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MASTER'S THESIS

**PRICE DETERMINANTS AND VALUATION MODELS OF
CRYPTOCURRENCIES**

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LIST OF ABBREVIATIONS

ADA	Cardano
AML	Anti Money Laundering
BNB	Binance Coin
BSA	Bank Secrecy Act
BTC	Bitcoin
BUSD	Binance Stable Coin
CBDC	Central Bank Digital Currency
CME	Chicago Mercantile Exchange
CPI	Consumer Price Index
DCF	Discounted Cash Flow
DeFi	Decentralized Finance
DOGE	Dogecoin
ETH	Ethereum
EVM	Ethereum Virtual Machine
FinCEN	Financial Crimes Enforcement Network
ICO	Initial Coin Offering
IRS	International Revenue Service
KYC	Know Your Customer
NFT	Non-fungible Token
P2P	Peer-to-peer
PBOC	People's Bank of China
PC	Personal Computer
PoH	Proof-of-history
PoS	Proof-of-stake
PoW	Proof-of-work
S&P500	Standard & Poor's Index
S2F	Stock-to-flow
S2FX	Stock-to-flow Cross Assets
SDR	Special Drawing Rights
SEC	Securities and Exchange Commission
SOL	Solana
TPS	Transaction per Second
USDC	USD Coin
USDT	Tether
XRP	Ripple

INTRODUCTION

Since Bitcoin's introduction, the cryptocurrency industry has evolved rapidly, with the blockchain as the underlying technology that supports cryptocurrencies constantly evolving. Financial institutions such as Accenture, JP Morgan, UBS, and others are joining forces with other large corporations to improve blockchain to make it faster, more secure, and more reliable (Aggarwal, Taylor, Varshney & Patel, 2019). A form of digital money relying on encryption is known as cryptocurrency. It functions in a manner reminiscent of old currency, enabling users to transact virtually for goods or services without the use of a centralized, reliable authority. This reduces the advantageous use of human weaknesses including transaction fees associated with middlemen, fees associated with credit card and debit card transactions, and the impossibility of direct selling and purchasing goods. Despite the governments of major powerful countries including India, Russia, the United States, and Japan refusing to adopt cryptocurrency, the usage of such technologies is fast gaining ground in several civilizations throughout the globe. People with libertarian values from all over the world are drawn to the cryptocurrency's rebelling nature and the fact that it is decentralized. This method requires users to trust the blockchain system more than to trust a middle party or organization with their data. This aspect is one of the major characteristics of cryptocurrencies which made them very popular and highly acceptable (Aggarwal, Taylor, Varshney & Patel, 2019). So-called investors are pouring large quantities of money into »crypto assets« that have no genuine history of providing value or revenue, and price appreciations have occurred only because other people have invested in them, causing a ripple effect in the markets. At one point over one trillion dollars have been invested in over 19,000 digital currencies and projects around the world. The majority of cryptocurrencies are designed similarly to Bitcoin, which allows for unrestricted trading on cryptocurrency exchanges and implies they are not controlled by an authority such as a central bank. This has led to many uncertainties and concerns being expressed regarding the present and future of autonomous cryptocurrencies. Two main viewpoints are provided. One side claims that it is a speculative bubble with no real assets that will inevitably crash while the opposers argue that the cryptocurrency markets will become a means for millions of people to join in a worldwide financial network potentially worth tens of trillions of dollars.

The cryptocurrency market accounts for a small proportion of global financial markets although the inflow of capital is steadily growing throughout the last decade. Due to a lack of control and rules, it is an ideal location for fraud and scams. Because of its relatively small market capitalization, it is also vulnerable to market manipulation. Many projects don't provide anything new in the area of blockchain but instead rely on the cryptocurrency hype to raise funds (Drofenik & Kovacic Batista, 2018). Everyone involved in the blockchain space is dealing with a market that is public and thus accessible to anyone, allowing participants to become investors in lucrative and profitable projects, as has happened in the past. Therefore, there are many questions investors need to ask themselves before blindly following the hype and investing in projects that promise to offer value but do close to nothing in terms of utility. But how can a person judge whether or not a project is worth investing in, and at what cost? As

a result, cryptocurrency valuation models are both required and helpful, although they are still limited in development.

The purpose of the master's thesis was to gain a better understanding of price determinants and valuation models of cryptocurrencies, which represent an increasingly salient and legitimate asset category. In my research paper, I present several facts, views, and opinions from different sources of information through effective research and data gathering. The main goals were to define crypto-assets and their fundamentals, identify factors influencing cryptocurrency prices and underlying valuation models, and provide a look at the prospects and limitations of the cryptocurrency market. My biggest concern was how to value cryptocurrency assets, particularly given they have no connection to an underlying company, create no operating cash flow, and promise to pay nothing to their owners (Winton, 2018). My initial objective was to determine the determinants and factors that influence a cryptocurrency's value, as well as how this relates to finding possibly viable projects that can generate value in the future. Following that, I looked at different cryptocurrency valuation methods that are evolving from the traditional ones in the next part of my research. Because there are no academically acknowledged valuation models, I searched the cryptocurrency community for the first visionaries who attempted to build a model for valuing cryptocurrency assets and frameworks proposed by numerous prominent cryptocurrency investors and thinkers. I present a variety of cryptocurrency asset valuation models based on well-known financial theories among which are: Discounted Cash Flow model, Velocity of Money Theory, and Metcalfe's Law.

My research primarily consisted of data analysis. The majority of the information originates from secondary sources. The study is primarily qualitative, but it does include some quantitative elements. Quantitative because I'm also working with numerical data shown in tables and graphs, and qualitative because I'm looking at how to correctly evaluate the value of cryptocurrency assets. The study was designed as a desktop study using the methodologies stated above. It was based on secondary data, and the existing literature was collected and critically evaluated. However, there are few academically recognized sources for information on cryptocurrency valuation techniques, therefore I relied on websites, papers, blogs, and other articles from researchers who are innovating in the field of cryptocurrency asset valuation and whose concepts are backed by the cryptocurrency community.

2 CRYPTOCURRENCY AND BLOCKCHAIN

2.1 The history of money

For the past 5,000 years, money has existed in various forms, ranging from simple coins to banknotes and digital currencies that are widely used today. Historians generally assume that before the invention of money, people used a bartering system. The bartering system is based on the basic principle of direct trade of services and goods, which is a time-consuming process. Money, whether it's represented by a seashell, a metal coin, a piece of paper, or a string of code electronically mined by a computer, doesn't always have value and it heavily depends on the importance that people place on it as a medium of exchange, a unit of measurement, and a

storehouse for wealth (Beattie, 2022). In 600 BC, Lydia's King Alyattes issued the Lydian stater, which is said to be the world's first formal currency. Originally produced from a mixture of silver and gold, the coins were imprinted with pictures that represented several denominations. Around 700 BC, people in China began using coins, and by the 16th century, most of Europe had abandoned metal coins in favor of paper money. The colonization effort brought in fresh supplies of valuable metals and enabled the major European nations to keep producing more coins. However, banks eventually started using paper banknotes for depositors and borrowers to carry around in place of metal coins, additionally these notes could be taken to the bank at any time and exchanged for their face value in metal - usually silver or gold coins, and the paper money was used to buy goods and services (Beattie, 2022).

