacy promotes ethical considerations when engaging with social media platforms in the cryptocurrency market. It encourages investors to consider the ethical implications of sharing or promoting misleading information, engaging in market manipulation, or participating in pump-and-dump schemes. Media literacy fosters responsible behavior and encourages investors to uphold ethical standards within the online investment community.

### **Bounded Rationality and its influences on individual decision-making process on social media**

Bounded rationality in social networks suggests that individuals make non-optimum decisions due to the limitations of access to information. Based on the premise that adopting a state or an idea can be regarded as being 'rational' (Kasthurirathna, D., Harre, M., & Piraveenan, M. (2015), *Optimising influence in social networks using bounded rationality models*). The advent of social media platforms has greatly influenced the information landscape, investor behavior and decision-making process in the cryptocurrency market. Bounded Rationality plays a crucial role in shaping investors responses to information received through social media. Its influence can be pinpointed with 6 key points:

**Information Overload and Limited Attention:** Social media platforms offer a wide range of information and opinions cryptocurrency products. However, individuals and/or investors have limited attention spans (Spira & Feintuch, 2006). Research shown that individuals jump to an interruption about 40% of the time instead of focusing on the original tasks. And it can take one up to 25 minutes to come back to the original cognitive state (Czerwinski, Cutrell, & Horvitz, 2000). In addition, with bounded rationality, it implies that investors may not be able to carefully analyze and validate information they encounter, leading to a reliance on heuristics and shortcuts when making investment decisions.

**Herding Behavior and Social Proof:** Social media help spreading information and opinions among a large number of users. Bounded rationality, combined with social media influences, can lead to herding behavior, where individuals mimic the reaction of others without proper

analysis beforehand. Which may lead to amplified trends, volatility and potential market bubbles. (Koumar, 2020)

**Confirmation Bias:** Confirmation bias is the tendency to seek out information that confirms pre-existing beliefs or opinions. Social media platforms allow users to curate their information feed, potentially reinforcing their existing biases. Bounded rationality can cause individuals to selectively consume information that aligns with their preconceived notions about cryptocurrencies, hindering a more objective and comprehensive analysis of the market.

**Influence of Influencers and Opinion Leaders:** Social media platforms provide a platform for influencers and opinion leaders to express their views on cryptocurrencies. Bounded rationality can lead investors to place undue weight on the opinions and recommendations of these individuals, even if they lack expertise or reliable information. The influence of social media personalities can significantly impact market sentiment and investor behavior.

**Emotional Contagion and FOMO:** Bounded rationality acknowledges the role of emotions in decision-making. Social media platforms can amplify emotions through emotional contagion, where users' emotions are influenced by the sentiments expressed by others. Fear of Missing Out (FOMO) can drive impulsive and irrational investment decisions, as investors fear missing out on potential gains based on information shared on social media.

**Spread of Misinformation and Market Manipulation:** Bounded rationality within the cryptocurrency market on social media platforms raises concerns about the spread of misinformation and market manipulation. Malicious actors can exploit cognitive biases and limited information to spread false or misleading information, artificially influencing market sentiment and prices.

### **Rational Choice theory and their influence on investment decision-making process in the times of social media**

Rational choice theory posits that individuals make decisions by weighing the costs and benefits of different options and choosing the one that maximizes their utility. In the context of investment decision-making processes in the mix of social media, rational choice theory can have several influences:

**Information access and efficiency:** Social media platforms provide investors with easy access to a vast amount of financial information, news, and market data. Rational choice theory

suggests that investors can utilize this information to make informed decisions. By leveraging social media platforms, investors can efficiently gather and analyze relevant information, potentially improving their investment decision-making process.

**Diverse perspectives and opinions:** Social media platforms enable investors to access a wide range of opinions, perspectives, and investment advice from various individuals and experts. Rational choice theory suggests that investors can consider these diverse viewpoints and integrate them into their decision-making process. Exposure to different perspectives on social media can help investors evaluate multiple options and make more informed choices.

**Speed and real-time updates:** Rational choice theory recognizes the importance of timely information in decision making. Social media platforms offer real-time updates on market trends, news, and events, allowing investors to react quickly to changing conditions. Investors can leverage social media to stay informed about market movements and make timely investment decisions based on the most up-to-date information available.

**Transparency and accountability:** Social media platforms provide transparency in terms of tracking investment activities and sharing performance results. Rational choice theory suggests that investors can utilize this transparency to evaluate the credibility and track record of other investors or financial influencers on social media. Investors can make more rational choices by considering the accountability and past performance of individuals sharing investment advice or insights.

**Networking and collaboration:** Rational choice theory acknowledges the importance of social interactions and networking in decision making. Social media platforms facilitate networking among investors, enabling them to collaborate, discuss investment strategies, and share insights. By engaging in these networks, investors can benefit from collective intelligence and diverse perspectives, potentially improving their decision-making process.

**Behavioral biases and challenges:** While rational choice theory assumes that individuals make decisions based on rational calculations, it acknowledges that cognitive biases can influence decision making. Social media platforms can amplify these biases by promoting herd behavior, overconfidence, and emotional biases. Investors need to be aware of these challenges and exercise caution to make rational choices while utilizing social media platforms for investment decision making.

Some example scenarios in the cryptocurrency market where investors will very likely to rely on rational choice theory to assess their decision before investing can be listed below:

Evaluating ICO investments: An investor may come across a new cryptocurrency project that is about to carry out its ICO (Initial Coin Offering) that promises early investors a hefty return. Rational choice theory will suggest the investors to conduct due diligence by examining the project's whitepaper, market potential and so on. They will critically analyze all information presented and consider the possible risk and rewards and make a rational decision based on their assessment, rather than blindly follow the hype generated by social media

Monitoring market sentiment: Social media platforms provide real-time updates on market sentiment through hashtags, discussions, and sentiment analysis tools. Rational choice theory suggests that investors will incorporate this information into their decision-making process but also maintain a critical perspective. They will consider the broader market context, assess the credibility of the sources, and use sentiment analysis as one factor among others in their rational evaluation of the market.

### **Theoretical Framework**

To further assist readers in understanding the findings, this section introduces significant hypotheses. Modern portfolio theory, as well as both classical and contemporary financial theory, are the main topics of behavioral finance research. Social networking will be included in this chapter to show how it relates to behavioral finance.

#### ***Efficient Market Hypothesis (Traditional Finance) (EMH)***

Fama introduced the Efficient Market Hypothesis in 1960. The hypothesis asserts that the prices of stocks (or other financial products) always reflect a fair price because they already contain them. All the information about the market, even the new information. As a result, traders will not have the opportunity to profit from stock speculation.

The aforementioned hypothesis has served as the foundation for the contemporary financial system for more than 30 years. Three arguments support the efficient market theory. The first is that players in the market are choosing wisely. They receive important information to help them make decisions. Second, investors must manage information and knowledge sources very carefully in order to maintain the integrity of their investments. Every decision is taken methodically. Third, investors are free to make their own decisions, and the market will always be efficient and represent an asset's genuine worth. The stock market is efficient because stock prices already represent important information, according to the efficient market theory.

Three categories of EMH exist: weak, moderately strong, and strong. The random walk theory, which contends that stock prices fluctuate arbitrarily and independently of one another, is

frequently consistent with the weak form. Additionally, it states that a stock's price reflects all available market information. In light of this, it is utterly impossible to obtain abnormal returns through technical analysis (the study and prediction of the future price of a stock based on previous history). Prices are quickly adjusted for the relatively powerful class of EMH depending on both public and private information. As a result, it is impossible to achieve exceptional financial success through basic analysis, the study of financial and economic data. The strong form of EMH claims that a stock's price reflects information from both private and public parties.

There has been a lot of opposition to the efficient market theory. EMH is no longer useful for a variety of reasons in modern society. Which consists of:

- First, every investor approaches the market from a unique perspective, which shapes their ideas and assessments of equities.
- Second, stocks need time to respond to fresh information, so investors who get it first stand to gain.
- Third, stock prices may be affected by human mistake and emotional decisions.

The ability of investors to profit from market abnormalities has been demonstrated (Downey, 2021).

The efficient market hypothesis (EMH), however, insists that no one can beat the market and that increasing one's level of "risk" is the only way to get greater returns. Investors may construct efficient portfolios that have the potential to provide superior returns, claims the Modern Portfolio Theory.

Therefore, the EMH theory will not be used to evaluate investor decisions under the influence of social networks.

### ***Modern Portfolio Theory (MPT)***

According to modern portfolio theory, because the market is uncertain, investors' decisions cannot merely be driven by their preferences. According to this approach, a stock's risk should not be taken into account in isolation, but rather along with how its price fluctuates in response to changes in the price of the whole portfolio. The theory continues by claiming that a portfolio can be constructed based on an investor's risk tolerance while maximizing return. Modern Investment Theory is another name for this theory (BFM, nd).

The shortcomings of modern finance, however, can be identified by analyzing the returning variance and mean as follows:

According to expected utility theory (Lima de Castroa et al., 2016), regardless of time frames, the weighted average of all benefits will be the best representation in undervalued circumstances. which individuals will decide without taking the result into account. Making a trade-off between risk and reward is the objective.

Investors can now more easily optimize their portfolio holdings because of the Markowitz theory (1952), which also explains how variances might lower risk (Nik, 2009).

Stocks are valued by the market in accordance with their anticipated return on investment, according to the capital asset pricing model (Mossin, 1996). A single stock's price as well as the value of a whole portfolio of securities may be predicted using it.

### ***Bounded Rationality***

Bounded Rationality is a concept that discusses the limitations and constraints on human decision-making processes due to cognitive constraints, information limitations and the complexity of decision environments. It recognizes that individuals, when faced with decision-making tasks, often rely on simplified mental models, heuristics and rule of thumb to make decision, rather than fully engaging in rational and exhaustive analysis.

As described by the Nobel Laureate in Economics Science - Simon A. Herbert. He depicted individuals as “boundedly rational”, since they have limited cognitive abilities and cannot perfectly process and analyze all available information. (Simon H.A, 1955, A Behavioral Model of Rational Choice. The Quarterly Journal of Economics, 69(1), 99-118)

Bounded Rationality can be summarized into following key points:

**Limited Information Processing:** Bounded Rationality acknowledges that individuals have limited cognitive abilities and can only process a fraction of the available information. Due to this limitation, they tend to simplify complex problems and often rely on “mental shortcuts” to make decisions.

**Satisficing Behavior:** Instead of optimizing decisions to achieve the best possible results, bounded rationality suggest that individuals often settle for satisfactory solutions. This means

that individuals seek solutions that are “good enough” rather than investing their time and effort into finding the optimal solution

**Bounded Search:** Bounded Rationality recognizes that individuals cannot search exhaustively for all possible alternative and evaluates their consequences. Instead, they tend to limit their search to a subset of options that are readily available or easily accessible, leading to a limited consideration of alternatives.

**Cognitive Biases and Heuristics:** The theory also acknowledges the influence of cognitive biases and heuristics on decision-making. Cognitive biases are systematic error in the thought process that can lead to deviations from rational decision-making.

**Incremental decision-making:** Bounded rationality suggests that decisions are often made incrementally, with individuals making adjustments and adaptations as new information becomes available. This incremental decision-making process allows individuals to cope with complex and dynamic decisions environments.

