

THE IMPACT OF ANNOUNCEMENTS ON CRYPTOCURRENCY PRICES

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Abstract: *The study examines the influence of public announcements, regulatory actions, and significant events on the price movements of Bitcoin, Ethereum, Ripple, and Dogecoin, focusing on market volatility and stability. Historical exchange rate data, covering the period from 03 June 2017 to 27 October 2024, with over 2700 daily price observations, were analyzed. The primary aim was to explore how these events shape cryptocurrency price reactions, uncover patterns in market behavior, and assess market sentiment. The findings reveal that volatile assets like Dogecoin experience more pronounced and longer-lasting price changes in response to positive announcements, while more stable cryptocurrencies such as Bitcoin and Ethereum show relatively brief price shifts. Negative events, especially those involving regulatory actions or market disruptions, tend to have a prolonged and detrimental effect on cryptocurrency prices. Additionally, the study highlights the growing stability of the cryptocurrency market, driven by an expanding user base. Bitcoin and Ethereum exhibit moderate volatility, while Dogecoin and Ripple show higher volatility. The research also identifies correlations between cryptocurrencies, such as the strong relationship between Bitcoin and Ethereum, suggesting potential for price manipulation between correlated assets. Investor sentiment plays a crucial role in amplifying the effects of both positive and negative events, with favorable sentiment driving price increases and negative sentiment contributing to market declines. The research provides valuable insights for investors, enabling them to navigate cryptocurrency market volatility and make more informed investment decisions.*

Keywords: *market manipulation, cryptocurrency volatility, announcement effect, cryptocurrency news sentiment, cryptocurrency daily returns, market capitalization, cryptocurrency market dynamics, cryptocurrencies*

JEL classification: *G14, G15, G41, C58, C55, C63, C45, O33, E44*

1. Introduction

Since Bitcoin's creation in 2009, the cryptocurrency market has seen rapid growth. What was considered once a niche market, with unofficial trading in the beginning, now operates 24/7 across more than 500 exchanges (Wątarek, Kwapien, & Drożdż, 2023). However, in terms of capitalization, the cryptocurrency market is still far smaller than the global stock market (\$1.86 trillion vs. \$109 trillion) (Forbes, 2024; Visual Capitalist, 2024). The announcement effect, in the context of financial markets, has been studied for over 60 years (Fama, Fisher, Jensen, & Roll, 1969). At that time, the origin of the announcements was primarily local, and the rate at which the information spread was slower. These days, global access to the Internet, along with ubiquitous social media platforms, opens the gates for deception and manipulation (Nizzoli, Tardelli, Avvenuti, Cresci, Tesconi, & Ferrara, 2020).

Cryptocurrency market manipulation refers to strategies aimed at altering cryptocurrency prices, often leading to artificially high or low values compared to what would occur under typical market conditions. Common manipulation tactics in both cryptocurrency and traditional financial markets include pump-and-dump schemes, spoofing, wash trading, and insider trading. Although the Securities and Exchange Commission (SEC) has increased its efforts to regulate cryptocurrency markets, these markets still face less regulation and enforcement compared to more established financial markets like stock exchanges. Consequently, cryptocurrency markets remain more vulnerable to manipulation (EconOne, 2024).

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Insider trading, a long-standing issue in financial markets, can also take place in cryptocurrency markets. It happens when individuals use confidential information about a cryptocurrency to manipulate the market. This often involves using privileged knowledge of upcoming announcements, such as new cryptocurrency listings or major news that could significantly impact the market (EconOne, 2024).

The motivations behind this study are as follows:

1. Exploring the History and Evolution of the Cryptocurrency Market: Investigate the development of cryptocurrencies, the underlying technology, and the factors contributing to their popularity.
2. Analyzing the Influence of Announcements on Cryptocurrency Prices and Market Behavior: Examine how various announcements, such as regulatory changes, technological developments, public statements by opinion leaders, and black swan events, impact cryptocurrency prices and market dynamics.
3. Forecasting Cryptocurrency Price Movements: Forecast the price movements of selected cryptocurrencies by analyzing market trends and considering the impact of existing announcements, providing predictive insights into future market behavior.
4. Assessing the Stability and Volatility of the Cryptocurrency Market: Identify trends and patterns in the behavior of selected cryptocurrencies over time to understand market stability and volatility.
5. Understanding the Impact of External Factors on Cryptocurrency Price Movements: Explore how market sentiment and economic conditions shape cryptocurrency price movements.
6. Providing Actionable Insights and Recommendations for Investors: Offer strategies to navigate the volatility of the cryptocurrency market and capitalize on price movements influenced by announcements.

2. History of cryptocurrency market

All the existing markets are more or less similar, and the digital market is no exception, as it tries to copy the ones that already exist (The Art Newspaper, 2021). Global digitalization influences every market, but the cryptocurrency market claims to be the most affected by the media (Kyriazis, Papadamou, Tzeremes, & Corbet, 2022). At the same time, so-called Black Swans that usually cause a negative impact on the stock and foreign exchange markets can otherwise be positive for cryptocurrencies (Petti & Sergio, 2024). In terms of similarity, the cryptocurrency market rather reminds of the foreign exchange market, as it also has a relatively small amount of most traded currencies (LearnCrypto, 2024).

The Digital Revolution, or the Third Industrial Revolution, which started in 1947 and is still in progress, has forced many sectors to change or adapt to the new reality (Schoenherr, 2004). Invention of the Internet in 1969 along with invention of the World Wide Web in 1989 played a significant role in changing every possible business aspect, every institution and almost everything that surrounds us in general. Information flows have become much faster, and the amount of the information itself keeps steadily increasing. For example, in 2008, business information consumption was estimated at an unbelievable 9,570,000,000,000,000,000 bytes (9.57 zettabytes or 9,570,000,000 terabytes) a year (Hilbert, 2015). Apart from the constantly increasing amount of created data, there is artificial intelligence that, according to Roser (2023), will be developed within the next few decades, as 90% of the questioned experts gave a date within the next 100 years.

Digitalization affects financial institutions and markets as well. There are two types of markets: money and capital. The concept of a money market has been around for centuries, however the modern market as we know it first took shape in the XX century. The development of money market instruments and practices has evolved over time to meet the changing needs of the financial system. As well as money market capital markets have a long history dating back centuries. The Amsterdam Stock Exchange, established in 1602 by the Dutch East India Company (Verenigde Oost-Indische Compagnie (VOC)), is considered the world's first official stock exchange (Petram, 2011). However, various forms

of capital markets and financial instruments have existed even earlier in different cultures. For example, in the Roman Empire there was no capital market, however people, according to Peter Temin's article, have already been able to invest their money. More than that, they were showing financial sophistication and understanding that investors must think about the opportunity cost of invested funds, whether borrowed or not (Temin, 2006). Over the centuries capital markets have evolved and expanded globally to facilitate the buying and selling of financial instruments.

Considering existing risks, digitalization and the demand of people to remain anonymous when they purchase goods or make other transactions – the concept of cryptocurrency was developed. Oxford dictionary describes cryptocurrency as a digital currency in which transactions are verified and records maintained by a decentralized system using cryptography, rather than by a centralized authority. As for now, Bitcoin is the most popular and valuable cryptocurrency with its \$2.01 trillion market capitalization (2024), introduced in 2009 by a mysterious person no one has ever seen - Satoshi Nakamoto (Bankrate, 2024). However, Bitcoin is not clearly the first cryptocurrency as the concept of it is far older. The concept of a cryptocurrency was created and described by cryptographer David Chaum in his article «Blind Signatures for Untraceable Payments» published in 1983. Of course, there was no such a term (cryptocurrency) back then, so in fact David Chaum in his article rather introduces a new kind of cryptography called «blind signatures» that can be used in untraceable payment systems offering advanced level of personal privacy, auditability and control compared to the existed systems. There, he also touches on some highly relevant today cryptocurrency-related problems such as criminal use of payments, substantial personal privacy, impact on the nature, lack of control, and security (Chaum, Rivest, & Sherman, 1988). Later, he founded an electronic cash company named DigiCash in 1989 and the first-ever electronic money called eCash (Investopedia, 2024).

In 1998 Wei Dai published b-money proposal where a digital decentralized currency system was described. The key ideas mentioned in b-money were similar to the ones that were used for Bitcoin such as: Decentralization (a system where participants would maintain as hared ledger of accounts, removing the need of a central authority), Proof of Work (the idea of using computational effort with economic incentives for the users contributing their resources to secure the system), Smart contracts and anonymity (a system of smart contracts and accounts with only pseudonyms as names to enable anonymous transactions without trust in third parties were discussed in the following proposal) (Dai, 1998).

In the same year (1998) another proposal was introduced. Nick Szabo, a computer scientist and a cryptographer proposed Bit Gold that wasn't implemented; however, the concept was even more like Bitcoin itself than any other digital currency. The primary ideas in Bit Gold were: Proof of work (Nick Szabo proposed using computational puzzles to generate the currency that would be distinctive, limited and possess inherent value due to the effort needed to get produced), Decentralized ledger (a public ledger would be used for transactions and ownership of Bit Gold that is maintained by the participants in the network), Decentralization (similarly to b-money the system that is relied on cryptography and peer – to – peer verification is proposed to eliminate the need of intermediaries like banks), Immutable records (the concept Nick Szabo proposed included a tamper-proof chain of blocks to store records – that had a significant impact on Bitcoin's blockchain technology) (Szabo, 1998).

In 1997 Adam Black developed Hashcash – a system that was designed to confront spam emails and other types of network abuse by forcing senders to solve computational puzzles. The key concepts of Hashcash were: Proof of Work (the concept was that the email sender must demonstrate they spent computational resources in order to send it – the following concept later served as the foundation for the mining algorithm in Bitcoin), Computational puzzles (Hashcash required the sender to find a nonce that, when hashed with the recipient's address and timestamp, produced a hash with a specific number of leading zeroes, the difficulty could be adjusted to ensure it took a reasonable time to solve), Anti-Spam and Abuse prevention (By embedding the computational work in email headers, Hashcash made it costly for spammers to send bulk emails, as solving the puzzle was time-consuming and resource-intensive) (Back, 1997).