In 1821, the Bank of England was the first to use the Gold Standard with the agenda to back the value of all money issued with the gold reserves. Problems for the Gold Standard occurred with the increasing economy and population causing depreciation of the currency. The standard was finally demolished during World War I. The famous gold-based standard established in 1944 during the Bretton Woods conference has once again been found inefficient, with the United States exiting the pact in an event known as the Nixon shock (Low, 2017). In 1946, John Biggins, a New York banker, introduced what is today known as a credit card. It was called Charge-it and possessed the ability to be topped up and used in local stores. The Diners Club created the first general-purpose credit cards in 1950. Cards have remained one of the most popular methods of payment to this day. The most recent addition to the money creation timeline occurred in 2008 when Bitcoin was introduced as a cryptocurrency. The man, or as some claim the organization - Satoshi Nakamoto, whose true beginnings or name remain unknown, was the entity who processed the first Bitcoin block, pioneering the blockchain technology that will be described in more detail further in this paper. Money's success in signaling the price of commodities through numerical amounts and giving people a way to keep their fortune has resulted in indirect trade in products and services throughout history and now. Despite the frequent confusion between the terms "money" and "currency," several theories contend that they are not interchangeable. Correspondent with some beliefs, money is at its core an intangible idea, while currency is the tangible representation of money. Whether we are speaking about money in simple so-called primitive communities or much more advanced complex and sophisticated societies it is not enough merely to examine the narrow economic aspects of money to grasp its true meaning (Davies, 2017). To analyze the significance of money it must be broadly studied in the context of the particular society concerned. It has always been associated in varying degrees of closeness with religion and is partly interpreted in modern times as the psychology of habits, attitudes, hopes, fears, and expectations (Davies, 2017).

2.2 Creation of cryptocurrencies, and the idea behind it

To fully understand the idea of cryptocurrencies, one must first examine the role of various currencies in today's financial world, as well as their characteristics. There are three primary forms of currencies, ranging from fiat through virtual and, eventually, digital.

The value of such currency is derived from the public's trust in the issuing bodies such as central banks. Fiat money is widely used today and its role in the financial world is merely to act as legal tender but has no real intrinsic value whatsoever (Frankenfield, 2022a). The fundamental value of fiat currency stands in the claims of issuing authorities and is heavily influenced by the performance of the issuer's economy. Some of the most profound examples of fiat currencies today are U.S. Dollar, Euro, and Japanese Yen. Fiat money has many advantages from forming and maintaining the stability of financial markets to the ability of central banks to control supply and govern the economy. Those attempts, however, aren't always successful as their potentially unlimited supply can erode value, create bubbles, and cause inflationary tendencies if used in the wrong way by policymakers.

Digital currencies have no concrete properties, therefore they can only be accessed electronically. Electronic devices such as computers or electronic wallets connected to the internet are used to execute automated digital currency transactions. Central bank digital currencies (hereinafter: CBDCs) are digital currencies issued and regulated by a country's central bank. A CBDC can be a supplement or a replacement to traditional fiat currency. Unlike fiat currency, which exists in both physical and digital forms, a CBDC exists purely in digital form (Frankenfield, 2022a).

Virtual currency represents a subcategory of digital currency, which is a type of uncontrolled digital money distributed and typically contained by its developers. It is utilized and acknowledged by members of a certain virtual society. This type of currency is often stored and transacted via special software, mobile apps, or computer programs with particular transactions taking place over secure, dedicated networks or the Internet. Cryptocurrency is just one type of virtual currency that is known to mankind today, therefore the history and the original idea behind the invention of this completely new technology are still unfamiliar to the majority of people, thus it must be studied from the scratch. The cryptocurrency was first mentioned in the late 1980s when the idea of untraceable transfers and decentralized network structure without legal entities such as banks was still far-fetched and somehow represented an early form of what is known today as cryptocurrency space.

In 1995 American cryptographer David Chaum developed an anonymous cryptographic electronic money called DigiCash due to the tendency to have a scheme that would grant for quick and less costly transactions without the use of a third party. It was an early form of cryptographic electronic payments which required user software to withdraw from a bank and required specific encrypted keys before they could be sent to a recipient (Jones, 2022). What was then known as BitGold is today often used in the cryptocurrency space as Bitcoin's predecessor and was designed by Nick Szabo in 1998. BitGold, often called a direct precursor

to Bitcoin required a participant to dedicate computer power to solving cryptographic puzzles, and those who solved the puzzle received a reward (Jones, 2022). Combining Chaum's and Szabo's cryptocurrency ideas lead to the concept of Bitcoin. The fundamental problem which was trying to be solved by cryptocurrency technology was a phenomenon called double-spending known in the traditional economic environment as a system between trusted third parties such as banks that verify the preciseness of executed transactions. The cryptocurrency trade is based on the peer-to-peer network (hereinafter: P2P) used for example in a file exchange protocol. All transactions conducted by the users are made public and their verification is carried out by the system's users themselves (Srokosz & Kopyscianski, 2015). According to Jones (2022) BitGold was not suitable to solve the problem of double-spending and digital data was still able to be copied and pasted, and it was not until a decade later when a mysterious person or persons, using the pseudonym Satoshi Nakamoto, published a white paper called »Bitcoin – A Peer to Peer Electronic Cash System«, that the history of Bitcoin, and subsequent cryptocurrencies which marked the rise of technology and blockchain protocols that we know today.

In today's society, the idea that stands behind cryptocurrencies coincides well with the concept of "ideal money" described in the 2002 John Nash paper with the same name in which he describes the value of store and the correlation between the consumer price index (CPI) and the sequences of international trade. For a currency to be called »Ideal Money«, it must be suitable as a value of a store that is widely acceptable even outside national boundaries (Low, 2017). This effect is particularly crucial for individuals within the same currency systems who have lost faith in their currency and are looking for investment possibilities and portfolio diversification. International trade is an additional area where cryptocurrencies play a major role. With the advancement of technology and worldwide trade, we may finally have a feasible explanation and solution to the Triffin dilemma. This age-old problem is predicated on the core assumption of a conflict of interest for a country whose currency serves as a worldwide reserve currency. Bitcoin is getting closer to its proper role as a global reserve instrument as more people learn about cryptocurrencies, transact with them, and overcome the psychological chasm of accepting it as a legitimate form of payment. Cryptocurrencies operate with an assumption of zero trust between the transacting parties and are not under the control of a single command point. This makes them an ideal replacement for the current system of IMF Special Drawing Rights (SDR) (Low, 2017).