**Bounded Rationality versus Rationality:** Bounded rationality contrasts with the traditional concept of rationality, which assumes that individuals make fully rational decisions based on completed information and on-the-go optimization. Bounded rationality recognizes the constraints and limitations on human decision-making and provides a more realistic approach on the decision-making process.

### ***Rational Choice Theory***

Rational choice theory is a framework in economics and social sciences that assumes individuals make rational decisions by carefully evaluating all available information and selecting the option that maximizes their utility or satisfaction. It is based on the principle that individuals are self-interested and seek to maximize their own well-being. As described by Anthony Downs in his research paper “An Economic Theory of Political Action in a Democracy” in 1957, despite the paper heavily focuses on political decision-making, it provides a foundational framework for understanding rational choice theory and its application in various fields. Rational Choice theory, can be summarized below:

**Utility Maximization:** Rational choice theory posits that individuals make decisions to maximize their utility, which represents their personal preferences or well-being. Utility is subjective and varies from person to person. Individuals weigh the costs and benefits of different options and choose the one that yields the highest utility.

**Consistency and Transitivity:** Rational choice theory assumes that individuals have consistent preferences and can rank their options in a transitive manner. For example, if an individual prefers Option A over Option B and Option B over Option C, they should also prefer Option A over Option C.

**Complete Information:** Rational choice theory assumes that individuals have complete and accurate information about all available options and their consequences. This assumption allows individuals to make fully informed decisions.

**Rationality and Self-Interest:** Rational choice theory assumes that individuals are rational and act in their own self-interest. They are capable of making logical decisions by carefully weighing the costs and benefits of different options. Rationality, in this context, refers to the ability to make consistent and logical choices based on available information.

### ***Behavioral Finance***

Contrary to classical financial theory, Behavioral Finance can determine why the value of certain stocks can be predicted to increase or vice versa based on the actions of financial market participants. While the main focus is on financial markets (Ricciardi & Simon, 2000), the above theory can also be used to explain other perspectives of finance or economics where numbers alone cannot be explained (Areiqat, 2019). However, the method of making decisions influenced by external factors can cause a lot of chaos due to the many biases that exist around financial markets. Other possible events such as calculation errors are another reason behind human intelligence can lead to investment growth over a long period of time.

By asserting that investors must select between risky asset classes by weighing utility value against probability, the prospect theory, developed by Kahneman and Tversky in 1979, contests the expectations of utility theory. Output and whether usefulness is determined by the overall assets' present condition. Prospect theory, on the other hand, contends that under the conditions of anticipated utility theory, people would select between options that have both risk and reward components. Investors employ a range of strategies when making decisions since expected returns are based on the potential worth of a victory or loss rather than the real result. Investors frequently try to minimize risk, which results in lower winning wagers. They frequently take bigger chances with losses and steer clear of wins. (2014) Soufian et al. adapted the theory of an efficient market to

Although they are constantly described in economics textbooks, efficient market conditions are frequently absent from financial markets. This is the outcome of behavioral finance, a new area

of finance. It aids in addressing and illuminating some of the themes underlying shifts in investor behavior that have become independent of logical judgment.

In the 1979 book *Prospect Theory* by Daniel Kahneman and Amos Tversky. They examined the choices made by investors in a hazardous setting. At the time when prospect theory was first proposed, their study was regarded as a key foundational piece of behavioral finance research. By combining economics and psychology, behavioral finance, as defined by Belsky and Gilovich (2000), explains why and how investors exhibit irrational behavior whether borrowing, spending, saving, or investing their own money. Additionally, behavioral finance has been characterized as the psychology's impact on investor behavior and an attempt to comprehend why people are unable to interact to one another by Verma (2007) and Mahesh (2016). Mahesh (2016) discusses the fundamentals of the financial markets and emotion-based investment. Mahesh (2016) argues in his research that

According to the theory presented above, investment decisions are affected by alternatives that have meaningful probability given the likely outcome of the investment. The interpretation of prospect theory based on the notion of individual decision making has greatly benefited from Thaler's work from the 1980s. According to this idea, biased thinking might lead to investors making illogical choices. The behavioral finance theory has encountered a great deal of resistance from the financial community, much like traditional and classical finance theories have.

However, in the book "*The End of Behavioural Finance*" written by Thaler (1999), he gives various examples of how modern financial theory also cannot account for behaviors that would allow Behavioral finance to explain the behavior of investors.

Thaler (1999) selects five areas in the stock market in which the behavior of investors is different. These include dividends, trading volume, range, the equity premium puzzle, and predictability, with which Shiller (2003) provides solid material for eradication. Remove the uncertainty associated with the efficient market hypothesis. Observations from anomalies in different investment sequences have been devised with the help of Behavioral Finance.

### ***Herding Bias***

From a behavioral finance perspective, crowd behavior is referred to as herding behavior. It is defined as a type of decision-making based on copying the behavior of others. Almansour (2015, 2017) defines this phenomenon as situations where investors tend to act irrationally by copying the decisions of others.

Cipriani and Guarino (2012) used data from the Ashland Company on the New York Stock Exchange to investigate the significance of herding behavior in financial markets.. That said effect did affect buying/selling decisions of traders, and also on the value of the asset. Oehler and Wendt (2009) used managers' purchasing and selling data for the years 2000–2005 to identify crowding behaviour in German hedge funds.. The findings reveal that they invest 70% of their money in the stock market, which is unmistakably evidence of stock market herding. Using data from these nine economies between 2000 and 2005, Ornelas and Alemanni (2008) examined herding behavior from emerging markets. According to survey findings, crowd behavior happens in emerging markets. The outcomes also demonstrate that the aforementioned conduct has little impact on the variety of market movements.

In another study, Kumar (2020), has shown that the crowd effect will appear even stronger when the market is in an overcrowded or volatile phase. Based on observations between 240 different cryptocurrencies assets during a bull market phase (Kyriazis, 2020), it is assumed that the crowd behavior has just begun to emerge due to the hysteria in the market, leading to transaction volume increasing dramatically.

### ***Overconfidence Bias***

According to behavioral finance theory, overconfidence is a psychological characteristic that greatly affects investment choices. These choices may involve stock market investments or choices related to other markets (Joo, 2017). Additionally, overconfidence can lead to mispricing in the form of excessive volatility and fluctuating returns, which makes financial markets inefficient (Ko & James Huang, 2007).

Investors that are overconfident tend to assume that one criterion is more crucial than another, which is a psychological bias that impacts judgment. A person will never reach the ideal conclusion while making such mistakes in judgment (Dubra, 2004). Hedge fund managers consistently fail due to the overconfidence bias, according to research (Gruber, 1996).

In the equities markets, it has been shown that elevated overconfidence raises trading activity and price volatility (Graham, Harvey, & Huang, 2009). Nir Jaimovich and Sergio Rebelo, 2007. Investors' overly optimistic estimates of their capacity to take in and understand information led to panic (Kent Daniela, David Hirshleifer, 2002); (Mushinada & Veluri, 2018). The researchers contend that, in contrast to this study, investor success in correcting market abnormalities is also well predicted by overconfidence. Abdin, Sultana, Farooq, and Farooq (2017). Overconfidence is an error in judgment because people inflate their skills, expertise,

and individual assessments of likely outcomes (Campbell, Goodie, & Foster, 2004); (Glaser, Markus & Weber, 2010).

On social media forums for cryptocurrencies. Our study and observations show that overconfidence frequently develops after the market experiences extreme moments, particularly when the price of a well-known coin unexpectedly lowers, climbs, or breaks all-time high levels. For instance, Bitcoin soared from \$32,294 to \$69,006 between January and August 2021. For instance, there were several individual posts regarding whether to purchase or sell Bitcoin in Facebook groups at the time, but either they lacked detailed justifications or had low predictive value. Similar articles can be found in large numbers. As a result, throughout this time, the price and trading volume of bitcoin both rose and then fell dramatically.



*(Bitcoin trading volume and price from January 1, 2021 to December 31, 2021, Source: Messari, 2022)*

### **Disposition effect and risk-aversion**

Al-Mansour (2020), argues that the risk-averse behavior of cryptocurrency investors. With empirical evidence, he found evidence that losing - or loss avoidance behavior, was based on results from previous investments. Thereby, identifying prospect theory is one of the key factors in making investment decisions. Investors/traders rely on intuition and instinct (Al-mansour, 2020, p.165).

Being in the crypto market, especially within the futures market, where traders can use personal assets as collateral for futures contracts (long or short contracts) to earn profits. Part of the integral nature of the futures market is uncertainty. As a result, the fear of loss and aggressiveness is clearly reflected in the psychology of traders in the futures market.

Behaviors like convincing oneself that their open position will go back to positive after being in the negative, which can lead to the position being liquidated, or vice versa in the above example. When going through a winning streak in the market, the trader often confidently places new positions, hoping to make more profits is one of the prime examples of prospect psychology in the market.

Following on from the crypto futures market, social media also plays a huge role in a trader's decision. In large trading forums or chat groups, situations where traders share their biases towards the future price of a certain digital asset can cause information disturbances. Belief or sharing information about a certain token that can generate huge profits if bought in, most of these advice is incomplete or inaccurate. All are prime examples of loss avoidance or even risk-seeking behavior. (DepressionBTC. (2022, June 30). Twitter. <https://twitter.com/depression2019/status/1542539173164228608>),