Hal Finney expanded on Adam Black's Hashcash to create Reusable proof of work (RPOW) in

2004. The system that allowed users to reuse Proof of Work tokens for digital transactions and, despite being on a centralized server, was an important step toward Bitcoin’s decentralization Proof of Work system development (Forbes, 2024).

Bitcoin was developed using the following technologies with the purpose to make transactions online easier avoiding banks and other payments systems, as the most of them are: not fast enough (SWIFT), expensive to deal with (have high fees), bureaucratic, not secure enough. However, remains a mystery who or what entity behind this cryptocurrency is. Therefore, it is fair to assume it might end up being a financial pyramid after all, as there are no assets at all behind it. Despite this, cryptocurrencies formed their own unique cryptocurrency market, as according to CoinMarketCap, there are now more than 23,000 different cryptocurrencies in the world (Visual Capitalist, 2024). At the same time, the number of real currencies is far lower—180 that are circulating in 197 countries (Eurochange, 2024). Similarly, to foreign exchange where the majority of payments are made using the United States Dollar, the Euro, Great Britain Pound, Japanese Yen, or Chinese Yuan, the cryptocurrency market also has top traded currencies such as Bitcoin, Ethereum, Tether USDt, Binance Coin, Ripple, and so on (Investopedia, 2024; Statista, 2024). However, in terms of capitalization, the cryptocurrency market is still far smaller than the global stock market (\$3.91 trillion vs \$109 trillion) (Forbes, 2024; Visual Capitalist, 2024).

Cryptocurrency market, as for now, is not as well developed as other existing market. Appearance of brokers and other platforms, has, first of all, erased anonymity of crypto currency owners, as the majority of them require personal data only to register there. In fact, without this key feature of a cryptocurrency there is not a big difference between crypto and real currency for that matter. And indeed, for example, banks know everything about their clients so do platforms such as Binance, Coinbase and so on. Basically, the only advantage remaining is speed, as transactions are made faster than SWIFT, however the amount of risk might be even higher. As it was mentioned above, there are plenty of risks when it comes to finance. Despite that, according to Nobel Prize winner Richard Thaler, people make illogical and irrational choices all the time and in a highly predictable manner (The Decision Lab, 2024). More than that, there is another one upcoming risk for cryptocurrency owners. Blockchain technology is well known for its security, however the question is – Will it still be secure enough when Artificial Intelligence gets invented that will be also able to guess all the passwords?

Many scholars seek to understand the impact of the announcement effect, as it is easier to influence a smaller market than a larger, more stable one (Shah, 2024). Obviously, if the market keeps getting more and more investors is considered healthy, or, otherwise, if everyone loses interest and quits everything collapses. However, when it particularly comes to the cryptocurrency market, it is far worse, as cryptos have nothing behind them (no real assets), meaning the risk of losing everything is extreme (Chimienti, Kochanska, & Pinna, 2019). Cryptocurrencies have far more problems that require research, for example, plenty of legal issues, as in many countries they are considered illegal. Experts keep arguing if cryptoassets can be considered as property or not, dealing with exchange offices and crypto markets forces investors to register with their IDs, so cryptocurrencies lose one of their key purposes, such as anonymity, and so on (World Bank Blogs, 2024). Considering all this cryptocurrency market remains a mystery and requires complex research that combines different disciplines to be able to forecast it and to be able to find out if it will become a real market or fade away like financial pyramids.

By analyzing the article that explains not only how blockchain technology works but what bitcoin is made for – it is fair to compare the ideas of David Chaum’s eMoney to Satoshi Nakamoto’s Bitcoin and blockchain ideas in general.

Table 1: The Difference Between Key Digital Currency Ideas

David Chaum’s eMoney ideas	Satoshi Nakamoto’s Bitcoin / Blockchain ideas
Focus on Privacy Chaum’s work, especially with DigiCash declares the importance of privacy in digital transactions and his concept called «blinded	Trustless System The Bitcoin system relies on cryptographic proof rather than trust in a central authority. All transactions are recorded on a public blockchain

signatures» allowed for anonymous transaction where the identity could be hidden from everyone in the chain.	that is maintained by a decentralized network of miners who strive to secure the network and to validate all the transactions.
Centralized Trust Model Chaum’s digital cash system was still relying on central (bank – like) authority that was issuing and verifying the currency.	Decentralization Nakamoto’s idea is to eliminate the need for a central authority therefore instead of relying on a trusted third-party Bitcoin uses a peer-to-peer network where transactions are verified by multiple so-called nodes guaranteeing integrity and security through computational proof.
Preventing Double-Spending Double – spending was prevented by the same central authority that was verifying every transaction.	Double – Spending solution Nakamoto managed to solve double-spending problem by using an allocated timestamp server that orders all the transactions chronologically. The system is secured by proof – of – work that makes it impossible for anyone to change the transaction history or to spend Bitcoin twice.
Does not have any economic incentives Chaum’s eMoney had no incentives for participants over time apart from anonymous transactions. In other words, a person could only exchange his money to eMoney issued by a central authority to then make an anonymous transaction.	Does have economic incentives Nakamoto’s system allows participants (so-called miners – the ones that provide their own hardware to the system) to get rewarded with bitcoins and transaction fees for securing the network.

Source: Chaum, D., Rivest, R. L., & Sherman, A. T. (Eds.). (Year). *Advances in Cryptology*. Springer.
Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system*. Retrieved from <https://bitcoin.org/bitcoin.pdf> (Accessed: August 15, 2024).

Based on the comparison of the key ideas made in the Table 1 it is still impossible to say what approach is better. Every approach has its pros and cons and is rather depended on the specific needs, values of the individuals and the context in which the digital currency is being used. However, it is fair to assume that economic incentives for the participants of the process are surely one of the primary factors that made Bitcoin far more popular than eMoney.

3. Literature review

The cryptocurrency market looks more and more attractive, as it offers fast and huge profit for its investors. The market is much "younger" than others, and due to it, can be rather unstable, plus, not to mention, its dependency on the media—for example, Elon Musk, who replaced X’s application logo with the Shiba Inu dog, increased the price of so-called Dogecoin by 30% by doing just that (NPR, 2024). This also verifies the article «How Elon Musk's Twitter activity moves cryptocurrency markets» by Lennart Ante where the author concludes that Elon Musk’s posts in twitter (now X) influence the cryptocurrency market significantly, however the persistence of this «Musk Effect» is uncertain as it also raises concerns about investor protection due to the large price volume movements caused by a single post. The author highlights the need for potential regulatory measures, such as requiring influencers to disclose their holdings in cryptocurrencies they comment on (Ante, 2023). No doubt, some of the cryptocurrencies, like the one mentioned above, don’t even look serious enough to invest even a penny in them, as they rather look like a joke than a real asset. There is even a term that does exist for them - "meme coin" (CoinMarketCap, 2024). More than that, according to CoinGekko over 50% of existing 24000 coins since 2014 had failed and considered «dead». More than 8000 cryptocurrencies have failed in 2021 and 2022 combined. Those 2 years were the first after the COVID-19 pandemic, so it means the bullish expectations during it did not meet the reality. Cryptocurrencies that are considered failed get deactivated and removed from the platforms for the following reasons: no trading activity within the last 30 days, projects are fraudulent or involve rug pulls, or projects get deactivated upon the

owner's request (CoinGecko, 2024). This fact might mean that the interest in cryptocurrencies is temporary.

Deceased national currencies also exist; however, there's usually a chance to replace demonetized currencies with new ones. When it comes to cryptocurrencies, there is never such an option—that's one of the advantages of having a central authority (BitRawr, 2024).

It is essential to understand the nature of the market to be able to forecast it and to find out if it is no more than another financial pyramid or the future of money. Understanding the nature also helps to forecast possible risks so it can get evaluated before it appears.

In the article "Impact of Macroeconomic News, Regulation, and Hacking Exchange Markets on the Volatility of Bitcoin" by Stefan Lyócsá, Peter Molnár, Tomáš Plíhal, and Mária Širanová, the authors examine the factors influencing Bitcoin's volatility, with a particular focus on the impact of announcements. They find that Bitcoin's volatility increases significantly ahead of regulatory announcements, especially those covered by major outlets like the Financial Times. This is consistent with prior studies suggesting that regulation plays a crucial role in cryptocurrency price movements. Additionally, the authors find that Bitcoin's volatility is strongly affected by hacking attacks on exchanges, especially in terms of jump volatility, which involves abrupt price changes. In contrast, macroeconomic news has little effect on Bitcoin's volatility, except for forward-looking indicators like the consumer confidence index, suggesting that Bitcoin is more influenced by announcements specific to the cryptocurrency market rather than general economic news (Lyócsa, Molnár, Plíhal, & Širanová, 2020).

In the study "Cryptocurrency reaction to FOMC Announcements: Evidence of Heterogeneity Based on Blockchain Stack Position" by Shaen Corbet et al., the authors found that currency-based digital assets (e.g., Bitcoin) react similarly to traditional financial assets to monetary policy announcements such as those from the Federal Reserve. These assets are influenced by broader FIAT market conditions. However, protocol-based assets (like Ethereum) show a different reaction, sometimes even moving in the opposite direction to currency-based assets in response to similar announcements. The study also highlights the role of ICO-related announcements, where speculative movements and informational overshooting can cause significant price changes, especially in the application layer of the blockchain (Corbet, Larkin, Lucey, Meegan, & Yarovaya, 2020).