Apart from all of the beneficial characteristics of such currencies, they also have fundamental operational problems that make their adoption difficult. Because blockchain transactions are irreversible, an incorrect payment cannot be reversed. Cash flows are only flowing in one direction. Although it depends on the underlying contract, it is occasionally probable to complete an inverse transaction in some cryptocurrency systems. Binding online identities to real-world identities is an unsolved problem with cryptocurrency. Varying project and their underlying cryptocurrencies take distinctive positions on this problem, depending on how much of a tradeoff they can make between the privacy of the user and the transaction's convenience. Another big concern about cryptocurrency usage is that nearly all of them are deflationary. Nowadays the deflationary spiral phenomenon doesn't affect Bitcoin, hence the lack of

discussion on this particular topic but there is a universal belief amongst many economists that economies with deflationary characteristics are not viable.

2.3 Blockchain technology

In 2008 a groundbreaking paper »Bitcoin: A Peer-to-Peer Electronic Cash System« was written on the topic of peer-to-peer electronic cash under the pseudonym Satoshi Nakamoto and introduced the term »chain of blocks«. This term has gradually evolved into the word blockchain (Bashir, 2018). Satoshi's blockchain system or electronic cash system was developed to create digital money (coins) that are controlled by a distributed network rather than a single issuing authority like a government or a bank. With the execution of the first mining operation in early 2009, the system became fully operational, and it has since grown in terms of users and miners executing operations within the network.

Interest in blockchain technology has soared in the last few years, once disregarded by some as geek money from a cryptocurrency point of view or as something that was not considered worthwhile, it is now being researched by the largest companies and organizations around the world with millions of dollars being spent to adopt, and experiment with this technology (Bashir, 2018). Permissionless blockchains require a protocol to generate consensus (Saleh, 2020). The earliest exchanges of blockchain technology were mainly limited to a small elite with a strong interest in cryptographic properties rather than the underlying worth of Bitcoin. People and organizations nowadays slowly utilize cryptocurrencies as a medium of exchange when buying and selling real-world goods and services, making them even more established as traditional currencies. Crosby (2016) explained the concept of blockchain on the example of Bitcoin, since it was developed primarily for this cryptocurrency, but emphasized that it applies to all digital transactions on the Internet. Blockchain is a revolutionary technology that can change the world with its convenience, transparency, accuracy and efficiency in speed and cost (Hashemi, Nishikawa & Dandapani, 2020). Currencies as such are therefore immediately usable and viable as an implementation tool upon such technology.

Cryptography is a method of transforming plain text into cipher text, replacing natural language text along the way with sequences of random-looking numbers and characters and thereby making normally readable text unreadable. Bitcoin, acting as a unique asset in the industry, is predicated on this process. The following are the top four functions of cryptography:

1. **Confidentiality** – a piece of information can be coherent only to the individual to whom it is addressed.
2. **Integrity** - ensuring the integrity of the data.
3. **Non-repudiation** - the transmitting time is protected and unchangeable.
4. **Authentication** – transaction information, such as the data about the sender and receiver, can be fact-checked and authenticated by both parties.

The assigned base where all transactions are recorded is the Bitcoin system's most distinguishing feature. A user needs an alphanumeric code known as an address to transmit and

receive Bitcoins (Ragnedda & Destefanis, 2019). An address can be seen as a bank account number and can be the recipient of funds. An address is a piece of public information derived from a public key. No personal information is recorded in a blockchain, and for this reason, the Bitcoin protocol offers pseudo-anonymity (Ragnedda & Destefanis, 2019). Blockchain is a series of entries in a distributed data ledger. Blocks are entries in this ledger that can hold numerous data points or transactions of information. Each block contains transactions that occurred at the same time, and the blocks are linked in a chain linearly and chronologically (Crosby, 2016). Instead of a single entity, a decentralized network allows a large group of computers, known as nodes, to collaborate. This ensures optimum data security through cryptography. The system can be used to verify and enable the transfer of various types of data between two parties in a network without incurring significant transaction costs. The collaboration of many computer devices maintaining a copy of the entire database through many machines or some computers sharing elements of the system makes it feasible to sustain the service of a distributed system. Since all data is immutable, no changes can be made to it, at least not without leaving behind some sort of proof. Every modification is recorded in a changes logbook of sorts. Transparency is by far the most important feature of blockchain. All computer work can be demonstrated, and the knowledge accessible on the subject is reliable. Aside from monetary transactions, blockchain technology has a wide range of applications in any industry that works as a middleman between buyers and producers. A rising variety of information categories are being upheld by blockchain, and they are secured against controversial manipulation by all members of the community, particularly miners, users, and creators.

According to Drogenik and Kovacic Batista (2018) transaction information within the blockchain consists of:

- Sender,
- Receiver,
- Document (e.g. smart contract),
- Digital signature,
- Hash algorithm for the digital signature,
- Digest,
- Public key,
- Private key,
- Key algorithms for public and private keys.

A digital signature protects every transaction by associating a person with a piece of digital data. Therefore, a public and private key are available to each user who has taken part in a transaction process, such as sending or receiving coins. A person must confirm a digital contract or document using his private key in order to conduct a transaction, which confirms the validity of the document. A digest, which is a special set of numbers and letters, is created by using a hash algorithm to check the document's information. The document's digital signature is created by first encrypting the digest with the author's encryption key. The digital signature is made up of the document's text, certification, and author's private key. By reversing the procedure and

applying the same technique that the sender did previously, the receiver can check the document's legitimacy. The latter produces a digest that must match the original exactly. The same digest is obtained by decoding the digital signature with the sender/public author's key. While the second analysis is based on the content of the document, the first one is dependent on the digital signature. If both digests match, the data and digital signature are verified.

Main steps for a blockchain system to operate successfully (Bashir, 2018):

1. A node starts a transaction by utilizing (signing) it with its private key.
2. Based on predetermined criteria, transactions are transmitted via each node and into a block.
3. Each node checks for the proof-of-work associated with its block.
4. If and therefore only if all of the transactions within the block are confirmed as genuine, the nodes approve the block.
5. With each newly produced block, transactions are verified again (usually six confirmations).

Blockchain technology and all of its features are not anymore about Bitcoin or cryptocurrencies specifically but rather a disruptive and revolutionary invention influencing everyday lives. The »World Wide Web« and the Internet as a whole may be used to examine the transformative power of this technology. Blockchain may be considered as a method to establish the next phase, which presents the potential of sharing wealth and producing value for its users, much like the Internet can be viewed as a tool for providing data. According to Ragnedda and Destefanis (2019), the application of blockchain is relatively infinite and can serve as a backbone infrastructure for running smart contracts which are usually seen as computer programs executed by participants in a blockchain, and also represent an additional disruptive force that has exploded in popularity in recent years, to the point that billions of dollars are now traded every day using this technology. Furthermore, there have been numerous occasions since the 2015 introduction of Ethereum's Frontier network when the implementation of smart contracts managing Ether currencies has led to problems or controversies. Smart contracts use a non-standard software life cycle, in which delivered programs, for example, can only be updated or fixed by releasing a new version of the software (Ragnedda & Destefanis, 2019). Smart contracts can be applied to many different scenarios: banks could use them to issue loans or to offer automatic payments, insurance companies could use them to automatically process claims according to agreed terms, and postal companies for payments on delivery (Ragnedda & Destefanis, 2019).