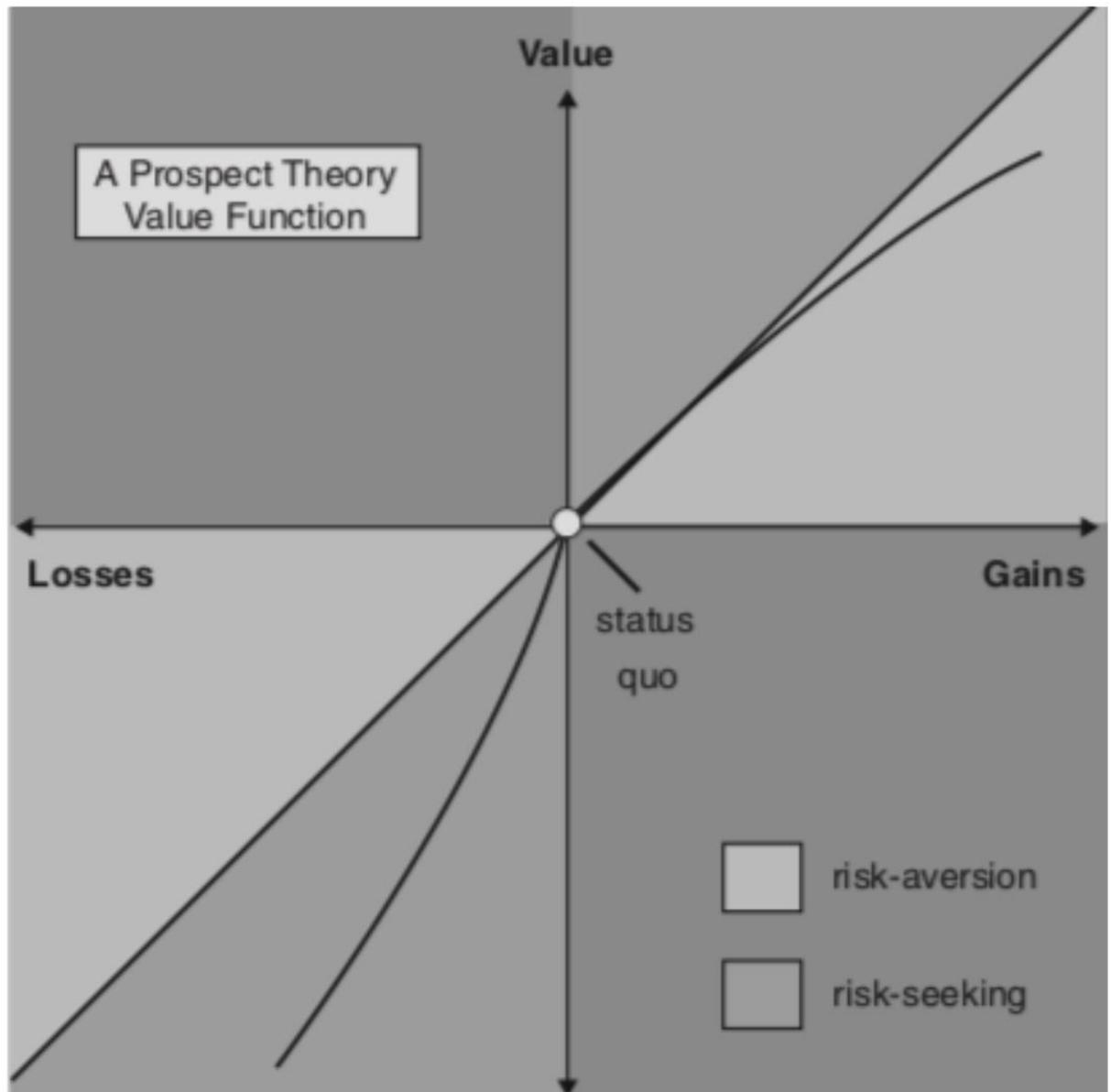


Figure 1 Hypothetical value function by Kahneman and Tversky (1979)

### **Anchoring**

This has been extensively explored (Shin & Park, 2018). Decisions about investments are impacted by anchoring bias (Wright & Anderson, n.d). While people heavily rely on the information they initially got when making judgments, this impact is known as a type of cognitive bias that can be used to explain why this tendency exists. (Shin & Park, 2018); (Maqsood Ahmad, Syed Zulfiqar Ali Shah, 2018); (Singh, 2016). Investors tend to buy stocks based on the previous highest closing price. These behavioral responses indicate that anchor bias is often associated with bad decisions by investors (Krause, Shleifer, Shiller, Wilcox & Shiller, 29170). The use of stock prices over the previous 52 weeks as a benchmark to assess stock returns is an example of anchor bias. This bias arises when investors rely on past prices

to make decisions in uncertain situations. (Jahanmiri, 2018). Researchers have also documented the negative effect of anchor bias on investors' initial judgments. People will have a tendency to “anchor” some large outcome, while using this bias and conforming to predict, based on previously predicted information (Amir & Ganzach, 1998). The anchor bias is a type of heuristic bias that influences investors to base their decisions on past price changes and historical prices. (Ormos & Timotity, 2016).

On social networks, the anchoring effect can be observed in posts that predict future prices based on information that has happened in the past

### ***Prospect theory***

Prospect theory generalizes how individuals or groups perceive losses and wins under uncertain circumstances. The main element of prospect theory is the emotional (short-term) of individuals (such as aggressiveness and fear of loss).

This idea was initially put out in 1979 by Kahneman and Tversky, who showed that investors are not totally rational. Investors frequently possess insufficient information. The assessment of information will also differ based on objective validity and subjective likelihood due to human variations. In the end, investors' actions will show irrational behavior and depart from the prospect model of traditional economic theory.

Kahneman and Tversky's theory proposes that decision-making involves two stages: a correction phase and an evaluation phase. In the correction phase, investors gather and categorize information to determine what information is necessary for making decisions.

During the evaluation. The investor will evaluate and correct the expected values based on an objective criterion determined by the value of the information and select a decision-making plan.

### ***Prospect theory can be generalized as follows:***

Compared with the change in assets price and the absolute balance, investors often prefer the absolute balance. In other words, investors often pay more attention to profit or profit after investment. [1]

When investors deal with the prospects of winning or losing, they often choose risk over risk taking. While dealing with the prospect of being profitable, the opposite is true. They are more likely to avoid risk in order to win. [2]

The sensitivity to losses and wins is different. [3]

The outcome of the decision-making will influence the investor's attitude towards risk. Investors will increase the risk level if the investment is profitable at first, but if they receive losses in the early stages of investing, their risk appetite will decrease. [4]

### **Rational Choice Theory**

*Hypothesis / Research questions:*

***Please ask the author to add the figure***

#### *Research framework*

The research model presented above leads to the development of the following hypotheses:

-> H1: The similarities between stocks and cryptocurrencies can help investors from these two fields easily communicate with each other to discuss and exchange information.

-> H2: Poor quality investment advice affects investment decisions.

-> H3: Investors' decisions can still be affected by bad decisions even if they believe they are not influenced by it.

-> H4: Investors are very likely to rely on any advice they found online before considering its credibility.

Case Study: The collapse of LUNA and the effect of social networks on investor's decisions

### ***Introduction to Stablecoins***

Cryptocurrencies, as introduced above, have very high volatility. However, a small branch of cryptocurrencies, known as Stablecoins, was created to help investors and traders survive periods of great volatility while remaining in the market.

Cryptocurrency products called stablecoins are intended to be anchored to fiat currencies like the US Dollar (USD). Stablecoins tokens that are tied to the US dollar will always have a price of \$1.

Different Stablecoin projects use different methods to maintain a 1:1 peg to fiat currencies. Tether (USDT) and Circle's USD currency (USDC), the two most well-known initiatives, both include cash or other assets with a cash value in reserve that can be used for escrow. So, the stablecoin minting parties own every USDT or USDC exchanged on the cryptocurrency market.

### ***About Luna and TerraUSD***

In the case of TerraUSD (UST) and Luna (LUNA). UST is a stablecoin that is not backed by cash or other cash-valued assets, instead, UST's 1:1 USD peg is controlled by an algorithm. Luna's algorithm consists of 2 tokens, the former is the stablecoin, the latter will back the former stablecoin, and the algorithm (also known as smart contract), will control the relationship of the 2 tokens.

Like other types of assets such as stocks or real estate, the value of cryptocurrencies can fluctuate based on the level of supply and demand in the market. Stablecoins are also included because they can be freely traded and exchanged within the cryptocurrency market.

To avoid de-pegging, which is the situation in which a stablecoin loses its 1:1 peg to fiat money and can no longer be transferred to the US dollar or other analogous currencies. The supply and demand of these two tokens will be managed by the algorithm. An asset's price will rise when there is an excessive amount of demand for it but an insufficient amount of supply, and vice versa.

Terra employs a dual-token system in which Terra serves as a stablecoin and LUNA serves as a reserved token. Terra may confidently use it for payments on e-commerce platforms because to the development of Stablecoin, which makes it simple for customers to utilize. Currently, Terra has formed an online commerce collaboration with several local companies, including TMON, Pomelo, and Tiki.vn (Vietnam),...

Through an algorithmic connection with Terra's own token, LUNA, TerraUSD(UST) keeps a 1:1 peg to the US dollar. The price of UST will exceed \$1 when there is an insufficient supply and an excessive demand. Users of the Terra portal will be able to swap \$1 worth of LUNA coin for 1 UST at the Terra exchange, bringing the UST back to the proper pegging rate. Users can sell the "minted" UST after this transaction and profit 1 cent for every 1 trade by "burning" 1 USD of LUNA. Users can "burn" as much LUNA as they want to mint UST until the price of the UST drops to \$1. Users of the exchange can so act in the opposite way from what was just said: Purchase one UST for \$0.99 USD, then exchange it for one LUNA for one dollar. This transaction issues 1 USD of LUNA and "burns" 1 UST.

### ***Evolution of LUNA***

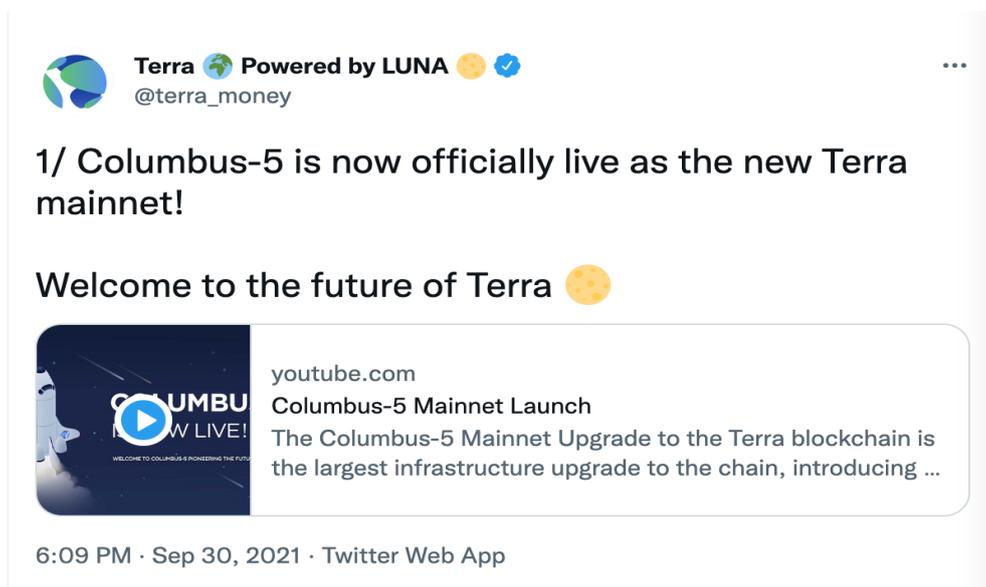
Terra was developed in 2018 by Do Kwon and Daniel Shin. Terra's mission, according to the CEO of Terra Labs, is to promote the power of cryptocurrencies and master the power of cryptocurrencies. And is a blockchain system developed by the Korean company Terraform Labs. The project raised US\$32 million from the public sale of Luna coins. This investment comes from big players in the cryptocurrency industry such as Binance, Huobi and OKEx.

At one time LUNA was named as one of the most successful Decentralized Finance industry products. At one point, CoinMarketCap ranked LUNA as the 7th most valuable cryptocurrency product based on its market capitalization. After the crash in the summer of 2022, LUNA's position fell to 214th in July 2022.

On January 30, 2019, LUNA was offered for sale to investors on the ICODrops site. In the fundraising round, Terraform Labs offered LUNA at 18 cents/token, and 80 cents/token in the non-public offering.

### ***Luna's explosive 2021***

After the Columbus-5 mainnet upgrade on September 30, 2021, Luna's price peaked at \$49.45 on October 4, 2021.



*(Official tweet from the Terralabs team about the Columbus-5 upgrade, Source: Twitter, 2022)*

This event was responded to by many investors, creating a crowd effect and mass prospect.

The image shows a screenshot of four tweets from Twitter, all replying to @terra\_money. The tweets are arranged vertically. Each tweet includes a profile picture, the user's name and handle, the date, the text of the tweet, and interaction icons (reply, retweet, like, share, and a warning icon labeled 'Tiền tip').