In the article Expectations of Macroeconomic News Announcements: Bitcoin vs. Traditional Assets by Ivan Mužić and Ivan Gržeta, the authors examine how U.S. macroeconomic news impacts Bitcoin compared to traditional assets like gold, the S&P 500, and Treasury notes. They find that while macroeconomic news significantly affects Bitcoin's returns, it has little impact on volume or volatility. Bitcoin's response is similar to 2-year Treasury notes, but not to gold, challenging the idea of Bitcoin as "digital gold." The study highlights Bitcoin's riskier, emotion-driven market, suggesting the need for regulation to protect retail investors due to its high volatility (Mužić & Gržeta, 2022).

Igor Makarov and Antoinette Schoar, in their article, study price formation and arbitrage in the cryptocurrency market and conclude that the arbitrage spreads are much larger for exchanges across countries than within the same one. As well, exchange rates between different currencies show small deviations on all exchanges. These results display that the main factors that contribute to market segmentation are the lack of regulatory oversight along with capital control (Makarov & Schoar, 2020).

More than that, the so-called "Black swans" mentioned above might otherwise have a positive impact on the cryptocurrency market, like the recent COVID-19 pandemic (Mnif, Jarboui, & Mouakhar, 2020). Cryptocurrencies are well known for being extremely complex and highly volatile (Antonakakis, Chatziantoniou, & Gabauer, 2019). In fact, when other markets were struggling due to the economy shut down resulting in significant losses, cryptocurrencies were otherwise gaining value (Ashraf, 2020). As in March 2020, the price of one Bitcoin dropped more than 50% from \$10,000 to \$4,000; however, by February 2021, it was around \$44,000 (Khan & Khan, 2021). Analyzing such a phenomena Mrestyal and Maaz Khan in their article conclude that all cryptocurrencies (Bitcoin, Ethereum and Litecoin used in the article) exhibit volatility clustering, as well as fat tail phenomena with leverage effects in both

(before and after) the period of COVID-19 pandemic. More than that they claim that conditional volatility of the mentioned above cryptocurrencies also affected by the recent news (ARCH effect) and by old news as well (GARCH effect) (Khan & Khan, 2021).

According to Hashemi Joo and others in their article «Announcement effects in the cryptocurrency market» significant abnormal returns can be observed on the day of the news event, however cumulative abnormal returns continue to diverge for several days after the event, indicating that it takes time for the market to fully incorporate the news into prices. Cumulative abnormal returns extending up to six days after the event therefore the information in the cryptocurrency market is absorbed slowly. Negative news results in larger cumulative abnormal returns compared to positive news, displaying a stronger reaction to negative events. Traders and investors might still find trading opportunities by entering positions even after major news announcements due to the market reaction to news that can be prolonged and more pronounced for negative events (Hashemi Joo, Nishikawa, & Dandapani, 2020).

Similar results are declared by Emrah Öget in his article The effect of positive and negative events on cryptocurrency prices, where he finds that negative events have a stronger impact on cryptocurrencies than positive. The article suggests that investors consider even quitting the market after negative news is announced to avoid greater losses (Öget, 2022).

Gourang Aggarwal and others in their article «Understanding the Social Factors Affecting the Cryptocurrency Market» indicate a weak correlation between social factors and cryptocurrency market trends suggesting that traditional methods of analyzing the stock market may not be applicable to the cryptocurrencies market due to different nature of this market with different characteristics and markets behavior. The article also declares that various news stories may influence market fluctuations, either short or long term. However, the overall effect of media on cryptocurrency prices is not yet clear due to limited data and the emerging nature of the market itself (Aggarwal, Patel, Varshney, & Taylor, 2019).

The study «Impact of public information arrivals on cryptocurrency market: a case of twitter posts on ripple» published by Samet Gunay by using Markov regime switching regression analysis examined the impact of Ripple's (one of the most popular cryptocurrencies) Twitter (now X) announcements on its price under different market conditions. The result declares that in a bull market, public information positively influenced Ripple's price; however, in a bear market, these announcements were not enough to counteract the downward trend (Gunay, 2019).

Shaen Corbet and others share surprising results in their article «The volatility generating effects of macroeconomic news on cryptocurrency returns». The results declare the absence of significant relationship between GDP announcements and Bitcoin returns due to the reduced number of observations since GDP data is released quarterly. The study also finds that news related to durable goods and unemployment significantly affects Bitcoin returns, while even CPI doesn't show statistically significant relationships (Corbet, Larkin, Lucey, Meegan, & Yarovaya, 2018).

Minjung Park and Sangmi Chain in their article «The Effect of Information Asymmetry on Investment Behavior in Cryptocurrency Market» found that many traders base their trading decisions more on sentiment rather than on concrete information about cryptocurrencies they buy. The cryptocurrency market itself exhibits a high degree of information asymmetry compared to the stock market what means that privileged information has a stronger influence there contributing to higher risk and market inefficiency. The article suggests that to manage sentiment-based investments and reduce price volatility, as well as proper regulation and public information dissemination, are necessary (Park & Chai, 2020).

Anamika Kulbhaskar and others in their article «Do News Headlines Matter in the Cryptocurrency Market? » came a conclusion that news sentiment significantly impact cryptocurrency returns. A notable result of the study is that cryptocurrencies respond differently to sentiment due to their diverse and heterogeneous nature, with sentiment having a stronger effect on younger, smaller, and more volatile cryptos (Kulbhaskar, Anamika, & Subramaniam, 2021).

Stuart Hyde and others compare cryptocurrency market to Forex in their article «News Sentiment

in the Cryptocurrency Market: An Empirical Comparison with Forex». The don't agree with the result that cryptocurrencies react more on negative news, otherwise the authors declare that particularly Bitcoin shows a stronger response to positive news and even ignores negative ones. They underline that negative news has a delayed effect on Bitcoin and even sometimes positive effect. They add that Bitcoin's trading volume increases with news, however its volatility remains largely unaffected by news, except during so-called bubble periods. The authors find that traditional currencies (Forex) react immediately and significantly to economic news, with negative news decreasing exchange rate returns and positive news increasing them, which is quite logical. At the same time, both types of news lead to increased trading volume (Hyde, 2020).

The research by Tiam Bakhtiar, Xiaojun Luo, and Ismail Adelopo explores the factors influencing cryptocurrency prices, with a focus on network effects and social media influence. They found that variables such as the number of active wallet addresses, transactions, and circulating supply significantly impact cryptocurrency prices. These factors could amplify the effects of announcements or other external events, indirectly reflecting the announcement effect on prices. Additionally, the study underscores the influence of social media, specifically X (Twitter) sentiment and Reddit subscribers, suggesting that online sentiment and social networks play a key role in determining cryptocurrency values. Future research could integrate these elements into more comprehensive models to better understand market dynamics (Bakhtiar, Luo, & Adelopo, 2023).

However, banks might even face bankruptcy investing their money wrong. Carlos Esparcia, Ana Escribano, and Francisco Jareño conclude in their article that the USD Coin stablecoin may have played a significant role in the recent collapse of the Silvergate bank (Esparcia, Escribano, & Jareño, 2023). So, it means even professional investors can easily fail investing in cryptocurrencies.

4. Data collection

Four cryptocurrencies are selected for the following research. All of them as for 26 November 2024, are listed in top 10 cryptocurrencies based on market cap. The first one is Bitcoin itself that is considered the most valuable and the strongest cryptocurrency, Ethereum with more than \$400 billion USD market cap, XRP with its \$78 billion USD market cap, and Dogecoin, which is considered one of the top-performing cryptocurrencies due to Elon Musk's rise of political influence and the fact he used to "promote" it via posting tweets on his account (CoinRanking, 2024; Visual Capitalist, 2024).

All four selected currencies have different market capitalization, with the prices of the two biggest ones (Bitcoin, Ethereum) differing by an order of magnitude from the other two (Dogecoin, Ripple (XRP)). Three of them are considered the most mentioned cryptocurrencies on Twitter (now X) (Bitcoin, Ethereum, Dogecoin), while Ripple (XRP) is less influential (PlasBit, 2024). All selected currencies have designed with different purposes:

- Bitcoin aims to be a store of value and digital currency.
- Ethereum is a decentralized platform for decentralized applications and smart contracts.
- Dogecoin started as a meme but has become a fun way to exchange small amounts.
- XRP focuses on facilitating fast and cheap cross-border payments.

Considering the difference in purposes, the influential level, market capitalization, and other distinguishing factors, this variety of cryptocurrencies should indeed be sufficient to achieve the research goals. By incorporating both major players like Bitcoin and Ethereum, and smaller altcoins with niche purposes or communities, it should be possible to observe how different triggers (market sentiment, regulatory events, technological developments, black swans) affect various segments of the cryptocurrency market. Only four cryptocurrencies were selected due to three of them being considered the most mentioned cryptocurrencies on social media (Bitcoin, Ethereum, Dogecoin) along with the one that is less influential, Ripple (XRP) (New Straits Times, 2024).

However, all of them have established histories with strong price movements tied to events like regulatory rulings, celebrity endorsements, and technological advancements, making them ideal for studying the announcement effect. Other coins may not exhibit the same level of volatility, media

coverage or being way too new, limiting their usefulness for this specific research. These four provide enough data and relevant market responses to draw meaningful insights.

It is fair to consider Bitcoin, Ethereum, and XRP as real payment methods; however, Dogecoin was created and designed as a joke to make fun of the speculation in cryptocurrencies. Therefore, a hypothesis arises that Dogecoin's success is only based on the announcement effect, as there are quite a few cryptocurrencies designed for fun (there is even a term—Meme Coins), but they have never been promoted as much as Dogecoin (Barron's, 2024). It is also fair to notice that investors understanding the risks usually avoid not serious assets, however for Dogecoin it looks an entirely different story.