2.4 Mining

The practice of mining cryptocurrencies is typically thought of as a way to create new currency, although this does not accurately define it. The process through which Bitcoin and various cryptocurrencies create new coins and approve additional transactions is known as mining. Blockchains, which are digital ledgers that track cryptocurrency transactions, must be verified and protected using massive, independent networks of computers spread over the globe. Any

transaction that has previously taken place in the chain may be verified. Computers in the network are rewarded with new coins in exchange for contributing their processing power which is a virtuous circle: the miners maintain and secure the blockchain, the blockchain awards the coins, and the coins provide an incentive for the miners to maintain the blockchain all contributing to one important concept of prevention of double-spending of digital currency on a distributed network (Coinbase). To ensure that only verified cryptocurrency miners can mine and validate transactions, a proof-of-work (hereinafter: PoW) consensus protocol has been put into place. PoW also secures the network from any external attacks (Freeman Law Portal, 2022). When a transaction block is created, miners start processing it. The information from the block is turned into a series of letters and numbers, the so-called "hash," utilizing information from the block and a mathematical algorithm. Miners utilize the hash of the previous block in the chain, as well as the information from the transaction block, to build a hash. This provides a digital stamp and verifies the legitimacy of each block in the chain. A change in one block would generate a chain reaction to the end of the chain if someone tried to fake a transaction. The reason for this is that each block's hash is used to create the following block.

According to Hileman and Rauchs (2017), mining has progressed from a hobby involving individuals using personal computers to a capital-intensive sector including custom equipment and specialized value chains, which can be characterized by the five categories listed in table 1. A few mining equipment manufacturers are supplying the industry nowadays. Organizations that offer services for renting and maintaining the necessary resources for mining have also been developed, which enables participation in the mining process without owning your own equipment (Hileman & Rauchs 2017). Highly advanced professional mining pools have been developed to ensure support and additional customer service to users.

Table 1: Mining participants and their activities

Activity	Description
Mining	Individuals and organizations using their own equipment to process transactions and earn from mining fees
Mining Pool	Combines computational resources from a larger number of miners to increase the likelihood and frequency of finding a new block and then shares rewards among the miners based on the amount of computing computer resources
Mining hardware manufacturing	Organizations specializing in the production of mining equipment
Cloud mining services	Organizations renting out "hashing power" to customers/users
Remote hosting services	Organisations hosting and maintaining customer-owned mining equipment

Source: Hileman and Rauchs (2017).

The miners' main purpose is to solve a mathematical problem that explains how they confirmed the new block and won the prize. The complexity of solving these puzzles has increased as miners add more processing power. In 2010, the first Bitcoin mining pools were formed as a result of this. Prizes were assigned among the participants according to the computational power each miner contributed to the pool. With the increase in interest in cryptocurrencies, and thus in prices, there has been a great acceleration in the "arming" of miners with newer and more efficient equipment. Today, mining has become a competitive and resource-intensive industry (Hileman & Rauchs, 2017).

According to Hileman and Rauchs (2017), determining where to place mining facilities is based on three key factors:

1. Electricity must be available at a low cost to miners.
2. In order to collect and transmit data to other nodes within the network on schedule, miners need to have accessibility to a speedy internet connection.
3. To protect mining equipment from high temperatures and overheating, locations in lower temperature zones are required to keep cooling costs lower.

Following this principle, most mining facilities are located in areas where these three factors are largely satisfied. This applies to China, Northern, and Eastern Europe, and North America. The United States is the country with the largest number of mining sites and the largest power for cryptocurrency mining in the world. As much as 37% of the world's mining bases are located in the United States, 21,11% in Europe, and 13,22% in Kazakhstan (Statista, 2022).

2.5 Wallets

A wallet represents a piece of software that allows you to safely receive, send, and store cryptocurrency by managing private and public cryptographic keys. The keys are a crucial part of the cryptocurrency ecosystem since they are the first and most important step to establishing ownership of digital assets and to completing certain transactions that assign or change them in some way. Without such a system there would be no way to establish ownership of a digital asset, which could be anything from a classical cryptocurrency like Bitcoin to a token that represents some kind of asset. Wallets also administer a user-friendly or complicated interface for managing cryptocurrency balances and automating activities, such as computing the amount needed to reach a certain transaction confirmation time, known as fees. Through time, wallets have evolved from simple software programs handling key management to sophisticated applications that offer a variety of technical features and additional services that go beyond the simple storage of cryptocurrency (Mearian, 2019). A particular wallet keeps track of the blockchain address of a specific item, and stores the encryption keys needed to digitally sign transactions. If that specific address is lost by an individual they, unfortunately, lose their control over assets. Such a system is on the other hand not practical for many users for a variety of reasons. As a result, several wallet providers have emerged in recent years to make the storage of cryptocurrencies as well as using wallets easier. These wallets range from open-

source projects operated by volunteer developers to registered enterprises with venture capital backing (Mearian, 2019).

Cold wallets and hot wallets are the two most common types of cryptocurrency wallets. For users to be able to use the hot wallet, they need an active internet connection whilst cold wallets don't require any connectivity. While cold storage wallets are comparable to safety deposit boxes for putting away numerous types of digital currencies, hot storage wallets are obtainable through an internet service, such as Coinbase, one of the biggest cryptocurrency exchanges that offers online wallets for customers. Client-side wallets are maintained locally on a user's computer or mobile device. Cold storage wallets are also available as hardware from companies like Trezor and Ledger that comes with the software already installed. A cold storage wallet is intrinsically more safe than a hot wallet since it is not connected to the internet. According to Mearian (2019), the majority of Bitcoin attacks have taken place when a hacker targets an online wallet service and transfers the secret keys to their own wallet, thereby transferring the funds as well. Depending on the digital wallet chosen, each has its own level of security to ensure that the private key is kept safe.

Hot Wallets

Desktop wallets

Desktop wallets require the installation of an application on a computer or laptop. The application then assists in the creation of a data file that stores the users' keys. To access the keys, users are required to generate a password. Desktop wallets give control over one's key, but users should be aware of physical damage or malware infection like computer viruses.

Web wallets

Web wallets are among the most popular types of hot wallets since today almost anyone can use a web browser to access the web wallets without having to download any extra software or programs. Browser access is used by web wallets, to allow users to access cryptocurrency assets from anywhere having a password, a device, and a web browser. The keys to cryptocurrency assets are owned by the website which is often not admired by cryptocurrency enthusiasts.