- Injective** (@Injective\_) · Oct 1, 2021  
Replying to @terra\_money  
Congrats to the entire @terra\_money community! This is an amazing step forward for all of crypto. Looking forward to doing more together with \$LUNA and \$UST 🚀  
1 reply, 41 likes, 1 share, 1 warning icon.
- Liam Connor** (@L1am\_Crypto) · Oct 1, 2021  
Replying to @Injective\_ @InjectiveLabs and @terra\_money  
When injective IBC integration 🤪💪  
8 likes, 1 share, 1 warning icon.
- Philipp (🌱, 🌱)** (@PhilippInvest) · Oct 1, 2021  
Replying to @terra\_money  
Congrats, this is a big step!  
1 share, 1 warning icon.
- Js** (@js\_1403) · Sep 30, 2021  
Replying to @terra\_money  
Hi was just wondering if there's an increase in the transaction speed per second for col-5, any particular figures?  
2 replies, 1 share, 1 warning icon.

Below the last tweet is a blue link that says "Show replies".

*(Foreign investors' outlook on Luna is on Twitter, Source: Twitter, 2022)*

**Hoài Nam** ▸ UB Holding - Hold coin theo cách của bạn

6 tháng 10, 2021 · 🌐

⋮

Hệ Terra Luna đang lên, tiềm năng như lúc Sol 30-40\$ vậy, mọi người để ý nhé, ANC, MIR là những đồng đang triển vọng, hệ này đang xây, các dự án chưa có nhiều, mình cảm giác giống Binance Smart Chain hồi tháng 1.

#	Tên	Giá	24h %	7d %	Vốn hóa thị trường	Khối lượng(24 giờ)	Lượng cung lưu hành	7 ngày qua
☆ 11	Terra LUNA	\$42.82	+6.87%	-23.01%	\$17,238,654,804	\$1,254,878,130 29,304,547 LUNA	402,565,760 LUNA	
☆ 54	TerraUSD UST	\$1.00	-0.10%	-0.27%	\$2,694,586,312	\$71,845,424 71,614,219 UST	2,685,914,876 UST	
☆ 230	Anchor Protocol ANC	\$3.25	-3.32%	-18.17%	\$395,756,653	\$10,578,135 3,252,423 ANC	121,681,925 ANC	
☆ 280	Mirror Protocol MIR	\$3.02	-0.74%	-8.03%	\$234,431,750	\$27,995,456 9,283,904 MIR	77,742,680 MIR	
☆ 609	TerraKRW KRT	\$0.0008304	-1.61%	-1.61%	\$36,276,348	\$22 26,397 KRT	43,685,210,760 KRT	
☆ 2796	Pylon Protocol MINE	\$0.2235	-1.10%	-27.89%	--	\$5,626,298 25,167,069 MINE	0 MINE	
☆ 3007	Spectrum Token SPEC	\$7.82	-4.96%	-26.88%	--	\$1,278,448 163,548 SPEC	0 SPEC	
☆ 3041	StarTerra STT	\$5.60	-4.39%	-9.19%	--	\$1,001,930 172,876 STT	0 STT	
☆ 5983	Terra SDT SDT	\$1.28	-0.03%	-0.01%	--	--	--	
☆ --	Wrapped UST Token	UST	--	--	--	--	--	

Minh Trí, Ngọc Minh và 651 người khác

87 bình luận 24 lượt chia sẻ

Thích

Bình luận

Chia sẻ

Tặng

**Marginatm - Tin tức & Phân tích Crypto**  
20 Tháng 12, 2021 · 🌐

Terra (LUNA) khoẻ thật anh em ơi 🤩

**MarginATM**

Name	Protocols	1d Change	7d Change	TVL ↓	Mcap/TVL
1  Ethereum (ETH)	361	-1.24%	-3.08%	\$148.09b	3.03579
2  Terra (LUNA)	13	+5.16%	+33.21%	\$16.98b	1.64128
3  BSC (BNB)	222	-0.54%	+0.98%	\$16.28b	5.31623
4  Avalanche (AVAX)	102	-2.42%	+0.91%	\$11.69b	2.13881
5  Solana (SOL)	40	+12.32%	+0.25%	\$11.54b	4.63706
6  Tron (TRON)	6	-2.18%	-11.06%	\$5.19b	1.51341
7  Polygon (MATIC)	136	-1.37%	-1.59%	\$4.87b	2.92212
8  Fantom (FTM)	95	-3.51%	-6.76%	\$4.37b	0.78123
9  Arbitrum	47	-1.72%	-7.52%	\$1.78b	-
10  Cronos (CRO)	19	-2.78%	+3.70%	\$1.53b	8.22493

**Terra chính thức vượt Binance Smart Chain leo lên Top 2 về TVL, theo sau Ethereum**

👍 67 6 bình luận

*(Prospects of some Vietnamese investors on the social network Facebook, Source: Facebook, 2022)*

According to Messari data, the trading volume after the upgrade of the Columbus-5 network from August 1, 2021 to September 30, 2021, was up to 4.1 billion USD at one point, and the price went up to \$43.37.



*Luna's price and trading volume from August 2021, Messari (2022)*

The above update has brought many new features to the Terra blockchain system. For example, it becomes faster and easier to move UST assets across other blockchain platforms. Terra is able to achieve this because it is integrated into the Cosmos network, a network system consisting of various blockchain systems.

Since the value of Luna depends on the growth of the Terra ecosystem, blockchain system updates have caused the price of Luna to soar. Luna first went public in 2019, starting at \$1.31. A year later, its price is still below \$10. However, by the end of 2021, its price has increased more than 100 times. On December 27, Luna's closing price was at \$103.33, the highest price recorded for the year. (Source: Currency.com, 2021; Messari, 2022)



*LUNA's price from 2021 to its fall in May 2022 (Messari, 2022)*

### ***Luna on the verge of "collapse"***

In March 2022, Algod, a well-known cryptocurrency trader, made a \$1 billion bet with Do Kwon (the founder of Terra Luna project), stating that Luna's price would close below \$88 by March 2020. On March 26, 2022, The Luna Foundation Guard Bitcoin wallet address purchased an estimated \$1.3 billion (27,000 BTC) worth of Bitcoin at the time.

On March 28, 2022, the price of the Luna token increased by 10% in 24 hours, reaching \$106.

### ***The downfall of Luna***

Luna's demise could have been foretold, as Cyrus Younessi, head of risk management at MakerDAO and former analyst at Scalar Capital, spoke out about LUNA's unsustainable model in 2018. Cyrus explained that using Luna as a governor token for UST is extremely disadvantageous. In case UST went de-peg, only Luna can save UST. But the price of Luna would continue to fall as investors panic, and Terra will continue to collapse, and the two factors will contribute to Luna's "death spiral".

- On May 5, 2022, Luna Foundation Guard (LFG) bought an additional 1.5 billion USD in Bitcoin to raise the reserve for UST to nearly 3.5 billion USD.
- May 7, 2022, Curve Whale Watching, a Twitter account specializing in tracking “whales” (cryptocurrency wallets with huge balances), announced that a “whale” had converted 85 million UST to 85 million USDC, the Terra Luna project began to show the first signs of asset fragmentation.
- May 8, 2022, the price of LUNA started to decrease, UST de-pegged for the first time, dropping to \$0.985. Jump Crypto buys large amounts of UST to subsidize prices.
- On May 9, 2022, LFG was forced to sell 750 million USD BTC to stabilize prices.
- On May 10, 2022, the second UST de-peg. The situation turned bad, LFG transferred the remaining \$1.2 billion in BTC to the exchange to continue to save the price.
- In May 11, 2022, UST de-peg for the 3rd time, LUNA decreased to 13 USD. By the evening of the same day, UST de-pegged for the 4th time, by then, the price of LUNA divided 19 times compared to the morning, reduced to \$0.68.
- On May 12, 2022, Terraform Labs announced the plan to “burn” 1.3 billion USD to save UST prices.

– On May 13, 2022, because of the issuance of more tokens, the supply of LUNA increased from 400 million to 6.9 trillion within 72 hours, the price fall is now irreversible, UST depegged again for the 5th time. In addition, the Terra blockchain system had to halt operation twice for fear of being attacked.

– On May 15, 2022, the price of LUNA and UST fell 99%, the \$60 billion ecosystem completely collapsed.

The price of LUNA peaked at \$118.12 in March 2022 and completely collapsed just two months later, to 0.001 (Messari, 2022)



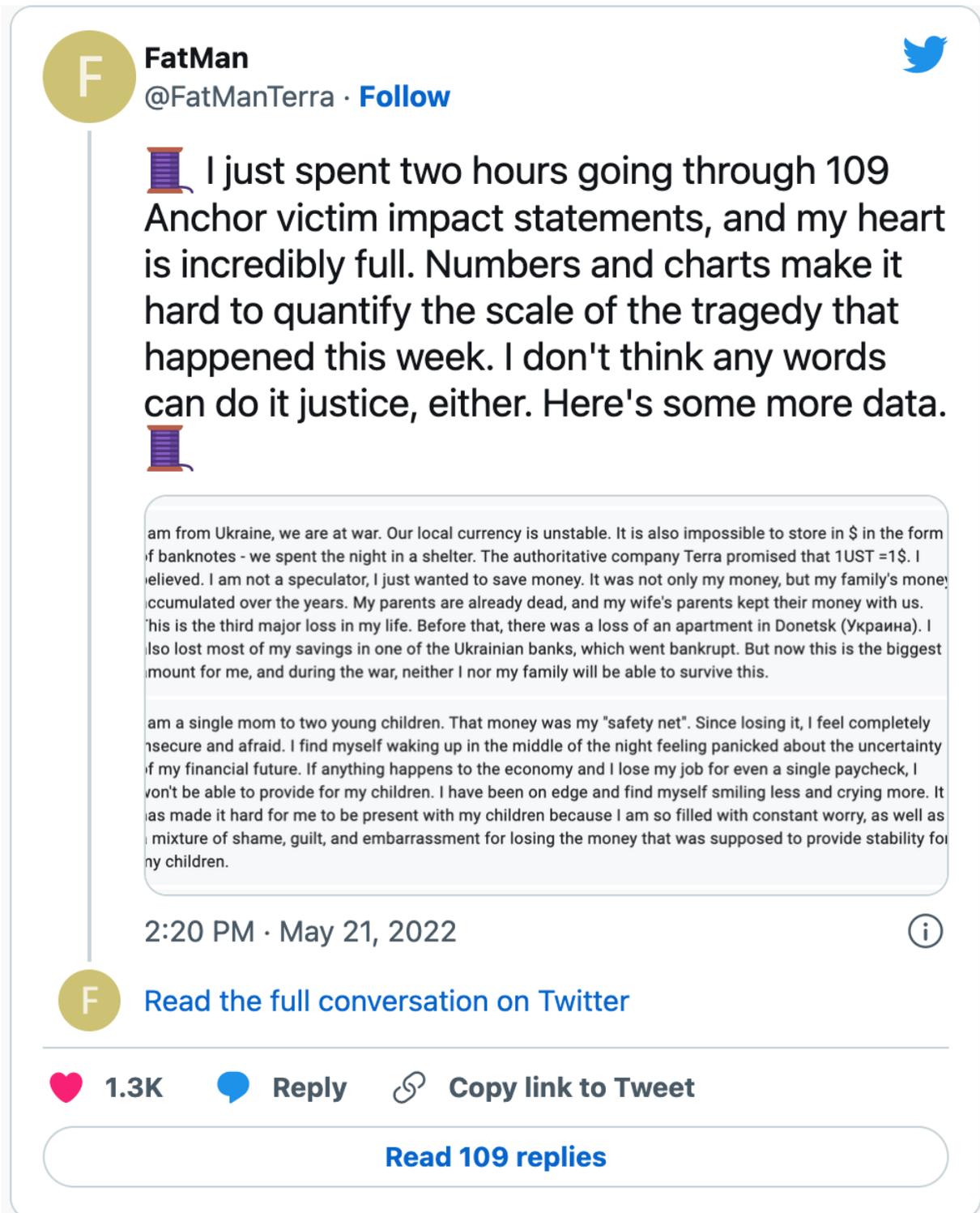
*Source: Messari.io, 2022*

### ***The Aftermath***

Do Kwon, the founder of the Terra project, shared on his Twitter profile about reassuring investors just a few days after the catastrophic collapse. Kwon then came up with a plan to save the ecosystem and distribute 1 billion tokens to investors affected by the crash. In addition, the same event also brought Bitcoin - the coin with the largest market capitalization, dropped to under \$30K, the lowest level ever recorded in 2020 (Messari, 2022).