The decision to avoid cryptocurrencies that are linked to the US Dollar is based on the fact they are designed to maintain a 1:1 value with the United States Dollar. Consequently, all the announcements that affect US Dollar directly affect the cryptocurrency that is linked to it. Dollar in this case minimizes price volatility, makes these cryptocurrencies popular for trading, payments and to store. The primary concern of the research is to focus on high volatile assets that are not linked to stable national currencies, but that are independent or linked to other cryptocurrencies to find out the impact of the announcement affect. Additionally, it is essential to find out if there is a correlation between cryptocurrency prices, despite the fact if they are linked to each other or not.

Historical exchange rate secondary data is sourced from Investing.com and covers the period from 03 June 2017 to 27 October 2024, for all the selected cryptocurrencies. It includes more than 2700 daily price observations. This period encompasses major and minor announcements listed below in Table 2. The number of observations is sufficient for forecasting prices and for the statistical analysis as well. All the exchange rates are in US Dollar (Investing.com, 2024a; Investing.com, 2024b; Investing.com, 2024c; Investing.com, 2024d).

Major and minor announcements are categorized as positive or negative based on their impact on the price change of the cryptocurrencies mentioned in them. The categorization also considers their effect on other markets, the type of news, and the period from 12 July 2019 to 27 July 2024. Each announcement in this study had a significant impact on either a specific cryptocurrency, another, or on all of them combined. The analysis focuses on how these events—whether regulatory, technological, or market-related—shaped investor behavior and price movements across the selected cryptocurrencies. The sources of the announcements are BBC News, CNN, Reuters, The New York Times, The Wall Street Journal, Forbes, Bloomberg, The Financial Times and Twitter (now X) itself. The list of the selected announcements is presented in the Table 2.

Table 2: The List of Selected Announcements

No	Date	Positive/negative for the crypto market	Type of news	Event
1	27.07.2024	Positive	Public speech of an opinion leader	Donald Trump pledged to make the U.S. the "crypto capital of the planet" if he wins the 2024 election, proposing to end the "war on crypto," establish a federal Bitcoin reserve, and promote Bitcoin mining and transactions.
2	13.07.2023	Positive	Regulatory action	A U.S. judge ruled XRP was not a security on exchanges, causing XRP to surge and boosting positive sentiment in the crypto market.
3	07.11.2022	Negative	Bankruptcy of a cryptocurrency exchange FTX	Binance announced plans to sell its entire FTT holdings after criticism of FTX CEO Sam Bankman-Fried's regulatory stance. This caused FTT's price to plummet by 19%.
4	24.02.2022	Negative/Positive	Black swan	Russo-Ukrainian conflict
5	12.05.2021	Negative	Tweet of an opinion leader	Tweet: Musk announced Tesla would stop accepting Bitcoin over environmental concerns.

				Impact: Bitcoin's price dropped sharply but later recovered amid talks on sustainable energy.
6	28.04.2021	Positive	Tweet of an opinion leader	Tweet: Musk referred to himself as "The Dogefather" ahead of his SNL appearance. Impact: Dogecoin saw a surge in interest and a short-term price spike.
7	01.04.2021	Positive	Tweet of an opinion leader	Tweet: Musk announced SpaceX would put a "literal Dogecoin on the literal moon." Impact: Dogecoin's price surged, boosting its popularity.
8	08.02.2021	Positive	Tweet of a company	Tweet: Tesla announced a \$1.5B Bitcoin investment and acceptance as payment. Impact: Bitcoin surged to a then all-time high of \$44,000.
9	29.01.2021	Positive	Tweet of an opinion leader	Tweet: Musk added "#Bitcoin" to his Twitter bio. Impact: Bitcoin's price surged to new all-time highs.
10	22.12.2020	Negative	Regulatory action	The SEC's lawsuit against Ripple over XRP as an unregistered security caused XRP's price to plummet and raised broader concerns about crypto regulation.
11	20.12.2020	Positive	Tweet of an opinion leader	Tweet: Musk tweeted, "One word: Doge." Impact: Dogecoin's price spiked significantly.
12	12.03.2020	Negative/Positive	Black swan	The COVID-19 pandemic caused a market crash, with Bitcoin dropping over 50% in a day, revealing its strong correlation with traditional markets in crises.
13	11.07.2019	Negative	Tweet of an opinion leader	Tweet: Trump called Bitcoin volatile and baseless. Impact: His criticism hinted at stricter U.S. regulation, briefly dipping Bitcoin's price before recovery.

5. Research Methodology

To avoid skewed results or biased models it is necessary to standardize the exchange rate data collected for all the currencies. Due to the significant exchange rate difference, for example, as for, 27.10.2024 the price of 1 Bitcoin is more than \$60000 USD, at the same time, the price of 1 Dogecoin or 1 Ripple (XRP) is less than \$1 USD.

It is necessary to find out if there is a correlation between selected cryptocurrencies (Bitcoin, Ethereum, Dogecoin and Ripple (XRP)). It is essential as a positive or negative announcement that touches one cryptocurrency can automatically affect other ones that might be linked to it. As long as there are only four cryptocurrencies and there is no clear resulting factor, regression analysis might be ineffective and to display inaccurate results. Additionally, cryptocurrencies are considered extremely high volatile assets with their constantly changing prices due to speculative factors. Cryptocurrencies might move within complex nonlinear relationships: between each other and/or with other assets as well. The market is rather emotion-driven therefore cryptocurrencies are heavily influenced by investor behavior and speculative news. Regression models perform poorly with data where market structures frequently shift in general. Also, with only four cryptocurrencies multicollinearity could occur, consequently regression in this case faces challenges in terms of interpretability and stability of the coefficients, so without applying additional methods like principal component analysis (PCA) that reduces the number of correlated predictors the result is rather inaccurate especially considering the lack of the clear resulting factor as well. As a result, only correlation analysis will be used to determine the correlation between selected variables. To determine the correlation between selected variables a correlation matrix will be calculated.

To find out the impact of the announcements, the daily returns will be calculated by using the following formula (Zivot, 2019):

$$\overline{R}_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (1)$$

Where:

\overline{P}_t – closing price of the asset on the day t

\overline{P}_{t-1} – closing price of the asset on the previous day

For the forecasts Holt's Linear Trend Method will be used. The method extends simple exponential smoothing method to account for trends and has two components: Level and Trend. Holt – Winters Seasonal Methods that extend Holt's method and include seasonality won't be used at the same time due to seasonality not being confirmed. Holt's Linear Trend Method contains three key following formulas (11)(12)(13) (Holt, 1957):

1. Level (Smoothed value at time \overline{t}):

$$\overline{l}_t = \alpha y_t + (1 - \alpha)(\overline{l}_{t-1} + \overline{b}_{t-1}) \quad (2)$$

Where:

\overline{l}_t – smoothed level at time \overline{t}

α – level smoothing parameter ($0 \leq \alpha \leq 1$)

y_t – actual observation at time \overline{t}

\overline{l}_{t-1} – smoothed level at the previous time step

\overline{b}_{t-1} – smoothed trend at the previous time step

2. Trend (Rate of change at time \overline{t}):

$$\overline{b}_t = \beta(\overline{l}_t - \overline{l}_{t-1}) + (1 - \beta)\overline{b}_{t-1} \quad (3)$$

Where:

\overline{b}_t – smoothed trend at time \overline{t}

β – trend smoothing parameter ($0 \leq \beta \leq 1$)

$\overline{l}_t - \overline{l}_{t-1}$ – change in the level between the current and previous time step

3. Forecast:

$$\overline{\hat{y}}_{t+k} = \overline{l}_t + k\overline{b}_t \quad (4)$$

Where:

$\overline{\hat{y}}_{t+k}$ – Forecast for \overline{k} – steps ahead

\overline{k} – forecast horizon

\overline{l}_t – smoothed level at the most recent time step

\overline{b}_t – smoothed trend at the most recent time step

To calculate the total return of an asset over a certain period of time based on its daily logarithmic returns, the following formula will be used (Luenberger, 1998):

$$\text{Cumulative Growth} = \exp\left(\sum_{k=\overline{t}_0+1}^{\overline{t}} \ln\left(\frac{P_k}{P_{k-1}}\right)\right) \quad (5)$$

Where:

\overline{t}_0 is the starting day – the day before the first return calculation

\overline{t} is the random target day until the overall growth will be calculated

\overline{P}_k is the closing price of the asset on the day k

\overline{P}_{k-1} - closing price of the asset on the previous day

ANALYSIS AND FINDINGS

The result of correlation analysis is displayed in the Table 3.

Table 3: The Correlation Matrix for The Selected Cryptocurrencies

	BITCOIN	DOGECOIN	ETHEREUM	RIPPLE(XRP)
BITCOIN	1	0.74	0.93	0.49
DOGECOIN	0.74	1	0.84	0.62
ETHEREUM	0.93	0.84	1	0.59
RIPPLE(XRP)	0.49	0.62	0.59	1

Based on the results displayed in the Table 3 it is fair to conclude:

1. There is a strong correlation ($|r| > 0.7$) between Bitcoin and Dogecoin (0.74) that indicates positive linear relationship. The coefficient is positive meaning that as Bitcoin price increases Dogecoin price also tends to increase. Consequently, if Bitcoin price decreases, Dogecoin will likely decrease as well. The value (0.74) is not a perfect correlation that would be 1.0, but it still displays strong relationships, however there is still a room for other factors affecting Dogecoin that are not explained by Bitcoin price changes.
2. There is a very strong correlation ($|r| > 0.7$) between Bitcoin and Ethereum (0.93) that suggests a very strong positive linear relationship. The coefficient is close to the perfect value which is 1.0 and is positive meaning that as Bitcoin price increases Ethereum price also tends to increase in a predictable way. Similarly, if Bitcoin price decreases Ethereum price is likely to decrease as well. At the same time there still could be minor deviation or factors influencing Ethereum that are not only captured by Bitcoin price changes.
3. There is a moderate correlation ($0.4 \leq |r| \leq 0.7$) between Bitcoin and Ripple (XRP) (0.49) that displays neither weak nor strong relationship. The coefficient is positive so as Bitcoin increases Ripple tends to increase and when Bitcoin decreases Ripple generally decreases as well. However, the relationship is not strong enough the price of Ripple (XRP) based solely on Bitcoin price trends with high accuracy, so it means even if they are somewhat related there is still significant variability and other factors might influence the price of Ripple (XRP)
4. There is a strong correlation ($|r| > 0.7$) between Dogecoin and Ethereum (0.84) that indicates a strong positive linear relationship. The coefficient is positive and is close to the perfect correlation value (1.0) therefore it is fair to conclude both Dogecoin and Ethereum tend to move together in a predictable way. So, if Dogecoin price increases Ethereum price tends to increase, and if Dogecoin price decreases Ethereum price is likely to decrease as well. Despite the fact the relationship is strong enough there still could be some variability or other factors affecting Ethereum.
5. There is a moderate correlation ($0.4 \leq |r| \leq 0.7$) between Dogecoin and Ripple (XRP) (0.62) that is considered a moderate-to-strong relationship. It means bot variable tend to increase together, however still with some degree variability in how closely they follow each other. The relationship is not perfectly strong therefore other factors might be affecting Ripple (XRP) prices beyond just the price of Dogecoin. It is also important to notice that the correlation between Dogecoin and Ripple (XRP) that is 0.62 is a bit higher than correlation between Bitcoin and Ripple (XRP) 0.49.
6. There is a moderate correlation ($0.4 \leq |r| \leq 0.7$) between Ethereum and Ripple (XRP) (0.59) that indicates a moderate positive relationship. It suggests that Ethereum and Ripple

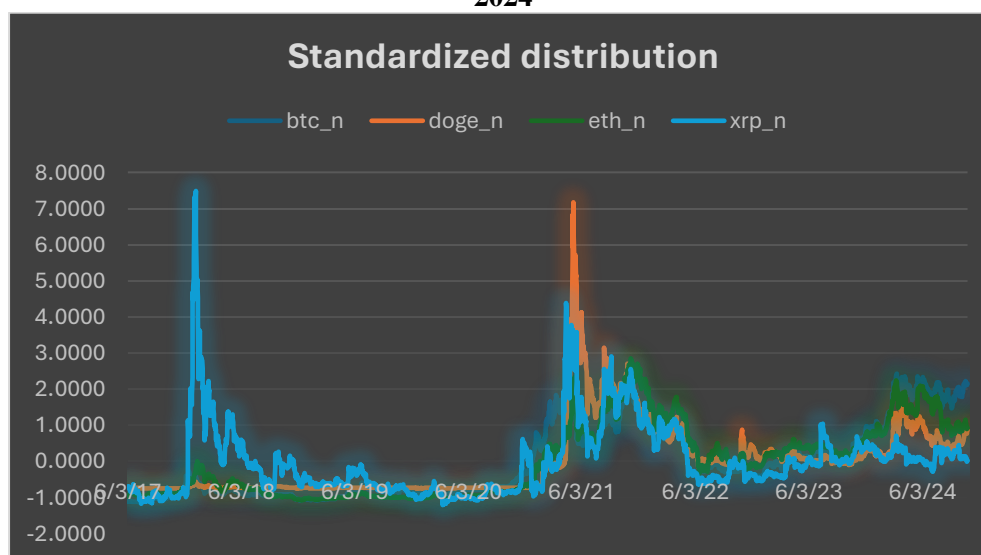
(XRP) are somewhat related, but the relationship is not extremely strong. The coefficient is positive so it means if Ethereum price increases Ripple (XRP) price tends to increase and when Ethereum price decreases Ripple (XRP) price will generally decrease as well. However, due to the fact the relationship is not perfectly consistent and despite the tendency of moving together there is still a fair amount of variability, and the relationship is not perfectly predictable as well as other factors could be influencing Ripple (XRP) besides Ethereum. It is also interesting to notice that once again the correlation between Ethereum and Ripple (XRP) (0.59) is a bit higher than the correlation between the most valuable cryptocurrency (Bitcoin) and Ripple (XRP) (0.49).

In conclusion it is essential to remember that even if there is a very strong correlation between two variables it doesn't mean that changes in one will necessarily cause changes in the other as it rather displays a strong tendency to change together in time.

Based on the correlation coefficients there also could be some multicollinearity, particularly between: Bitcoin and Ethereum (0.93) and Dogecoin and Ethereum (0.84), however due to the fact there is no clear resulting factor regression analysis will not be performed.

A graph of standardized distribution displayed on the Figure 1 was plotted using standardized data.

Figure 1: Standardized Distribution of Four Selected Cryptocurrencies from 03 June 2017 to 27 October 2024



The graph displays the price dynamics of 4 selected cryptocurrencies (Bitcoin (btc_n), Dogecoin (doge_n), Ethereum (eth_n), Ripple (xrp_n)). By observing the graph is fair to conclude there is no clear seasonality factor, due to the fact that predictable patterns don't occur at regular intervals. The graph displays rather stable market behavior with two massive outliers on it.

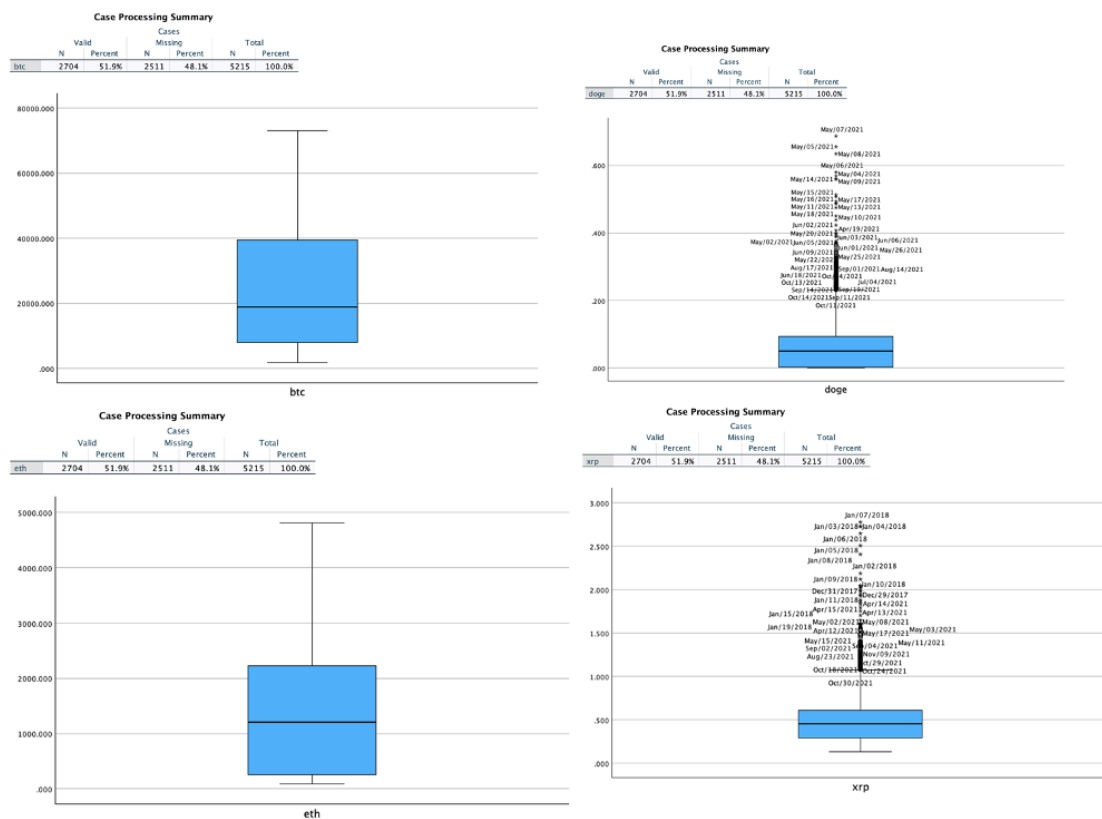
The first massive outlier touches mostly Ripple (XRP) with the price increase from \$0.25 USD in early December 2017 to over \$3 USD by the first days of January 2018 – a near 1200% increase in just a few weeks. The prices of other currencies also increased; however, Ripple's (XRP) increase was notably faster compared to many other cryptocurrencies in the observed period of time (early December 2017 – the first days of January 2018). This increase in Ripple's (XRP) price was driven by speculation, traders rushed into the market expecting further growth along with news of Ripple's developing partnerships with financial institutions.

The second outlier in the middle of the graph happened during the pandemic of COVID-19 when all the cryptocurrencies were recovering and surging after an initial drop when the pandemic was announced.

Boxplots can also display the stability of an asset. Of course, it might not be the primary tool to measure stability, however it can still visualize the dispersion and central tendency of the asset’s price data that can indirectly display how stable or volatile the asset is over a selected period of time.

Figure 2 displays boxplots of Bitcoin, Ethereum, Dogecoin, Ripple (XRP) closing prices (from 03 June 2017 to 27 October 2024). Two left ones indicate stable currencies such as Bitcoin and Ethereum, also here on the right – Dogecoin and Ripple (XRP). It is easy to notice that there are no any outliers on two left ones. It indicates that while there’s a variability, the price stays within a reasonable range without extreme deviations. However, the boxes are moderately thick indicating significant variability in typical values. There is a long upper whisker as well showing a broader range of data outside the interquartile range; however, the length is not extreme.

Figure 2: Boxplot of Bitcoin Closing Prices from 03 June 2017 to 27 October 2024



Consequently, the boxplots of Bitcoin and Ethereum closing prices display moderate volatility without any extreme deviations as there are no any outliers as well as no drastic price swings.