Mobile wallets

Another important category of hot wallets is called mobile wallets which are related to desktop wallets. Mobile application download and installation are required on the user's phone which acts as a hot wallet. These types of wallets give users more flexibility when exchanging money, but they also present serious security risks if the devices are stolen or misplaced.

Multisignature wallets

Depending on the level of security, two or three private keys are required to access funds after completing a transaction using a multi-signature wallet. This method is beneficial for businesses that delegate responsibilities to different employees, requiring them to share their private keys to obtain access to funds (Geroni, 2022).

Table 2: Comparison of best hot cryptocurrency wallets in 2022

The Wallet	Supported Coins	Fee Structure	Fee for sending cryptocurrencies	Mobile App
eToro	43	Free, Spread-Only on Trades	Blockchain Fee	Yes
Coinbase	50+	Free to Download, 1.49% on Trades	Blockchain Fee	Yes
Binance	1,000+ markets	Free to Download, 0.1% on Trades	Blockchain Fee	Yes
Huobi	200+	Free to Download, 0.2% on Trades	Blockchain Fee	Yes
Kraken	50+	Free to Download, 0.26% on Trades	Blockchain Fee	Yes

Source: Mediawire (2022).

Cold Wallets

Paper wallets

Physical pieces of paper make up paper wallets. All the information required to use the coin must be provided on paper. Cold wallets, overall, provide more security which is not the case with paper wallets. Individuals run the risk of losing the cryptocurrency assets in their wallets if they lose the paper document. The inability to transfer partial payments with ease is another drawback of paper wallets, and the lengthy nature of operations with paper wallets poses considerable obstacles to their use.

Hardware wallets

Hardware wallets are the ultimate cold wallet concepts. Additional security is being provided in the process by preventing private keys from being exposed online. According to Geroni (2022), hardware wallets are similar to flash drives in that they store private keys on a physical device in an offline environment, and because a user can connect them to PCs or any other

device with a USB drive, hardware wallets are one of the most user-friendly cryptocurrency wallets (Geroni, 2022). The private key never leaves the device, not even when it is online, without first obtaining transaction details, doing data validation, and concluding the operation. Later, the transactional information is transmitted to an online network, where it is recorded.

Table 3: Comparison of best cold cryptocurrency wallets in 2022

The Wallet	Supported Coins	LCD Display	Ease of use	Support for micro SD	Ease of recovery	Compatibility
Ledger Nano S	Supports a long list of coins	An impressive LCD screen	Easy to use for first-time users	No	Easy to recover using the seed phrase	Windows, Linux, OS X
Trezor Wallet	Supports many coins but not to the level of Ledger Nano S	An impressive large LCD screen	Easy to learn	No	Generates a seed phrase to help recover lost coins	Windows, Linux, OS X
KeepKey	Only supports six coins	A smooth and impressive display	Fairly simple	No	Provides a recovery seed phrase for use in the case of a loss	Windows, Linux, OS X
Opendime	Only supports Bitcoin and Litecoin	No	Complex, especially for first-time users	No	Doesn't have a process for recovering coins	Windows, OS X
Digital BitBox	BTC, ETH, ETC, LTC, ERC20 tokens	Lacks LCD support	Very easy to use	Yes	Easy to recover using a MicroSD card	Windows, Linux, OS X

Source: Ico Holder (2021).

Other uses for cryptocurrency wallets

The software can be employed to hold the keys of fungible and non-fungible tokens which usually represent products, investment securities, shares, and services, even though the bulk of

cryptocurrency wallet softwares are designed to store cryptocurrencies like Bitcoin, Ethereum, Ripple, Solana, and Cardano. For example, a token stored in a cryptocurrency wallet could represent concert or plane tickets, unique artwork, or goods in a supply chain - virtually anything with a digital value attached to it (Geroni, 2022). Geroni (2022) also claims that in the future, a new, "trustless" global economy could be based on blockchain and cryptocurrency wallets that enable everything from individual financial or professional histories, tax information, medical information, or consumer preferences to corporations maintaining employee or partner digital identities and controlling application access. In the future cryptocurrency wallets could be utilized as storage means for electronic traditional identity documents such as driver's licenses, passports, birth certificates, social security, and healthcare cards, therefore, enhancing their security and value thus offering full control of their owners.

3 MAIN CRYPTOCURRENCIES, REGULATIONS, AND RISKS

3.1 Ten biggest cryptocurrencies by market capitalization and their characteristics

After 2009 and the emergence of the first cryptocurrency Bitcoin, a total of 19,704 cryptocurrencies have developed worldwide as of June 2nd, 2022 according to the CoinMarketCap website. The ten largest cryptocurrencies by market capitalization are shown in Table 4. The combined market capitalization of all known cryptocurrencies today is \$1,237,422,710,307 with Bitcoin's dominance of 46,1% and Ethereum's standing at 17,8%.

Table 4: Ten leading cryptocurrencies by market capitalization as of June 2nd, 2022

Cryptocurrency	Market Capitalization (\$)
1. Bitcoin (BTC)	570,390,736,190
2. Ethereum (ETH)	220,770,857,650
3. Tether* (USDT)	72,488,666,483
4. USD Coin* (USDC)	54,073,692,334
5. Binance Coin (BNB)	49,475,227,667
6. Cardano (ADA)	19,190,087,488
7. Ripple (XRP)	19,123,973,792
8. Binance USD* (BUSD)	18,043,317,962
9. Solana (SOL)	13,461,769,573
10. Dogecoin (DOGE)	10,790,438,047

* = stablecoin

Source: CoinMarketCap (2022).

1. Bitcoin (BTC)

Bitcoin is the first and certainly the most important cryptocurrency. It was first mentioned in 2008 in the article »Bitcoin: A Peer-to-Peer Electronic Cash System« by Satoshi Nakamoto. Almost nothing is known about the author of the article, Nakamoto, and the name itself is a pseudonym. Numerous theories have been developed about who Nakamoto is, and it is assumed that this is a team of experts who invented Bitcoin. Some also believe that Nakamoto is an individual who withdrew for the protection of his privacy, after leaving the lead role to Gavin Anderson, the person who now runs the Bitcoin project. In early 2009, Satoshi Nakamoto launched the BitcoinQt project, which created the Bitcoin currency and launched the first tokens right after. The fundamental network of Bitcoin working on a peer-to-peer network protocol has been developed on January 3, 2009, with Bitcoin mining starting the same year. In the early days, the value of Bitcoin was very low, and activities were reflected mainly in the exchange between a small number of people interested in cryptography. The number of people who mined Bitcoin, as well as the weight of the mining itself, was low. Satoshi Nakamoto mined about 1 million Bitcoins, which was about 10% of the total supply at the time. Surprisingly, none of these Bitcoins have been spent to date. However, following the publicity principle of the blockchain, it is believed that a clue to Nakamoto's identity will soon be revealed, as a link will be created between the account controlled by Nakamoto and some real-world individuals (Franco, 2015). Bitcoin was deliberately built as a decentralized system, as confirmed by Nakamoto's statements where he states: »I think there was a lot of interest in 90s financial systems, but after decades of failed third party trust systems, they see them as a lost cause and I would be surprised if we do not use electronic currency in 10 years, now that we know how to do it.« The total number of Bitcoins is limited by the algorithm to 21 million, and to date, about 19 million have been mined. Kapoor (2016) states that the last "satoshi", or 0.00000001 Bitcoin, is expected to be mined by 2140, as the mining rate decreases exponentially over time.