Additionally, an investor from Taiwan had committed suicide after losing his entire investment portfolio worth more than NT\$58.63 million (more than US\$2 million) in Luna, after the above event. , there have also been many cases of suicide due to loss taking place.



**F** **FatMan** @FatManTerra · [Follow](#) 

 I just spent two hours going through 109 Anchor victim impact statements, and my heart is incredibly full. Numbers and charts make it hard to quantify the scale of the tragedy that happened this week. I don't think any words can do it justice, either. Here's some more data.



am from Ukraine, we are at war. Our local currency is unstable. It is also impossible to store in \$ in the form of banknotes - we spent the night in a shelter. The authoritative company Terra promised that 1UST =1\$. I relieved. I am not a speculator, I just wanted to save money. It was not only my money, but my family's money, accumulated over the years. My parents are already dead, and my wife's parents kept their money with us. This is the third major loss in my life. Before that, there was a loss of an apartment in Donetsk (Україна). I also lost most of my savings in one of the Ukrainian banks, which went bankrupt. But now this is the biggest amount for me, and during the war, neither I nor my family will be able to survive this.

am a single mom to two young children. That money was my "safety net". Since losing it, I feel completely insecure and afraid. I find myself waking up in the middle of the night feeling panicked about the uncertainty of my financial future. If anything happens to the economy and I lose my job for even a single paycheck, I won't be able to provide for my children. I have been on edge and find myself smiling less and crying more. It has made it hard for me to be present with my children because I am so filled with constant worry, as well as a mixture of shame, guilt, and embarrassment for losing the money that was supposed to provide stability for my children.

2:20 PM · May 21, 2022 

**F** [Read the full conversation on Twitter](#)

 **1.3K**  **Reply**  **Copy link to Tweet**

[Read 109 replies](#)

In addition, user @FatManTerra on Twitter also had very heartbreaking share about the fate of investors in the Terra Luna project when this user released a statistics indicated 41.1% of Anchor's victims (a cryptocurrency savings project built on top of Terra Luna's infrastructure) has considered self-harm or suicide, 91.7% of victims had their mental health severely affected, 39.6% of the victims gone through breakups, emotional rift with their loved ones, 86.8% of the victims were psychologically affected heavily after the Luna token collapsed.



### *Aftershocks after the Terra Luna incident*

As a result, Tether's total supply dropped to \$7 billion in just one week, leading to demands for auditing by the community with concerns about the project's "shady" series of events in the past and has had a bigger impact on USDT at the time. To reinforce public opinion, Tether immediately announced that they had a reserve of \$82.4 billion in assets, asserting that it was "more than enough" to back USDT, but that also could not help Tether regain its trust from the cryptocurrency community.

A series of financial institutions were also involved, admitting to having had losses from LUNA. For example, Binance lost \$ 1.6 billion, Galaxy Digital, Delphi Capital, Pantera, Jump Crypto, Hashed Korea were also in loss, or businesses of the cryptocurrency industry also encountered many difficulties, investment funds were also affected. Three Arrows Capital was forced to liquidate both physical and digital assets in bulk, Voyager filed for bankruptcy on to New York Supreme Court (USA), HODLNAUT blocked customer withdrawals, withdrew its operating license to restructure debt and many more other names are victims of Terra Luna.

Not ending there, LUNA also sparked a "liquidity crisis" that spread throughout the market and continued until the end of 2022.

### *An interesting reaction from crypto traders and investors after the Luna incident*

Regardless of such brutal downfall of the Terra Luna project and the enormous loss of many investors and traders worldwide. The crypto community still seems to have not taken a lesson of doing proper research before investing and still lean over to social media to seek financial advice. At the time of writing this research, the hype showed no signs of dying down. As seen in the images below, these are some of the tweets encouraging crypto traders to buy the token, suggesting a sign of Overconfidence Bias in the tweets.





### Case Study Conclusion

After briefing through the rise and fall of the Terra Luna project and its interesting community. We can confirm that investors and traders often believe financial advice they found online before considering its credibility and bad financial advice can affect investors decisions.

### Analysis and Discussion

This chapter will further expand the empirical findings from the above case study. Which will include data crawling from Twitter, which consists of individual tweets related to the Terra Luna cryptocurrency project, ranging from 2021 to 2022. The tweets will be collected and analyzed via Orange 3 data mining software.

### Twitter Sentiment Analysis

Sentiment analysis is a subfield of computational natural language processing that involves determining the positive, negative, or neutral sentiments expressed in a text (1). However,

Twitter tweets present a unique challenge due to their irregular language, frequent use of emoticons, and sarcasm (2). This makes it difficult for standard sentiment analysis tools to accurately analyze tweets and generate reliable results.

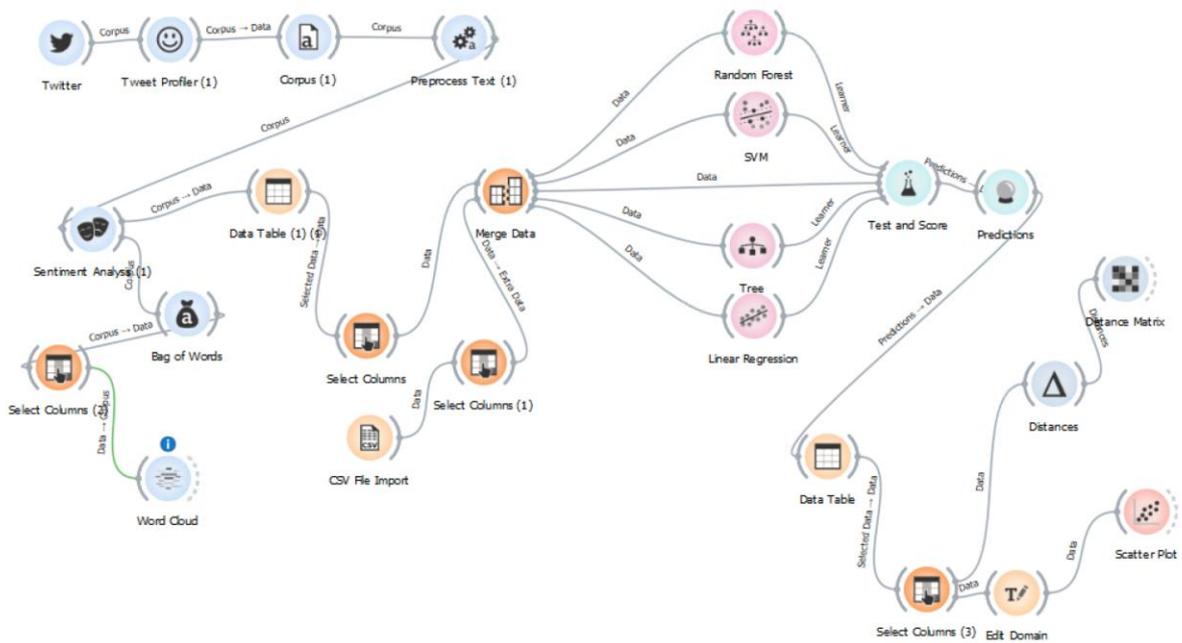
Using the LUNA-related hashtags, we gathered tweets from Twitter for this study. Orange3 was used to tidy up these tweets. Machine learning models may be employed with Orange3, a data and text mining service [3]. On these tweets, we ran a sentiment analysis research.

The first portion of the following paragraphs describes our efforts to produce sentiment analysis data for the alternative currency LUNA. Next, we go over how we created a sentiment analysis tool. In experiments, we explore whether the daily sentiment of tweets is connected with the price of alternative cryptocurrencies by analyzing daily tweets using the trained sentiment analyzer. The Conclusion concludes by summarizing our contributions.

(1) C. Harwick, "Cryptocurrency and the problem of intermediation", in *Independent Review*, vol. 20, no. 4, pp. 569-588, Spring 2016.

(2) I. Makarov, and A. Schoar, "Trading and arbitrage in cryptocurrency markets" in *Journal of Financial Economics*, vol. 135, pp. 293-319, 2020.

(3) Demsar J, Curk T, Erjavec A, Gorup C, Hocevar T, Milutinovic M, Mozina M, Polajnar M, Toplak M, Staric A, Stajdohar M, Umek L, Zagar L, Zbontar J, Zitnik M, Zupan B (2013) Orange: Data Mining Toolbox in Python, *Journal of Machine Learning Research* 14(Aug): 2349–2353.



**Data Set**

*Collecting Tweets*

We used two data sources in this study: 1). We obtained daily LUNC (Formerly LUNA) price and volumes from Messari from June 2021 to October 2022). We used Orange3’s Twitter widget to obtain tweets with the following hashtags and cash-tag: \$LUNC, #LUNC, \$LUNA, #LUNA, #UST, #Crypto, Terra Luna, Luna, \$UST, #USTC, \$USTC. The total number of tweets collected are 45 thousand, containing username, name, tweet, language, hashtags, cash tags, etc. All the results were being set to use English only, as it would be easier for Sentiment Analysis libraries to work with English phrases. The loaded tweets will be transferred to Tweet Profiler to profile emotions using the POMS classification method.

Collected data has been uploaded to GitHub to provide transparency in the data analysis process: <https://github.com/Dkhanh0412/RMCDDataCollect>

**Data Preprocessing**

The Twitter data was contaminated. We were unable to index any fields for automated filtering. Due to this, we took the next action:

1) In order to remove any hashtags or cashtags from the tweets, we made use of the Preprocessing Text widget. We also filtered out numerous links and addresses in the tweets that started with HTTP/HTTPS. The steps taken are outlined in Table 1:

*Table 1*

Unfiltered Tweet	Filtered Tweet
RT @bullluncdao: #lunc accumulating at support levels 🚀	bullluncdao: lunc accumulating at support levels
RT @TheMoonHailey: \$LUNC will pumped so hard people won't expect it! 🚀🌕	TheMoonHailey: LUNC will pumped so hard people won't expect it

2) Punctuation removal: All punctuation was taken out of tweets. Additionally, using a regular expression, the hashtags LUNA and LUNC as well as the dollar and plus signs in the tweet were eliminated. In the previous step, only cryptocurrencies that had certain tags were removed. However, in this stage, those tags have been eliminated altogether.

3) Deleting stopwords and spaces from tweets. Finally, we used Python's NLTK module to eliminate the stop words from the English language.