Two boxplots on the right look far more unstable due to the amount of outliers on it. The outliers indicate price extremes and highlight the days of unusual behavior. The upper whisker is long and combined with the outliers suggests noticeable variability. As well as the interquartile range that is moderately wide that indicates variability in the 50% of the data. It is also important to notice its asymmetric distribution due to outlier appearing only on the upper side of the graph meaning that the price has experienced more frequent positive spikes or so-called upward volatility.

Consequently, the asset (Dogecoin) exhibits much higher volatility compared to the previous examples such were: Bitcoin and Ethereum and is considered as an extremely high volatile asset. The number of outliers is rather big with a tendency toward asymmetric spikes. As well as Dogecoin the boxplot of Ripple indicates a huge amount of outliers with an asymmetric behavior suggesting strong positive price spikes as the outliers are located above the upper whisker. The whiskers are long, and it shows that the data points go beyond the interquartile range while staying within the non-outlier range.

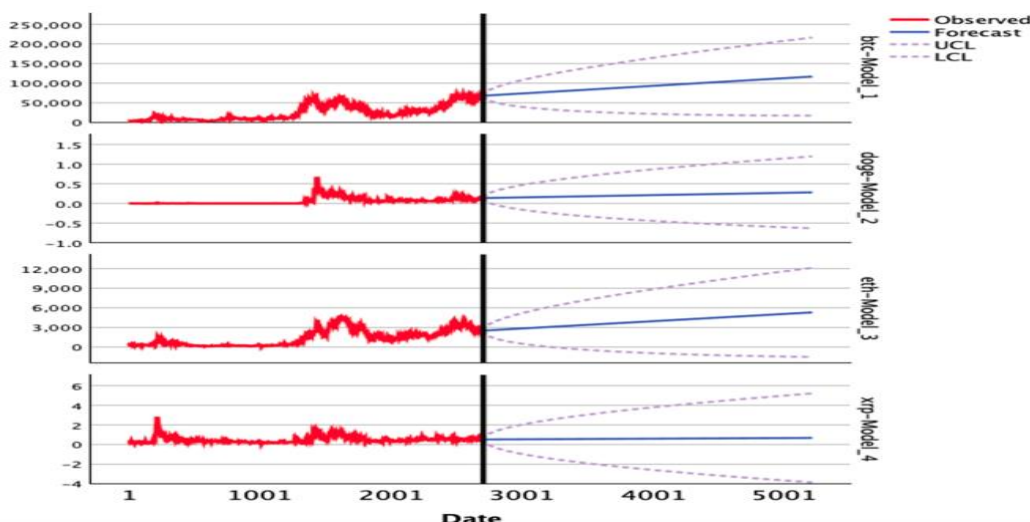
The boxplot indicates an extremely volatile asset with an asymmetry toward the upper end and with plenty of outliers that represent unpredictable and substantial price changes. In conclusion Table 4 underlines the difference between graphs.

Table 4: Comparison of Closing Price Distributions for Bitcoin, Ethereum, Ripple, and Dogecoin

Feature	BITCOIN	ETHEREUM	DOGECOIN	RIPPLE (XRP)
Interquartile Range	Moderate Thickness	Moderate Thickness	Moderate Thickness	Moderate Thickness
Whiskers	Moderate asymmetric (upper is longer)	Moderate asymmetric (upper is longer)	Long asymmetric (upper is longer)	Moderate asymmetric (upper is longer)
Outliers	None	None	Many, all of them on the upper side	Many, all of them on the upper side
Volatility Level	Moderate Level	Moderate Level	Extremely high level	Extremely high level

As a result of graphical analysis, it is fair to conclude that the selected cryptocurrencies (Bitcoin, Ethereum, Dogecoin, Ripple (XRP)) display a stable market behavior without having constant massive outliers. At the same time analysis using boxplots indicates that the two most valuable cryptocurrencies (Bitcoin, Ethereum) are moderate volatility level assets while two less valuable ones (Dogecoin, Ripple (XRP)) are considered extremely high volatility level assets. The lack of outliers or otherwise it is abundance on boxplots doesn't automatically mean that announcements or other events don't have an impact on the assets or otherwise all the outliers are the result of them. Analysis using boxplots only displays the level of volatility and the lack of outliers or its presence don't necessarily mean the announcements have no significant influence on every selected crypto asset. The results of usage Holt's Linear Trend Method is displayed on the figure 3, four graphics with the actual forecasts for each selected cryptocurrency is shown. The following results will be used to compare actual daily returns and cryptocurrency prices considering the announcement effect with the forecasted values.

Figure 3: Actual Forecasts for Selected Cryptocurrencies from 03.06.2017 to 27.10.2024 and from 27.10.2024 to 12.09.2031



Every selected cryptocurrency shows a positive growing trend. The horizon of the forecast is long-term, and it covers more than 5000 days. From 03.06.2017 to 27.10.2024 the used data is known, so the method forecasts the prices based on the natural market behavior considering announcements after they occur. The second part of the forecast from 27.10.2024 to 12.09.2031 is based on the previous dataset (03.06.2017 - 27.10.2024). Obviously, it might not be precise enough due to its long duration,

however it clearly displays the trends. For example, the model says that Bitcoin will be worth \$100,000 USD on 20.05.2029, however it happened much earlier on 05.12.2024 (CNN, 2024). Despite this, it is necessary to see the trends that indicate all the selected cryptocurrencies (Bitcoin, Ethereum, Dogecoin and Ripple (XRP)) have the tendency to grow even without announcements or other events, as well as, it was mentioned above some of them have a clear upward volatility.

In the Table 5 the impact of positive events presented based on actual and forecasted cumulative returns covering the selected periods [-3;3], [-4;4] and [-3;6] days. The table mentions the date of the event, the type of it and the currency that was highlighted in the particular announcement.

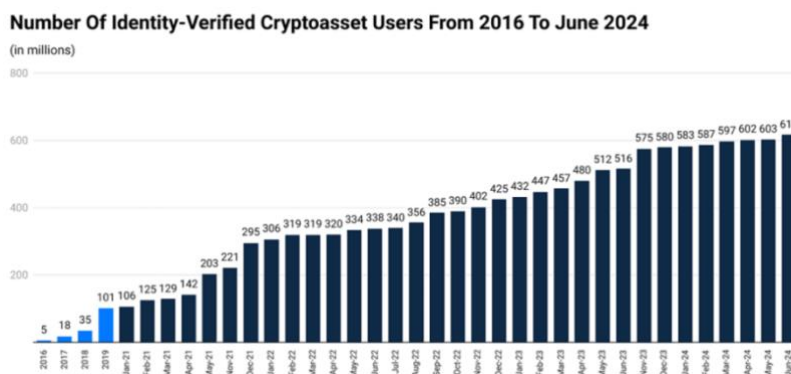
Table 5: The impact of Positive Events on Cumulative Returns: Actual and Forecasted (Selected Period)

EVENT	27.07.2024 Public speech of an opinion leader. Highlights: Bitcoin			13.07.2023 Regulatory action. Highlights: RIPPLE (XRP)		
TYPE	POSITIVE			POSITIVE		
	ACTUAL Cumulative Returns Around the Event Window (%)			ACTUAL Cumulative Returns Around the Event Window (%)		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	-1.99	1.25	-5.95	-0.09	-0.59	-1.66
ETHEREUM	-7.20	-1.69	-10.34	2.59	2.24	0.44
DOGECOIN	-6.43	-1.92	-12.79	6.84	6.59	7.36
RIPPLE (XRP)	4.28	1.47	-9.30	57.55	56.28	71.51
	FORECASTED Cumulative Returns Around the Event Window			FORECASTED Cumulative Returns Around the Event Window		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	-2.02	1.30	-0.95	-0.17	0.41	-0.98
ETHEREUM	-4.82	-4.76	-7.81	3.09	3.71	1.91
DOGECOIN	-8.85	-1.87	-8.86	6.14	9.51	5.17
RIPPLE (XRP)	3.21	0.82	-0.17	58.77	52.63	66.38
EVENT	28.04.2021 Tweet of an opinion leader. Highlights: Dogecoin			1.04.2021 Tweet of an opinion leader. Highlights: Dogecoin		
TYPE	POSITIVE			POSITIVE		
	ACTUAL Cumulative Returns Around the Event Window (%)			ACTUAL Cumulative Returns Around the Event Window (%)		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	13.01	18.06	9.76	5.79	1.01	-2.89
ETHEREUM	33.14	27.12	41.88	24.88	14.27	7.97
DOGECOIN	37.92	55.57	122.62	11.77	6.10	8.55
RIPPLE (XRP)	48.66	59.67	35.09	67.34	12.29	62.12
	FORECASTED Cumulative Returns Around the Event Window			FORECASTED Cumulative Returns Around the Event Window		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	12.98	14.95	14.04	4.18	2.41	4.04
ETHEREUM	23.61	24.29	51.91	21.03	19.49	24.96
DOGECOIN	53.70	24.39	61.06	5.30	3.88	18.81
RIPPLE (XRP)	41.05	52.05	48.03	15.86	6.08	99.80
EVENT	08.02.2021 Tweet of a company. Highlights: Bitcoin			29.01.2021 Tweet of an opinion leader. Highlights: Bitcoin		