Table 5: Bitcoin statistics as of June 2nd, 2022

Total BTC in existence	19,055,975.5
Bitcoins left to be mined	1,983,337.5
Share of Bitcoins issued	90.556 %
New Bitcoins per day	900
Mined Bitcoin blocks	732,666

Source: BuyBitcoinWorldwide (2022).

How does Bitcoin work?

The Bitcoin network consists of a large number of computers, i.e. nodes that are interconnected. When buying Bitcoin, each user gets two keys, private and public. A public key is an address,

similar to an email address, and can be given to any person to receive the currency. The private key is used by the owner to send Bitcoin (Kapoor, 2016). The Bitcoin records its transactions in a public log called the blockchain (Siner & Ittay, 2018). It contains information on all verified transactions and gives consumers a summary of all transactions. Cryptography is used to maintain the consistency and sequence of the blocks in the chain. Transactions between two Bitcoin wallets use a private key that serves as a signature, and mathematical proof that the transaction came from the real owner of the wallet (Nakamoto, 2008). All transactions are broadcasted online and usually confirmed through a process called mining. For transactions to be included in the chain, they must comply with strict cryptographic rules and be authenticated by the network (Nakamoto, 2008).

Bitcoin today

According to data from CoinMarketCap, the price of Bitcoin as of June 2nd, 2022 is \$29,938.70 with a market capitalization of \$570,390,736,190. As of today, 19,055,975 BTCs have been mined, and the final number is limited to 21 million. The highest price of Bitcoin was recorded on November 9th, 2021 when it reached \$67,566.

Figure 1: BTC to USD chart



Source: CoinMarketCap (2022).

2. Ethereum (ETH)

The first description of Ethereum was given by Vitalik Buterin at the end of 2013 while working on research in the Bitcoin community. Shortly afterward, Buterin published the white paper on Ethereum, in which he described and explained in detail the technical design, protocol, and architecture of smart contracts. In January 2014, during the North American Bitcoin

Conference, Ethereum was formally introduced. After working together and collaborating, Buterin and Gavin Wood co-founded Ethereum. In his "Yellow Paper Ethereum", Wood published a detailed specification of the operation of the Ethereum Virtual Machine (EVM). According to these specifications, Ethereum is implemented in seven programs (C ++, Go, Python, Java, JavaScript, Haskell, and Rust). To spark the interest of developers, miners, and investors, Ethereum has at the start announced a pre-sale of its Ethereum currency unit. Legal entities have been established to assist in fundraising through pre-sales, including the Ethereum Foundation (Stiftung Ethereum) established in June 2014 in Switzerland. In July of the same year, the 42-day allocation of ethers began, where 31,591 Bitcoins, then worth \$18,439,086, were exchanged for about 60,102,216 Ethers. Pre-sale earnings were used to repay legal debts and other expenses. To achieve the greatest possible security and stability of the system, rewards are offered to those who discover any weaknesses in the software. The first version of the Ethereum Frontier network was launched on July 30, 2015. Miners began to join the network in order to assist secure the blockchain and earn ethers. Building and using decentralized apps based on blockchain technology is possible thanks to Ethereum, an autonomous and open blockchain ecosystem. Since it is a decentralized currency, as with Bitcoin, no one controls or owns Ethereum. The difference with Bitcoin is that Ethereum is designed to be customizable and flexible.

How does Ethereum work?

Ethereum uses similar features to Bitcoin, with some of its changes and innovations. The Bitcoin blockchain is just a list of transactions whereas Ethereum's blockchain tracks the status of each account. Users pay substantially high transaction fees to the network, to protect the network from malicious computer tasks. Also, miners check and execute transactions, competing to have their block added next in the chain of blocks. For this, they receive compensation in the form of Ethereum, which gives them an incentive to participate in the network.

Ethereum today

According to data from CoinMarketCap, the price of Ethereum as of June 2nd, 2022 is \$1,830.64 with a market capitalization of \$220,435,179,923. As of today, 121,017,946.87 ETHs have been mined and the total supply is unlimited. The highest price of Ethereum was recorded on November 9th, 2021 when it reached \$4,812.09.

Figure 2: ETH to USD chart



Source: CoinMarketCap (2022).

3. Tether (USDT)

Tether is a blockchain-based cryptocurrency whose tokens in circulation are backed by an equivalent amount of U.S. dollars, making it a stablecoin with a price pegged to \$1.00 (Frankenfield, 2022a). Tether tokens, which were established by the cryptocurrency exchange BitFinex and trade under the USDT symbol, are the Tether network's native tokens (Frankenfield, 2022a). Tether is a stablecoin, a form of cryptocurrency that tries to prevent sharp fluctuations in the price of cryptocurrencies like most other well-known cryptocurrencies do. Instead of being used as a tool for speculative investments, it is mainly used as a medium of exchange and a method of wealth storage (Frankenfield, 2022a). It belongs to the category of stablecoins known as fiat-collateralized stablecoins and is therefore covered by conventional fiat money. Tether Ltd. does not guarantee any right to redeem or swap Tethers for actual money, suggesting these tokens cannot be converted to US dollars. As a result, there have been ongoing problems with the currency and the corporation itself in past few years. In January 2018, it hit another setback when the required audit to guarantee that the real-world reserve was maintained did not take place, and the company announced instead, its departure from the audit firm, after which regulators issued a subpoena (Frankenfield, 2022a). Worries about whether the company, accused of a lack of transparency, has enough in reserves to back the coin have been pervasive (Frankenfield, 2022a).

Tether today

The cryptocurrency market's primary source of liquidity is still Tether. By market valuation, USDT is the third-largest cryptocurrency worth over \$70 billion as of June 2nd, 2022. Due to a survey conducted by CryptoCompare, a global cryptocurrency market data source, Bitcoin to Tether trading continues to account for the majority of BTC exchanged into fiat or stablecoin. In May 2022, USDT accounted for more than 60% of all Bitcoin trading.

Figure 3: USDT to USD Chart



Source: CoinMarketCap (2022).