### ***Sentimental Analysis***

We connected the Preprocessing Text widget to the Sentiment Analysis widget in order to create a sentiment analysis model using the VADER engine. VADER stands for Valence Aware Dictionary and Sentiment Reasoner and was developed by C.J. Hutto and E.E. Gilbert at the Georgia Institute of Technology. It is a sentiment analysis model that uses a lexicon and specific rules designed for social media communications. The lexicon contains over 9,000 words, each of which has been rated by ten independent people on a scale from -4 (extremely negative) to 4 (extremely positive), with the final score being the average of all ten ratings [4].

Sample of raw-process texts and VADER's grading results will be demonstrated in Table 2:

Table 2

Anger	Depression	Fatigue	Vigour	Tension	Confusion	pos	neg	neu	compound
no	yes	no	no	no	no	0	0	1	0
no	yes	no	no	no	no	0.176	0	0.824	0.5707
no	no	no	yes	no	no	0	0	1	0
no	yes	no	no	no	no	0	0	1	0
yes	no	no	no	no	no	0.095	0.035	0.87	0.3442
no	no	no	no	no	yes	0	0	1	0
no	yes	no	no	no	no	0	0	1	0
no	yes	no	no	no	no	0	0	1	0
no	no	no	no	no	no	0	0.163	0.837	-0.6679
no	yes	no	no	no	no	0	0	1	0
no	yes	no	no	no	no	0	0	1	0
no	yes	no	no	no	no	0.027	0	0.973	0.0258

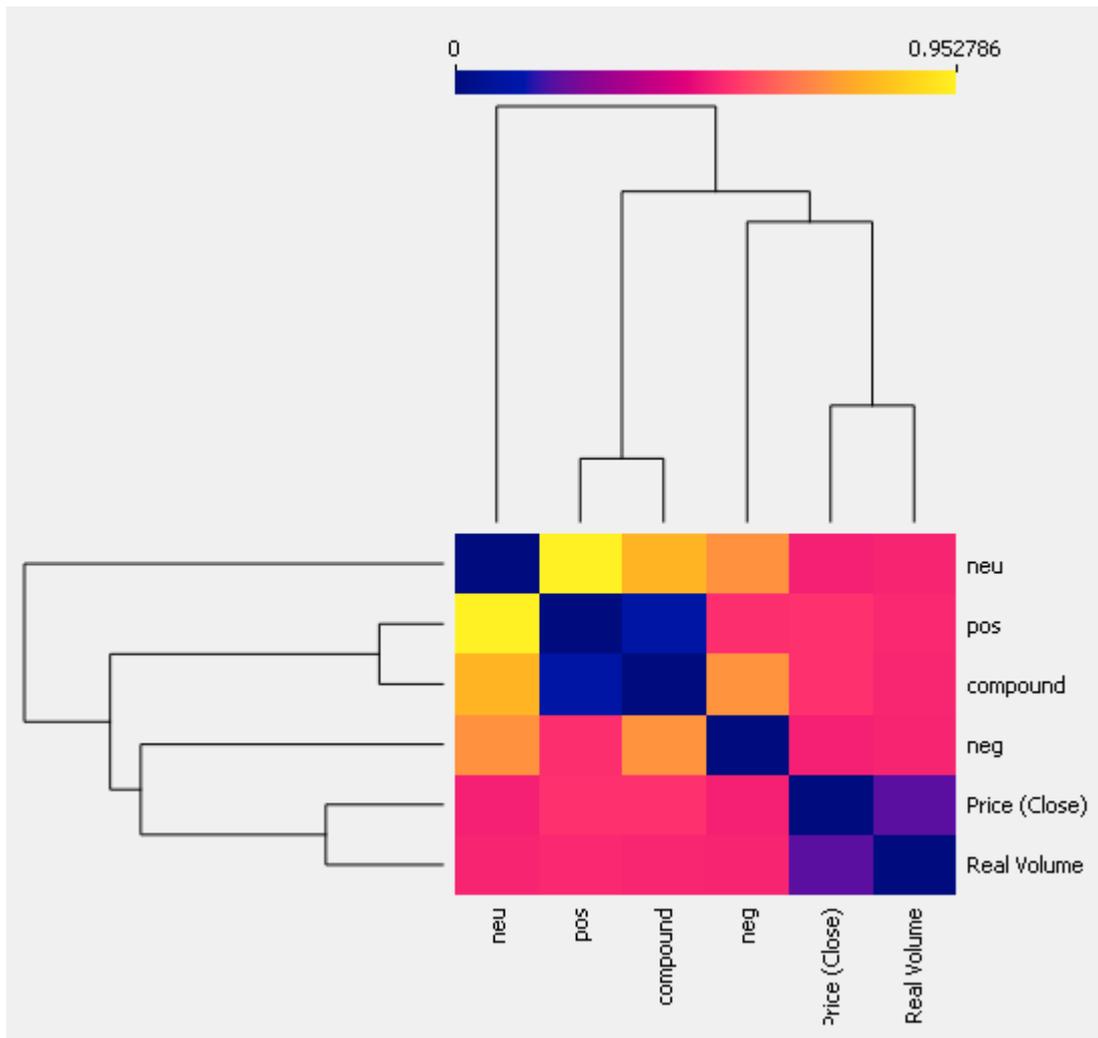
**Price Correlations**

This study's primary goal was to look at any potential relationships between LUNA price movements and daily tweets. In the created data frame, correlation is employed to determine the linear connection between two columns.. To do this. We imported LUNA price history, which is previously obtained via Messari, under a CSV file type, we then merge the data table generated from the Sentimental Analysis widget, then ran the merged data table through 4 models, which are: Random Forest, SVM, Tree and Linear Regression, we have a following results in Table 3:

Table 3: Results of different learning models pulled from Orange 3 - Test and Score widget

Model	MSE	RMSE	MAE	R2
Tree	11.107799735460697	3.3328365899726764	1.269205248274289	0.9855343900661045
SVM	1074.7275293254722	32.78303721935282	30.64763157750994	-0.39961014734631606
Random Forest	120.53172436924515	10.978694110377845	5.674127603084706	0.8430323780668167
Linear Regression	614.6598961255584	24.7923354310472	17.409465985385726	0.19953271474854517

Later on, we gathered the results and connected them to a Data Table, which then connected to a Distance widget to create a Distance file, which then will be used to create a visual Distance Map as demonstrated below:

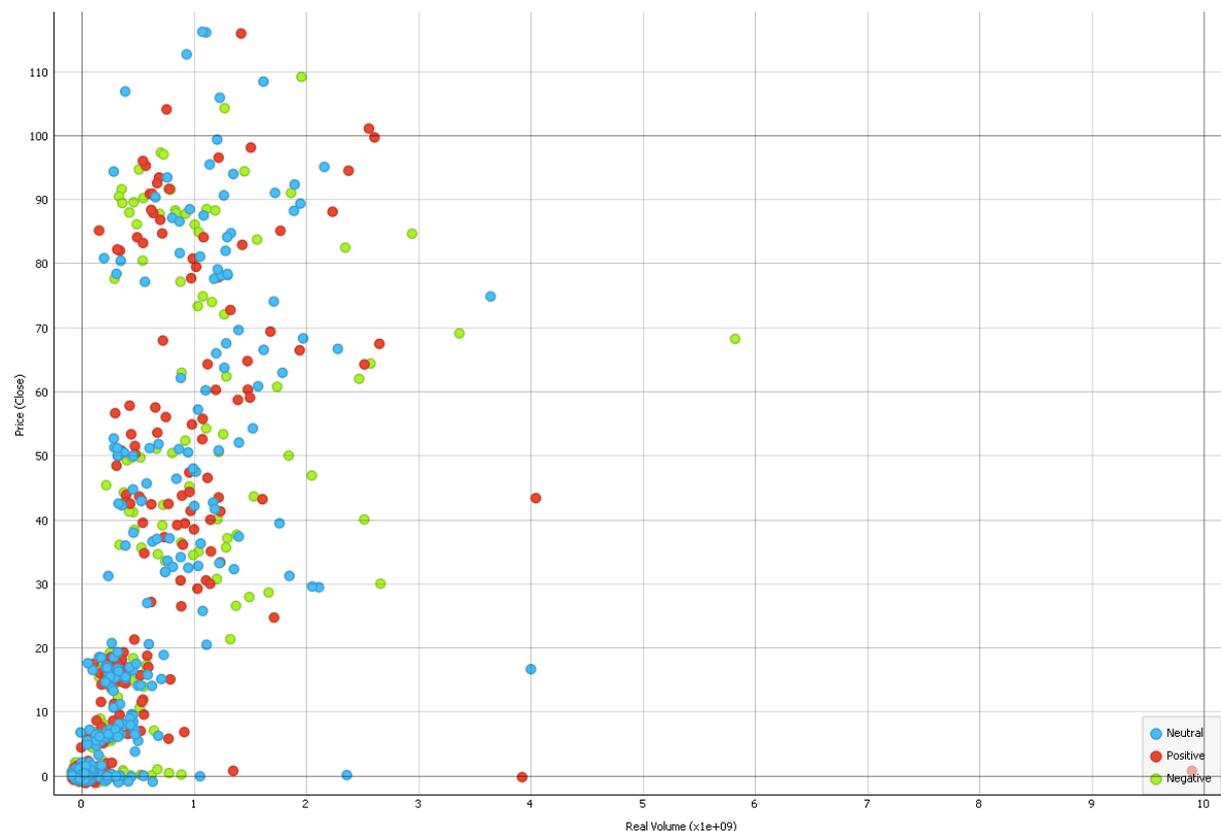


*Correlation of all column of LUNA using Distance Map widget*

Additionally, we have created a Word Cloud from the Tweets using the Word Cloud widget:



red) and negative sentiments (indicated by green) are less prevalent.. Further analysis of the scatter plot shows that the all 3 sentiment elements follow every price mark of LUNA, as soon as they reach a new price level, with Negative sentiment out-weighting the Positive sentiment. Which is some-what, correlated with the sentiment revolving around the negativity of news and opinions related to LUNA's unstable economic model mentioned in the above case study.



(4) Hutto, C., Gilbert, E.: Vader: A parsimonious rule-based model for sentiment analysis of social media text. In Proceedings of the International AAAI Conference on Web and Social Media (Vol. 8, No. 1) (2014).

The findings demonstrate a favorable association between the variables of information from social networks, online community activity, and market information's effect on investing decisions. According to findings from examining tweets using the pre-assembled collection of hashtags indicated above, behavior from online communities appears to have the most effect on investment decisions..

According to the efficient market hypothesis (EMH), it is challenging for investors to find undervalued stocks or sell overpriced stocks because the market's information is already incorporated into the stock price. As a result, investors are prevented from using historical data to forecast future prices and from engaging in stock speculation because fresh market information has already been included into stock prices.

This result is somewhat in line with the study of Kadous and other studies (Kadous et al., 2019), which assert that investors will decide based on what they see on social networks, and they believe that the information is for them, and for forecasting the direction of financial products in the future. As a result, it must be considered while deciding whether to purchase, sell, or refrain from trading. This finding is consistent with a research by Bollampelly (2016) that demonstrates how many investors base their judgments on non-traditional sources of information, such as financial reports or social media.

Despite having a lot of information that investors need about the cryptocurrency market, market participants are still capable of making irrational decisions, which may be because of psychological consequences. However, we need to understand that this study does not focus entirely on this thought. Therefore, the influence of social media on the cryptocurrency markets is still a rather vague ideal.