TYPE	POSITIVE			POSITIVE		
	ACTUAL Cumulative Returns Around the Event Window (%)			ACTUAL Cumulative Returns Around the Event Window (%)		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	28.09	25.31	27.01	10.02	3.12	13.78
ETHEREUM	15.50	3.91	4.80	14.68	0.52	16.67
DOGECOIN	31.82	48.80	33.89	274.67	321.18	542.52
RIPPLE (XRP)	37.05	16.91	31.14	39.13	38.45	65.54
	FORECASTED Cumulative Returns Around the Event Window			FORECASTED Cumulative Returns Around the Event Window		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	27.44	21.29	27.49	3.93	2.75	16.54
ETHEREUM	8.04	9.09	13.65	-0.58	-0.35	24.69
DOGECOIN	89.89	41.03	29.73	298.41	328.43	335.86
RIPPLE (XRP)	32.95	13.59	42.47	36.04	84.87	48.41
EVENT	20.12.2020 Tweet of an opinion leader. Highlights: Dogecoin					
TYPE	POSITIVE					
	ACTUAL Cumulative Returns Around the Event Window (%)					
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days			
BITCOIN	11.17	1.89	15.90			
ETHEREUM	-3.93	-8.94	-1.02			
DOGECOIN	33.60	1.18	21.09			
RIPPLE (XRP)	-40.86	-54.94	-49.02			
	FORECASTED Cumulative Returns Around the Event Window					
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days			
BITCOIN	19.75	11.69	15.77			
ETHEREUM	0.22	0.30	-1.21			
DOGECOIN	19.51	32.81	33.36			
RIPPLE (XRP)	-44.28	-21.66	-44.27			

Analyzing the results displayed in the Table 5 it can be concluded that the impact of positive announcements has a fading tendency year by year at the same time high volatile cryptocurrencies tend to react on positive announcement longer offering higher returns. The analysis shows that it gets more and more difficult to influence stable (that have moderate level of volatility) currencies such as Bitcoin and Ethereum nowadays especially with public announcements that don't imply any actions in the nearest future. Donald Trump's speech on 27 July 2024 can be a good example of it. Such announcements these days have rather a short duration of effect – a few hours significantly affecting the price multiple times during the trading day then getting fixed and stabilized by the market itself. The impact of them might also be displayed later when the action starts to take place. Constantly growing number of crypto asset users might be one of the key factors of the market stabilization (Figure 4). The number of owners of cryptoassets got 6 times bigger than it was when Elon Musk started publishing his Dogecoin related tweets in 2019. As well as the price of cryptoassets significantly increased making it more attractive for qualified investors that are rather reasonable than emotionally driven at least when it comes to stable currencies (Bitcoin, Ethereum).

Figure 4: Number of Identity – Verified Croptoassets Users from 2016 to June 2024



Source:

Statista. (n.d.). Global cryptocurrency user base statistics. Retrieved July 13, 2024, from <https://www.statista.com/statistics/1202503/global-cryptocurrency-user-base/>.

Significant price changes of small and volatile currencies (Dogecoin, RIPPLE(XRP)) can be explained by their cheapness as well. Dogecoin is considered a meme coin, and investors can potentially buy it even for fun, especially when someone known promotes it increasing the interest. Dogecoin’s bubble effect is visible based on the fact it was the only coin from all the observed ones to hit more than 100% , and once more than stunning 500% , of cumulative returns around the event window [-3;6] during three out of seven positive events observed making it the most manipulated cryptocurrency from all the observed ones. It also proves its extremely high volatility status. RIPPLE(XRP) is also a high volatile currency, however, it is designed as a digital payment network that focuses on providing fast, low-cost, and scalable solutions for cross-border transactions, at the same time is also rather extremely cheap compared to Bitcoin. Probably, with this low price and high volatility understanding it investors buy a small amount of those currencies diversifying the risk and giving the priority to the stable currencies not being afraid to lose a lot from fluctuations of the small ones. As well, available platforms such as Binance, for example, attract with their user-friendly interface and the ease of getting started with trading unqualified investors who buy cheap cryptocurrencies as a long-term investment expecting it to repeat Bitcoin’s success. These people might even be skeptical about Bitcoin and scared of its value, however still curious about the new opportunities the cryptocurrency market offers. In fact, curiosity is the key driver behind all the cryptoassets but especially behind the small ones as it is easy to calculate (it is only possible to buy a very small part of Bitcoin for \$1 USD but it is possible to buy even more than 1 Dogecoin), easy to buy and easy to sell using the available platforms, so unqualified investors could be joining the market buying them once there is a new announcement published. The correlation between the observed currencies is also visible, however Tables 5-7 display cumulative returns around the event window and other factors could occur during this period of time affecting one or another cryptocurrency. The forecasted values displayed in the Tables 5 – 7 indicate similar values meaning the model is able to predict the general price movement and trend quite accurately.

Negative events such as the Black swans and their impact observed in the Table 6, in fact only had a negative impact on cryptocurrencies for a certain period of time.

Table 6: The impact of Negative Events (Black Swans) on Cryptocurrencies: Short-Term Effects

EVENT	24.02.2022 Black swan. Affection: ALL			12.03.2020 Black swan. Affection: ALL		
TYPE	NEGATIVE / POSITIVE			NEGATIVE / POSITIVE		
	ACTUAL Cumulative Returns Around the Event Window (%)			ACTUAL Cumulative Returns Around the Event Window (%)		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days

BITCOIN	12.60	1.81	18.63	-37.39	-32.35	-32.42
ETHEREUM	11.57	1.81	14.68	-44.26	-38.70	-41.94
DOGECOIN	-2.30	-4.00	3.86	-24.84	-23.72	-24.75
RIPPLE (XRP)	0.73	2.82	9.58	-30.86	-26.96	-29.63
	FORECASTED Cumulative Returns Around the Event Window			FORECASTED Cumulative Returns Around the Event Window		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	-5.89	1.87	15.58	-39.63	-35.46	-34.68
ETHEREUM	-4.91	5.42	12.79	-47.51	-38.76	-42.64
DOGECOIN	-12.26	-6.89	-2.35	-29.07	-22.46	-22.29
RIPPLE (XRP)	-12.18	-3.25	1.06	-35.21	-28.35	-27.81

The results of two different Black swans were observed in the Table 6 that had a, more or less, significant impact on the global markets. The behavior of markets is difficult to predict reacting on the Black swans, as such events significantly affect even stable markets. However, in case of cryptocurrencies it is fair to assume that the ultimately fast recovering effect after the one that occurred on 24 February 2022 could be the result of the previous one happened on 12 March 2020. Russo – Ukrainian conflict resulted sanctions undermining trust in the global financial system therefore qualified investors and the ones who wanted to save their assets decided to invest in stable cryptocurrencies such as Bitcoin and Ethereum not really being interested in volatile ones like Dogecoin, Ripple(XRP) could still be interesting as it was designed as an alternative to traditional payment systems like SWIFT that was canceling transactions . However, violate ones during the starting dates of pandemic lost almost two times less than the holders of stable ones, presumably due to the cheapness of small ones and assuming that many were buying small number of coins not being afraid to lose. At the same time stable currency holders were rather at risk to lose a lot due to the value of their assets. According to the figure 4 in 2020 there were approx. 100 million crypto asset users, so the market could easily be influenced by panic, at the same time in 2022 there were already three times more crypto asset users registered, consequently the market got more stable. More than that some investors could be the ones who remembered the long-term positive impact of the other Black swan observed – COVID 19 pandemic that started with a free fall across all the markets. Therefore, it is reasonable to conclude that, at present, Black Swan events of global significance are beneficial for the cryptocurrency markets.

Table 7 indicates the events with the clear negative impact on the cryptocurrency market.

Table 7: Events with Clear Negative Impact on the Cryptocurrency Market

EVENT	07.11.2022 Bankruptcy of a cryptocurrency exchange FTX. Affecting: Every currency observed			12.05.2021 Tweet of an opinion leader. Highlights: Bitcoin		
TYPE	NEGATIVE			NEGATIVE		
	ACTUAL Cumulative Returns Around the Event Window (%)			ACTUAL Cumulative Returns Around the Event Window (%)		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	-15.62	-16.82	-22.80	-21.10	-19.80	-26.34
ETHEREUM	-15.84	-21.02	-25.75	-8.28	-7.15	-13.89
DOGECOIN	-30.45	-28.85	-32.60	-19.13	-10.77	-16.52
RIPPLE (XRP)	-15.52	-22.00	-32.65	-7.21	-3.17	3.65
	FORECASTED Cumulative Returns Around the Event Window			FORECASTED Cumulative Returns Around the Event Window		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days

BITCOIN	-12.96	-21.01	-16.83	-18.36	-15.24	-25.82
ETHEREUM	-15.77	-26.60	-17.72	5.59	4.57	-14.52
DOGECOIN	-31.53	-38.31	-28.61	-24.37	-13.65	-23.43
RIPPLE (XRP)	-12.29	-26.99	-20.11	-6.02	-10.18	-4.26
EVENT	22.12.2020 Regulatory action. Highlights: RIPPLE (XRP)			11.07.2019 Tweet of an opinion leader. Highlights: Bitcoin		
TYPE	NEGATIVE			NEGATIVE		
	ACTUAL Cumulative Returns Around the Event Window (%)			ACTUAL Cumulative Returns Around the Event Window (%)		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	14.38	3.55	13.48	-4.99	-16.75	-20.64
ETHEREUM	-2.64	-4.75	10.92	-25.06	-27.42	-32.44
DOGECOIN	16.70	16.25	17.04	-13.66	-14.51	-16.39
RIPPLE (XRP)	-49.51	-44.81	-56.76	-21.10	-24.06	-22.67
	FORECASTED Cumulative Returns Around the Event Window			FORECASTED Cumulative Returns Around the Event Window		
	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days	[- 4; 4] Days	[-3;3] Days	[-3; 6] Days
BITCOIN	8.24	2.62	13.60	-9.13	-0.32	-17.07
ETHEREUM	-2.61	-6.50	4.07	-19.92	-11.10	-33.45
DOGECOIN	23.06	16.73	17.85	-15.28	-7.83	-20.79
RIPPLE (XRP)	-44.93	-42.12	-51.34	-21.96	-16.26	-25.54

The clear negative events have a more significant impact on cryptocurrencies meaning that the recovery period might take longer than the effect of positive announcements. Negative announcements affecting Bitcoin usually automatically affect other ones as well (the ones it correlates with the most), however the numbers remain negative for longer due to the lack of trust. The market keeps rapidly growing but remains uncertain. Everyone knows - nothing backs the cryptoassets, and no one has ever seen the cryptocurrency market collapsing for real. Back when the number of users was smaller, it was easier to influence the market with tweets. However, nowadays, the market has become more stable, and only significant negative events can cause investors to panic. For example, a tweet posted on 11 July 2019 by the President of the United States Donald J. Trump where he calls Bitcoin volatile and baseless had a similar impact on the market with a bankruptcy of a cryptocurrency exchange FTX started on 7 November 2022. The difference between the number of worldwide crypto asset users is approx. 200 million (Figure 4). The first event involves an online post, while the second is a real collapse of a cryptocurrency exchange that caused users to urgently attempt to withdraw their funds from the platform undermining trust in other platforms as well. Regulatory action against Ripple (XRP), as shown in Table 7, had an impact primarily on Ripple itself. The currency showed the least correlation with the other three, and the positive movement in the others could be explained by investors choosing to reinvest their assets in more stable currencies, along with the less stable Dogecoin. The announcement on 12 May 2021, was a significant one, as Tesla, led by Elon Musk, made the impactful decision to stop accepting Bitcoin as payment for its vehicles, despite having invested \$1.5 billion in Bitcoin earlier that year. Certainly, Bitcoin, along with Ethereum, reacted to this, as did Dogecoin, given that Elon Musk is seen as its ambassador, at the same time Ripple (XRP) remained stable.