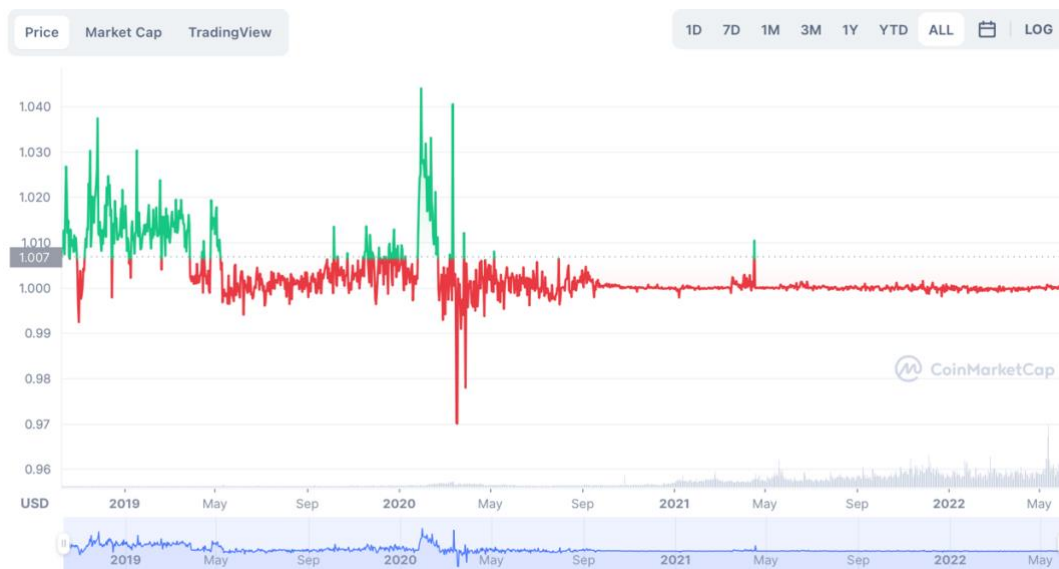
4. USD Coin (USDC)

A stablecoin called USD Coin is pegged 1:1 to the US dollar. Every token is secured by \$1 in reserves, which are maintained in a mix of short-term US Treasury bonds and cash. The Centre consortium, which backs this asset, claims that USDC is provided by licensed financial institutions. It was established by two people - peer-to-peer payment service company Circle and cryptocurrency trading platform Coinbase. This collaboration is open to other cryptocurrency enterprises. The stablecoin launched in limited supply in September 2018. According to CoinMarketCap, USD Coin's mantra is »digital money for the digital age«, and stablecoin is designed for a world where cashless transactions are becoming more common. The USD Coin has been given several applications. Enthusiasts believe that in exchange for giving cryptocurrency investors a safe haven throughout volatile times, it also allows firms to accept payments in virtual currencies, affecting a number of industries like gaming and decentralized finance. The main objective is to create a USDC community with the required number of wallets, exchanges, service providers, and apps.

USD Coin today

According to data from CoinMarketCap, the market cap of USDC as of June 2nd, 2022 is \$54,090,607,474. As of today, there are 54 billion USDCs in circulation, and the final number is unlimited. The currency itself had two major spikes in each direction since its creation.

Figure 4: USDC to USD Chart



Source: CoinMarketCap (2022).

5. Binance Coin (BNB)

Binance Coin is the cryptocurrency issued by the Binance exchange and trades with the BNB symbol, and as of Q2 2022, Binance Exchange is the largest cryptocurrency exchange in the world, with a volume of \$7.6 billion (Frankenfield, 2022a). Binance token was first launched in 2017 as a utility token for reduced trading fees, but its uses have now spread to a variety of platforms and apps (Frankenfield, 2022a). Being the Binance chain's native token, BNB was once an ERC 20 norm on the ETH blockchain. It had a fixed cap of 200 million Binance Coins when it was introduced via an ICO in July 2017. It offered 10%, or 20 million, BNB tokens to angel investors, 40%, or 80 million, tokens to the founding team, and the remaining 50%, or 100 million, to the various participants through the ICO process (Frankenfield, 2022a). The majority of the money received during the Initial Coin Offering was allocated to Binance's promotion and advertising, with the rest going into platform development and critical changes to the Binance ecosystem.

How does Binance Coin work?

The BNB chain consists of the BNB beacon chain and BNB Smart Chain. The former is focused on BNB Chain governance that allows BNB holders to participate in staking and voting. The

latter is a consensus layer, Ethereum Virtual Machine compatible, and has hubs to multi-chains and it is used to pay for Binance.com, Binance DEX, and Binance Chain transaction fees (CoinTelegraph, 2022). It could also be used to make payments at Cryptocurrency.com, Monetha, and HTC, as well as to arrange travel accommodations at sites such as TravelbyBit, Trip.io, and Travala.com (CoinTelegraph, 2022). Investors and token owners can sometimes use the token to pay for entertainment such as virtual goods, card packs, lotteries, and digital services such as BitTorrent, Canva, and Storm. BNB investors and individuals may use them to participate in any of the ICOs that have already been featured on Binance's Launchpad platform. Other businesses have backed the cryptocurrency coin, which has helped it gain popularity. It also has a partnership with Uplive, the top live online streaming service in Asia, which provides electronic rewards to Uplive's 20 million subscribers in exchange for BNB tokens. Binance coin is also supported by the platform, the mobile app, and the VISA debit card of Monaco, the pioneering payments and cryptocurrency platform (Frankenfield, 2022b).

Binance Coin today

According to data from CoinMarketCap, the price of Binance Coin as of June 2nd, 2022 is \$303.4 with a market capitalization of \$49,539,158,749. As of today, there are 163,276 million BNBs in circulation, and the final number is limited to 165 million. The highest price of BNB was recorded on May 3, 2021, when it was \$677.

Figure 5: BNB to USD Chart



Source: CoinMarketCap (2022).

6. Cardano (ADA)

Based on a blockchain that is adaptable, durable, and flexible for executing smart contracts, Cardano is the next-generation expansion of the Ethereum concept, enabling the development of a variety of autonomous finance services, new coins, videogames, and much more. Cardano is a third-generation blockchain initiative based on the technology established by Bitcoin and Ethereum which represent the first and second generations. Charles Hoskinson, a co-founder of Ethereum, formally introduced it in the autumn of 2017. A massively scalable and energy-efficient smart contract ecosystem is what Cardano aims to be. According to the article found on Coinbase, the “Ouroboros” consensus mechanism is based on peer-reviewed research by a team of computer scientists and cryptographers from the University of Edinburgh, Tokyo University, and other institutions. The Cardano platform's native currency is ADA (called after Ada Lovelace, the "world's first software engineer" and a 19th-century academic). ADA tokens are used to pay transaction fees and are staked by validators and delegators who want to assist in sustaining the network's security and stability in exchange for rewards, and it might be utilized as a governance token, giving holders the ability to vote on improvements and upgrades to the Cardano platform (Coinbase).