### **Conclusion**

Now that the case study and data analysis has been done, we would like to confirm the hypothesis that Investors are very likely to rely on any advice they found online before considering its credibility and Poor quality investment advice affects investment decisions. With the evidence from the Terra Luna case study, combining with Behavioral Finance factors. It can be seen that Herding bias and Overconfidence bias is totally at play within this Terra Luna community.

The main purpose of this study is to investigate the influence of the social media environment on investors' decisions through messages and/or tweets exchanged on social networks and whether social networks alters risk perception and investment decision making. This will further enrich our experience in behavioral finance. Even with investment information on social networks, every investor needs to conduct his/her own research carefully and should have enough valid evidence to confirm that the information one's perceived on social networks is correct. Emotional investing can lead to irreversible consequences.

However, due to the author's limited knowledge in the Data Analysis and Sentiment Analysis field, the result of the Data Analysis section can become biased, and due to the limitation of the dataset being used for this research, overfitting bias can be found along the process of this research.

## References

- (Algod. (2022, March).  
Twitter.<https://twitter.com/AlgodTrading/status/1503103705939423234>)
- (Cyrus). Younessi. (2018, April 20).  
Twitter.<https://twitter.com/cyounessi1/status/1524910207838699520>)
- (Falcon11. (2019, May 7). What is TERRA (Luna) <https://coin98.net/terra-luna> )
- (Godbole, O. (2022, March 25) Bitcoin tops \$44K amid rumors of Terra's foundation accumulating BTC. CoinDesk.<https://www.coindesk.com/markets/2022/03/25/bitcoin-tops-44k-amid-rumors-of-terras-lfg-accumulating-btc/>)
- (Jane. (2022, September 27). Tổng hợp diễn biến LUNA-UST, hành trình “bơm thổi” Terra 2.0 và lùm xùm quanh Do Kwon. Coin68. <https://coin68.com/tong-hop-luna-ust-terra-2-do-kwon/>).
- (Terra - All information about Terra ICO (Token Sale) (2018, August 30).  
<https://icodrops.com/terra/>)
- [1] Barberis, N., & Thaler, R. (2003). A survey of behavioral finance. *Handbook of the Economics of Finance*, 1, 1053-1128.
- [2] Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the econometric society*, 263-291.
- [3] Woolridge, JR, & Snow, CC (1990). Stock market reaction to strategic investment decisions. *Strategic management journal*, 11(5), 353-363.
- [4] Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and uncertainty*, 5(4), 297-323.
- AL-MANSOUR, BY (2020). Cryptocurrency Market: Behavioral Finance Perspective. *The Journal of Asian Finance, Economics and Business*, 7(12), 159–168. <https://doi.org/10.13106/JAFEB.2020.VOL7.NO12,159>
- Aliyu A., Bello, M., Kasim, R., Martin, D., (2014), Positivist and non-positivist paradigm in social science research: conflicting paradigms or perfect partners?
- Bakar, S., & Yi, A. (2016). The Impact of Psychological Factors on Investors' Decision Making in Malaysian Stock Market: A Case of Klang Valley and Pahang. *Procedia Economics and Finance*, 35, 319–328. [https://doi.org/10.1016/S2212-5671\(16\)00040-X](https://doi.org/10.1016/S2212-5671(16)00040-X)
- Baker, H., Filbeck, G., & Ricciardi, V. (2017). *Financial behavior: players, services, products, and markets*. Oxford University Press.
- Balcilar, M., Demirer, R., & Hammoudeh, SM (2012). Market regimes and herding behavior in Chinese A and B shares. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2150300>
- Barots, J. (2015). Does Bitcoin follow the hypothesis of efficient market? *International Journal of Economic Sciences*, IV(2), 10–23. <https://doi.org/10.20472/es.2015.4.2.002>
- Baur, DG, & McDermott, TKJ (2012). Safe haven assets and investor behavior under uncertainty. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2004796>
- Belsky, G., & Gilovich, T. (2000). *Why Smart People Make Big Money Mistakes and How to Correct Them*. New York: SIMON & SCHUSTER PAPERBACKS. April 09, 2021
- Bollampelly, N. (2016). *Understanding role of social media in investor reactions* [Dublin Business School].

- Bouri, E., Gupta, R., & Roubaud, D. (2019). Herding behavior in cryptocurrencies. *Finance Research Letters*, 29, 216–221. <https://doi.org/10.1016/j.frl.2018.07.008>
- Bouri, E., Shahzad, SJH, & Roubaud, D. (2019). Co-explosivity in the cryptocurrency market. *Finance Research Letters*, 29, 178–183. <https://doi.org/10.1016/j.frl.2018.07.005>
- Brick Financial Management (BFM),(n,d)
- Btc tăng, dom tăng -> tín hiệu tốt, dấu hiệu bull run. Twitter.) <https://twitter.com/RyanNguyenHC/status/1569546642508095489>
- Böhme, R., Christin, N., Edelman, B., & Moore, T. (2015). Bitcoin: economics, technology, and governance. *Journal of Economic Perspectives*, 29(2), 213–238.
- C. Harwick, "Cryptocurrency and the problem of intermediation", in *Independent Review*, vol. 20, no. 4, pp. 569-588, Spring 2016.
- Cade, N. (2018). Corporate social media: How two-way disclosure channels influence investors. *Accounting, Organizations and Society*, 68-69, 63–79. <https://doi.org/10.1016/j.aos.2018.03.004>
- Cade, NL (2018). Corporate social media: How two-way disclosure channels influence investors. *Accounting, Organizations and Society*, 68, 63-79.
- Campbell, WK, Goodie, AS, & Foster, JD (2004). Narcissism, Confidence, and Risk Attitude. *Journal of Behavioral Decision Making*, 311, 297-311.
- Celen, B., & Kariv, S. (2004). Distinguishing informational cascades from herd behavior in the laboratory. *American Economic Review*, 94(3), 484–498. <https://doi.org/10.1257/0002828041464461>
- CFA Institute, 2020, The Behavioral Biases of Individual
- Chainalysis, Crypto Crime Report, 2022, <https://go.chainalysis.com/rs/503-FAP-074/images/Crypto-Crime-Report-2022.pdf>
- Chen, GM, Kim, KA, Nofsinger, JR, & Rui, OM (2007). Trading Performance, Disposition Effect, Overconfidence, Representativeness Bias, and Experience of Emerging Market Investors. *Journal of Behavioral Decision Making*, 2(4), 425-451. <https://doi.org/10.1002/bdm>
- Chowdhury, A. (2016). Is Bitcoin the “Paris Hilton” of the currency world? Or are the early investors onto something that will make them rich? *The Journal of Investing*, 25(1), 64–72. <https://doi.com.org/10.3905/joi.2016.25.1.064>
- Chowdhury, A., & Mendelson, BK (2013). Virtual currency and the financial system: The case of Bitcoin. Working Paper.
- Daniela, K., Hirshleifer, D., & Teoh, SH (2002). Investor psychology in capital markets: evidence and policy implications. *Journal of Monetary Economics*, 49, 139-209. <https://doi.org/10.1007/978-3-642-39371-6-36>
- Demsar J, Curk T, Erjavec A, Gorup C, Hocevar T, Milutinovic M, Mozina M, Polajnar M, Toplak M, Staric A, Stajdohar M, Umek L, Zagar L, Zbontar J, Zitnik M, Zupan B (2013) Orange: Data Mining Toolbox in Python, *Journal of Machine Learning Research* 14(Aug): 2349–2353.
- Downey, L., (2021) Efficient market hypothesis (EMH), Investopedia, (Retrieved May 22, 2021) <https://www.investopedia.com/terms/e/efficientmarkethypothesis.asp#:~:text=The%20efficie>

nt %20market%20hypothesis%20(EMH)%2C%20alternatively%20known%20as%20the,consistent%20alpha%20generation%20is%20impossible.

Dubois, A., Gadde, L., (2002) Systematic combining: an abductive approach to case research, [https://www.pm.lth.se/fileadmin/\\_migrated/content\\_uploads/6.\\_Dubois\\_Gadde\\_Systematic\\_Combining.pdf](https://www.pm.lth.se/fileadmin/_migrated/content_uploads/6._Dubois_Gadde_Systematic_Combining.pdf)

Dubra, J. (2004). Optimism and overconfidence in search. *Review of Economic Dynamics*, 7(1), 198-218. [https://doi.org/10.1016/S1094-2025\(03\)00036-X](https://doi.org/10.1016/S1094-2025(03)00036-X)

Fama, EF (1970). American Finance Association Efficient Capital Markets : A Review of Theory and Empirical

Forbes, L. (2013). Does Social Media Influence Consumer Buying Behavior? An Investigation of Recommendations and Purchases. *Journal of Business & Economics Research* (Littleton, Colo.), 11(2), 107–. <https://doi.org/10.19030/jber.v11i2.7623>

Graham, JR, Harvey, CR, & Huang, H. (2009). Investor Competence, Trading Frequency, and Home Bias. *Management Science*, 55(7), 1094-1106. <https://doi.org/10.2139/ssrn.620801>

Gruber, MJ (1996). Another Puzzle: The Growth in Actively Managed Mutual Funds. *The Journal of Finance*, 51(3), 783-810. <https://doi.org/10.2307/2329222>

Hamrick, JT & Rouhi, Farhang & Mukherjee, Arghya & Feder, Amir & Gandal, Neil & Moore, Tyler & Vasek, Marie. (2021). An examination of the cryptocurrency pump-and-dump ecosystem. *Information Processing & Management*. 58. 102506. 10.1016/j.ipm.2021.102506.

[http://psych.fullerton.edu/mbirbaum/psych466/articles/Tversky\\_Kahneman\\_JRU\\_92.pdf](http://psych.fullerton.edu/mbirbaum/psych466/articles/Tversky_Kahneman_JRU_92.pdf)

<https://e.vnexpress.net/news/business/economy/young-vietnamese-look-to-cryptocurrencies-to-get-rich-quick-4410064.html>

<https://ideas.repec.org/a/eee/crpeac/v25y2014i8p724-742.html>

<https://ijesc.org/upload/188576e4e8764e0280c812942ca8a044.Behavioural%20Finance%20A%20Challenge%20to%20Market%20Efficiency.pdf>

<https://luatminhkhue.vn/nhung-dac-diem-cua-nha-dau-tu-va-cac-ly-thuyet-tai-chinh-hanh-vi.aspx>

<https://triple-a.io/crypto-ownership-data/>

<https://twitter.com/FatManTerra/status/1575022286234873857>

[https://www.brickfinancial.com/site\\_tools/mptemh.html](https://www.brickfinancial.com/site_tools/mptemh.html)

<https://www.goodfellowpublishers.com/academic-publishing.php?promoCode=&partnerID=&content=doi&doi=10.23912/978-1-91015851-7-2772>

<https://www.ig.com/en/trading-strategies/what-is-market-sentiment-and-how-do-you-trade-it-180420#:~:text=Market%20sentiment%20is%20demonstrated%20through,often%20correlate%20with%20one%20another.>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2827453/>

[https://www.researchgate.net/publication/323861317\\_Do\\_investors\\_exhibit\\_behavioral\\_biases\\_in\\_investment\\_decision\\_making\\_A\\_systematic\\_review](https://www.researchgate.net/publication/323861317_Do_investors_exhibit_behavioral_biases_in_investment_decision_making_A_systematic_review)

[https://www.researchgate.net/publication/46560184\\_Behavioral\\_Finance\\_Vs\\_Traditional\\_Finance](https://www.researchgate.net/publication/46560184_Behavioral_Finance_Vs_Traditional_Finance)

Hutto, C., Gilbert, E.: Vader: A parsimonious rule-based model for sentiment analysis of social media text. In Proceedings of the International AAAI Conference on Web and Social Media (Vol. 8, No. 1) (2014).