6. Practical Implications

Considering the results of the study it is fair to recommend to the potential investors despite the announcements being positive or negative to be cautious, as for now, it is still impossible to prove if the cryptocurrencies are a fraud or it is a good alternative for national currencies. There is also plenty of

«failed» cryptocurrencies, so it is essential to double check and to think twice before buying such rather unknown coins. However, the market gets more and more stable by attracting more and more new cryptocurrency users. By buying a company's stocks, an investor also risks losing the money they invested. Cryptocurrency market, as for now, can be also considered a positively trending somehow stable and even offers some moderate level volatility cryptocurrencies (Bitcoin, Ethereum) along with extremely high-level volatile ones such as Dogecoin, Ripple (XRP) for example. Consequently, it is advisable to diversify the assets in the portfolio giving the priority to less volatile coins and to well-known high-level volatile ones.

It is also crucial to select the right broker—a trading platform and wallets as well—since they require personal data, and there is a risk of the platform collapsing or imposing sanctions that could restrict the withdrawal or transfer of funds.

According to the results of the analysis it is also advisable to buy cryptoassets once the black swans appeared as during the economic, political, social, geopolitical, technological instability. Such advice is still considered extremely risky due to the limited number of observed Black Swan events within the relatively short period of cryptocurrencies existence.

Considering the longer reaction on negative events and overall positive trends of all the observed cryptocurrencies it could be advisable to buy not right after the negative announcement was made but a few days after.

Similarly to the stock market it is important to find an own strategy – for example long-term holding fewer volatile currencies through market fluctuations could be beneficial considering overall positive trends and the potential growth over time.

To develop the concept of cryptocurrencies it is recommended to use forward contract that is a financial agreement between two parties to buy or sell an asset such as currency, commodity or financial instrument at a predetermined price on a specific future date – such a contract could minimize the risks of fluctuations and therefore making cryptos more like real currencies rather than stocks.

7. Conclusion

In this study, the history of well-known markets was observed, as the cryptocurrency market is still a market and is formed in a similar manner to existing ones. The history of cryptocurrencies shows that the concept is much older than Bitcoin; however, it wasn't until Bitcoin that it gained widespread popularity. The core idea of cryptocurrency— anonymity—is gradually fading, as more and more online platforms and wallets require users to register with IDs or other documents that verify their identity. As a result, cryptocurrency transactions are becoming less distinguishable from transactions involving traditional currencies. However, fast transactions and anonymity perhaps not the key reasons of Bitcoins success. The idea of offering economic incentives in the form of actual coins to participants in a blockchain system existed before Bitcoin, but Bitcoin was the first to implement it. As a result, its success may have been largely influenced by this feature. The reason of enormous price of Bitcoin and a few other cryptocurrencies could possibly be exactly the thing why many investors are skeptical about them - there are no real assets behind them. For example, why stocks of a random company can't be this expensive – probably because every company publishes their balance sheet so everyone can see what it owns and how much it makes. Surely, there are companies that are considered bubbles, but still, their stocks are not even close to Bitcoin in terms of price and how fast it grows. Consequently, lack of real assets and a central authority behind cryptocurrencies grants them limitless growth potential. At the same time dealing with cryptocurrencies might cause legal problems as they are considered illegal in many countries, so investors always must keep an eye on the legislation and its changes. As well as if it was stolen by someone from investor's account it might not be considered as a crime as the legal status of cryptoassets remains unknown in some geographies where they are not considered as property due to not having material equivalent. Along with risks other markets have too, cryptocurrency market has also unique ones, for example: only cryptoassets have no real assets behind them. Many cryptocurrencies have already failed (more than 8000 cryptocurrencies have failed only in 2021 and 2022 combined) and

many of them were considered fraudulent. At the same time national currencies that are no longer in use are typically replaced, with central banks offering holders an alternative currency, so there is still an advantage of having a central authority.

Additionally, there is another risk there might be another coming up in the nearest future – AI (Artificial Intelligence), that can potentially guess passwords to get the access to online wallets with cryptocurrencies. The amount of risks compensates with the offered profit. So even banks deal with cryptocurrencies to generate profit and even fail like Silvergate bank that recently faced bankruptcy.

Taking into account the above-mentioned facts, the purpose of this study was to analyze the influence of announcements and significant events on the price movements of Bitcoin, Ethereum, Ripple, and Dogecoin. The research aimed to identify patterns in market reactions, assess the volatility and stability of these cryptocurrencies, and evaluate the impact of public announcements, regulatory actions, and major events on market sentiment. The historical exchange rate secondary data sourced from Investing.com was used that covers the period from 03 June 2017 to 27 October 2024, for all the selected cryptocurrencies. And includes more than 2700 daily price observations. This period encompasses major and minor announcements collected from the following sources: BBC News, CNN, Reuters, The New York Times, The Wall Street Journal, Forbes, Bloomberg, The Financial Times and Twitter (now X) itself. The methodology of the study starts with the data collection and its observation process, then classic statistical methods application such as correlation analysis, graph plotting and observation, daily returns and cumulative daily returns calculations along with trending analysis. The analysis shows that the cryptocurrency market keeps getting more and more stable due to constantly increasing the number of users. Moreover, the market has a strong positive trend, so all the observed currencies are expected to increase in price over time (not considering future unexpected events). Similarly to the foreign exchange market there are less volatile and more volatile ones. In terms of volatility the currencies observed in the study such as: Bitcoin, Ethereum show moderate level of volatility and Dogecoin, Ripple (XRP) show high level of volatility. In terms of correlation not every cryptocurrency out of the observed ones has a strong correlation with Bitcoin as for example the level of correlation between Bitcoin and Ripple is moderate and it is even stronger between Dogecoin and Ripple (XRP) (0.62) than between Bitcoin and Ripple (XRP) (0.49). The strongest correlations are between Bitcoin and Ethereum (0.93) and those are considered the less volatile ones and between Dogecoin and Ethereum (0.84), due to the following coefficients there could be some multicollinearity between them as well. Based on that it is possible to influence one coin to manipulate the other as they tend to grow or fall together and therefore to profit from a smaller, correlated currency.

The results display the fading impact of announcements on the cryptocurrencies due to the stabilizing type of a market (rapidly growing market with more than 600 million users). It gets more and more difficult to influence stable (moderate level volatility coins such as Bitcoin, Ethereum) and no matter if the announcement is positive or negative especially with the ones that don't imply any action. Negative announcements tend to have longer effect than positive ones, at the same time, it is fair to notice the lack of negative posts (comments) from the opinion leaders towards cryptocurrencies like it was years ago. Consequently, it is fair to assume opinion leaders somehow manipulate the market with only positive posts of bullish expectations as they are also cryptocurrency users and have their money invested. The effect of the positive or even negative ones can remain visible only within one trading day and to barely affect closing prices. The effect might appear later; however, it might be impossible to forecast when exactly and if it will in general. For example, the results indicate that Black Swan events of global significance are beneficial for the cryptocurrency markets (long-term) as investors prefer cryptocurrency during the economic, political, social, geopolitical, technological instability.

High level volatility coins such as Dogecoin and Ripple (XRP) used to get easily manipulated by the announcements drastically reacting on them, however due to their cheapness investors can potentially buy them even for fun (Dogecoin was designed as a meme for example), especially when someone known promotes it increasing the interest. Therefore, with this low price and high volatility understanding it investors buy a small amount of those currencies diversifying the risk and giving the

priority to the stable currencies not being afraid to lose a lot from fluctuations of the small ones. As well, available platforms such as Binance, for example, attract with their user-friendly interface and the ease of getting started with trading unqualified investors who buy cheap cryptocurrencies as a long-term investment expecting it to repeat Bitcoin's success. These people might even be skeptical about Bitcoin and scared of its value, however still curious about the new opportunities the cryptocurrency market offers. In fact, curiosity is the key driver behind all the cryptoassets but especially behind the small ones as it is easy to calculate (it is only possible to buy a very small part of Bitcoin for \$1 USD but it is possible to buy even more than 1 Dogecoin), easy to buy and easy to sell using the available platforms, so unqualified investors could be joining the market buying them once there is a new announcement published and keeping them as well in case it is bad.

The market continues to grow rapidly but remains uncertain, as no one has ever seen it collapse therefore no one knows how it is going to react once it starts losing the trust of its users and how fast it will be plus everyone knows - nothing backs the cryptoassets. Back when the number of users was smaller, it was easier to influence the market with tweets. However, nowadays, the market has become more stable, and only significant negative events (for example a collapse of a cryptocurrency exchange) can cause investors to panic.

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