I. Makarov, and A. Schoar, "Trading and arbitrage in cryptocurrency markets" in Journal of Financial Economics, vol. 135, pp. 293-319, 2020.

IMF (2022). Cryptic Connections: Spillovers between Crypto and Equity Markets

Influence of Task Type on Performance, Czerwinski, Cutrell, & Horvitz, 2000

Instant Messaging and Interruption: International Journal of Business and Emerging Markets, 1(1), 24. <https://doi.org/10.1504/ijbem.2008.019243>

Jaimovich, N., & Rebelo, S. (2007, May). Behavioral Theories of the Business Cycle. Journal Of The European Economic Association, 5, 361-368. Retrieved from <http://www.management4all.org/2009/11/behavioral-theories-of-motivation.html>

Joo, BAK (2017). Influence of Overconfidence, Optimism and Pessimism on the Rationality of the Individual Investors: An Empirical Analysis. Pacific Business Review International

Journal of Management and Sustainability, vol.4, no.3. <http://www.ccsenet.org/journal/index.php/jms/article/view/39893>

Kadous, K., Mercer, M., & Zhou, Y. (2017). Undue Influence? The Effect of Social Media Advice on Investment Decisions. <https://doi.org/10.2139/ssrn.2968407>

Kadous, K., Mercer, M., & Zhou, YD (2019). Do Individual Investors Understand How Social Media Advice Influences Their Investment Decisions? SSRN 2968407.

Kahneman, D. and Tversky, A. (1979), "Prospect theory: an analysis of decision under risk. Econometrical", *Journal of the Econometric Society*, Vol. 47 No. 3, pp. 263-291, available at: <https://doi.org/10.1111/j.1536-7150.2011.00774.x>

Kathryn Kadous, Molly Mercer, Yuepin (Daniel) Zhou (2022), WHY DO INVESTORS RELY ON LOW-QUALITY INVESTMENT ADVICE? EXPERIMENTAL EVIDENCE FROM SOCIAL MEDIA PLATFORMS

Kasthurirathna, D., Harre, M., & Piraveenan, M. (2015). Influence modelling using bounded rationality in social networks. <https://doi.org/10.1145/2808797.2808886>

Khan, A., Anjum, R., & Khan, M. (2021). Investor Perception of Cryptocurrency: A Moderating Role of Social Media on Decision-Making. *Global Economics Review*, VI(IV), 136-149. [https://doi.org/10.31703/ger.2021\(VI-IV\).11](https://doi.org/10.31703/ger.2021(VI-IV).11)

Kjaerland, F., Meland, M., Oust, A., & Øyen, V. (2018). How can Bitcoin price fluctuations be explained? *International Journal of Economics and Financial Issues*, 8(3), 323–332. <http://www.econjournals.com>

Kjærland, F., Khazal, A., Krogstad, E., Nordstrøm, F., & Oust, A. (2018). An analysis of Bitcoin's price dynamics. *Journal of Risk and Financial Management*, 11(4), 63. <https://doi.org/10.3390/jrfm11040063>

Ko, KJ, & James Huang, Z. (2007). Arrogance can be a virtue: Overconfidence, information acquisition, and market efficiency. *Journal of Financial Economics*, 84(2), 529-560. <https://doi.org/10.1016/j.jfineco.2006.03.002>

Krause, M., Shiller, V., Shleifer, A., Wilcox, D., & Shiller, RJ (1970). Human Behavior and the Efficiency of the Financial System. *Handbook of Macroeconomics*, 1-34.

Kreuser, Jerome L and Sornette, Didier, Bitcoin Bubble Trouble (January 12, 2018). Forthcoming in Wilmott Magazine, 2018, Swiss Finance Institute Research Paper No. 18-24, Available at SSRN:<https://ssrn.com/abstract=3143750>

Kristoufek, L. (2015). What are the main drivers of the bitcoin price? Evidence from wavelet coherence analysis. *PLoS ONE*, 10(4). <https://doi.org/10.1371/journal.pone.0123923>

Li, X. & Wu, L.. (2018). Herding and social media word-of-mouth: Evidence from Groupon. *MIS Quarterly: Management Information Systems*. 42. 1331-1351. [10.25300/MISQ/2018/14108](https://doi.org/10.25300/MISQ/2018/14108).

Lima de Castroa, P., Barreto Tedoroa, A., Irineu de Castro b, L., Parsons, S. (2016), Expected utility or prospect theory: Which better fits agent-based modeling of markets? <https://www.sciencedirect-com.proxy.ub.umu.se/science/article/pii/S187750316301806?via%3Dihub>

Luong, L., & Ha, D. (2011). Behavioral factors influencing individual investors' decision-making and performance: A survey at the Ho Chi Minh Stock Exchange.

Luu, QT, & Luong, HTT (2020). Herding behavior in emerging and frontier stock markets during pandemic influenza panics. *Journal of Asian Finance, Economics and Business*, 7(9), 147–158. <https://doi.org/10.13106/jafeb.2020.vol7.no9.147>

MacIntosh, K., O'Gorman, R., (2015), Mapping research methodology.

Madhavan, A. (2000). Market microstructure: A survey. *Journal of Financial Markets*, 3(3), 205–258. [https://doi.org/10.1016/S1386-4181\(00\)00007-0](https://doi.org/10.1016/S1386-4181(00)00007-0)

Mahesh. KM, (2016), Behavioural Finance: A Challenge to Market Efficiency,

Mariana Durcheva and Pavel Tsankov, AIP Conference Proceedings 2172, 090004 (2019); <https://doi.org/10.1063/1.5133581> Published Online: 13 November 2019

Markowitz, HM (1952), "Portfolio selection", *The Journal of Finance*, Vol. 7 No. 1, pp. 77-91, doi: [10.2307/2975974](https://doi.org/10.2307/2975974).

Mayfield, C., Perdue, G., & Wooten, K. (2008). Investment management and personality type. *Financial Services Review*, 17(3), 219.

Mossin, J. (1966), "Equilibrium in a Capital asset market", *Econometrica*, Vol. 34 No. 4, pp. 768-783.

[https://www.scirp.org/\(S\(351jmbntvnjsjtlaadkposzje\)\)/reference/ReferencesPapers.aspx?ReferenceID=1684643](https://www.scirp.org/(S(351jmbntvnjsjtlaadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=1684643)

Mushinada, VNC, & Veluri, VSS (2018). Investors overconfidence behavior at Bombay Stock Exchange. *International Journal of Managerial Finance*, 14(5), 613-632. <https://doi.org/10.1108/IJMF-05-2017-0093>

Nair, M. (2011). Understanding and measuring the value of social media. *The Journal of Corporate Accounting & Finance*, 22(3), 45–51. <https://doi.org/10.1002/jcaf.20674>

Naseer, M., Tariq, Y., 2016, The Efficient Market Hypothesis: A Critical Review of the Literature. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2714844](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2714844)

Nguyen Thi Ngoc Diep, Nguyen Minh Kieu (2013), FINANCIAL FACTORS AFFECTING INVESTMENT DECISIONS OF INVESTORS IN HO CHI MINH CITY TRANSFER

Niehaus, G., & Shrider, D. (2014). Framing and the disposition effect: Evidence from mutual fund investor redemption behaviour. *Quantitative Finance*, 14(4), 683-697. <https://doi.org/10.1080/14697688.2013.819114>

- Nik, M., (2009) Behavioral finance Vs traditional finance,
- Park, A., & Sabourian, H. (2011). Herding and contrarian behavior in financial markets. SSRN Electronic Journal. <https://doi.com org/10.2139/ssrn.913728>
- Pasewark, WR, & Riley, ME (2010). It's a matter of principle: The role of personal values in investment decisions. *Journal of Business Ethics*, 93(2), 237–253. <https://doi.org/10.1007/s10551-009-0218-6>
- Poyser, O. (2018). Herding behavior in cryptocurrency markets (Issue November). <http://arxiv.org/abs/1806.1348>
- Ritter, JR (2003). Behavioral finance. *Pacific Basin Finance Journal*, 11(4), 429–437. [https://doi.org/10.1016/S0927-538X\(03\)00048-9](https://doi.org/10.1016/S0927-538X(03)00048-9)
- Rogojanu, A., & Badea, L. (2014). The issue of competing currencies: Case study – Bitcoin. *Theoretical and Applied Economics*, 21(1), 103–114.
- Rothman, T., & Yakar, C. (2019). Empirical Analysis Towards the Effect of Social Media on Cryptocurrency Price and Volume. *European Scientific Journal*, ESJ, 15(31), 52. <https://doi.org/10.19044/esj.2019.v15n31p52>
- Ryan Nguyen. (2022, August 27). Quan điểm cá nhân của Ryan Tháng 9 này BTC sẽ xanh, khác so với những năm vừa rồi, đợi xem. Twitter. <https://twitter.com/RyanNguyenHC/status/1563365310161334273>, Ryan Nguyen. (2022, September 13).
- Sandor, K. (2022, September 9). Terra's LUNA token gains 200% in a few hours amid speculative frenzy. CoinDesk. <https://www.coindesk.com/markets/2022/09/09/terras-luna-token-gains-200-in-a-few-hours-amid-speculative-frenzy/>
- Saunders, M., Lewis, P. and Thornhill, A. (2009), *Research methods for business students*, (Fifth edition). Italy: Pearson Education Limited.
- Saunders, M., Lewis, P., & Thornhill, A., (2019), *Research methods for business students* (Eighth edition). Pearson Education.
- Shin, Heejeong & Park, Sorah. (2018). Do foreign investors mitigate anchoring bias in stock market? Evidence based on post-earnings announcement drift. *Pacific-Basin Finance Journal*. 48. [10.1016/j.pacfin.2018.02.008](https://doi.org/10.1016/j.pacfin.2018.02.008).
- Soufian, M., Forbes, W. and Hudson, R. (2014), “Adapting financial rationality: is a new paradigm emerging?”, *Critical Perspectives on Accounting*, Vol. 25 No. 8, pp. 724-742.
- Stambaugh, RF, Yu, J., & Yuan, Y. (2015). Arbitrage asymmetry and the idiosyncratic volatility Puzzle. *Journal of Finance*, 70(5), 1903–1948. <https://doi.org/10.1111/jofi.12286>
- Suddaby, Roy. (2006). From the editors: What grounded theory is not. *Academy of Management Journal* 49(4): 633–642.
- Tetlock, P. (2015). The Role of Media in Finance. In *Handbook of Media Economics* (Vol. 1, pp. 701–721). <https://doi.org/10.1016/B978-0-444-63685-0.0018-8>
- The Cost of Not Paying Attention: How Interruptions Impact Knowledge Worker Productivity, Spira & Feintuch, 2006
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124-1131. <https://doi.org/10.1126/science.185.4157.1124>

Waweru, NM, Munyoki, E., & Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange.

Work. Journal of Finance, 25(2), 28-30. <https://doi.org/10.2307/2325486>