How does Cardano work?

In comparison to other blockchains, Cardano employs a slightly different model. There are two layers to its blockchain: a settlement layer and a computational layer. The first layer is up and running and it allows users to transfer and receive ADA tokens across their wallets. It employs a method similar to that of Ethereum. The second layer is currently being developed, to allow users to initiate and sign up for smart contracts. Although it sounds identical to the Ethereum blockchain, it offers some advantages. For starters, Cardano is more versatile and responsive to changes according to the needs of its users. Various countries, for example, have different financial and monetary legislation. The same contract can be written to change how information is stored, processed, and accessed under those regulations. Because the computational foundation is unique, ADA users can continue to use the same money in different countries while following different rules and regulations. The Cardano project team can also use soft forks to make changes to the processing layer without affecting the ADA or payment layer. To validate transactions, the proof-of-stake system is employed. Validators are users who want to participate in the process and must invest a particular amount of ADA coins to demonstrate their "stake" in it. They are also compensated according to their stake.

Cardano today

According to data from CoinMarketCap, the price of Cardano as of June 2nd, 2022 is \$0,520 with a market capitalization was \$19,890,556,946. As of today, there are 33,82 billion ADAs in circulation, and the final number is limited to 45 billion. The highest price of ADA was recorded on September 3, 2021, when it was \$3.

Figure 6: ADA to USD Chart



Source: CoinMarketCap (2022).

7. Ripple (XRP)

Ryan Fugger founded the company in 2004 under the name RipplePay. The basic idea of the project was a network of trust in financial relations that would replace banks. In May 2011, Jed McCaleb, one of the pioneers of Bitcoin, joined the Ripple team, and shortly after Fugger handed him the complete Ripple project. At first, there were many problems with the inability of the participants to trust the structure of equal partners. To solve this problem, the "Ripple Gateway" was formed including big trustworthy companies. The founders considered this to be a good compromise between the traditional banking system and the peer-to-peer network. Ripple issued the first XRP coin in January 2013. It was based on a public chain of cryptographic signatures as in Bitcoin and did not require an initial network of trust. The tokens have a final supply limited at 100 billion with the company's ability to burn tokens. Many cryptocurrency enthusiasts today believe this is helping Ripple prevent price appreciation and therefore set the ground for further improvements in the future. Besides that many think that the XRP tokens don't possess the basic characteristics of a cryptocurrency as a company is publicly known to assist banking systems and major players in the financial community, therefore, fading away from the decentralized concept on which blockchain and digital currencies stand ground. The main difference between Ripple and some other well-known cryptocurrencies is that Ripple's digital currency is not mined. At the time of its establishment, a fixed number of Ripples has been set that will not increase, and there is no need for mining.

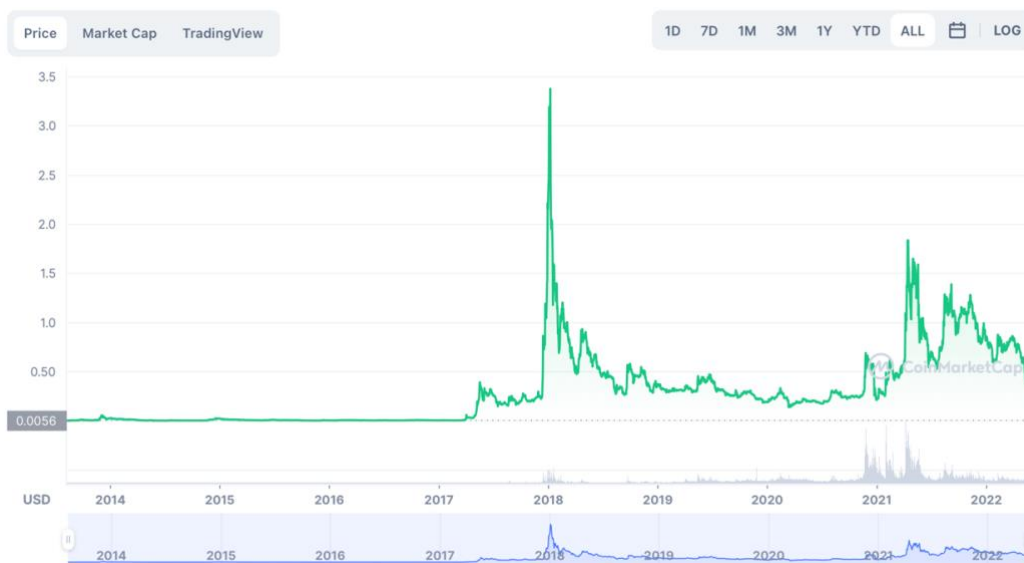
How does Ripple work?

The Ripple network is a relatively large network where trust between participants is commonly distorted. To solve this problem, chains of trust are used, as direct or indirect connections between two users. Information is transmitted through a protocol that is related to that used by banks to secure online credit card payments. After the payment, a small period of 3 to 4 seconds is required to update the user's books. Each transaction is charged a fee of 0.00001 XRP, and these fees are destroyed, thus benefiting all Ripples owners by reducing the total number of Ripples.

Ripple today

According to data from CoinMarketCap, the price of Ripple as of June 2nd, 2022 is \$0.3949 with a market capitalization of \$19,089,499,941. As of today, there are 48,3 billion XRPs in circulation, and the final number is limited to 100 billion. The highest price of XRP was recorded on January 4, 2018, when it reached \$3.84.

Figure 7: XRP to USD Chart



Source: CoinMarketCap (2022).

8. Binance USD (BUSD)

In partnership with Paxos, Binance developed Binance USD, a 1:1 USD-backed stablecoin that is governed and authorized by the New York State Department of Financial Services. Binance USD is a Binance-branded token that promises to merge the dollar's stability with blockchain technology. It was introduced in September 2019. BUSD has been adopted as a preferred stablecoin within the Binance system of products and services, as well as garnering recognition

from major DeFi platforms, cryptocurrency wallets, and other services not under Binance's control.

How does Binance USD work?

A Binance USD unit is generated through depositing US dollars on the Paxos platform, which ensures the 1:1 US dollar backing of the stablecoin. According to the article from Cryptocurrency.com BUSD uses the Ethereum blockchain, issued as an ERC-20 token, in addition, Binance offers a Binance-Peg version of BUSD that is not issued by Paxos on Binance Smart Chain and Binance Chain blockchains for transactions, supporting the BEP-2 and BEP-20 token standards. Binance USD is used for a variety of purposes, including transferring digital dollars, trading on exchanges, providing liquidity to DeFi platforms, and paying for products and services from merchants who accept the currency.

Binance USD today

According to data from CoinMarketCap, the market cap of BUSD as of June 2nd, 2022 is \$18,097,439,961. As of today, there are 18,07 billion BUSDs in circulation, and the final number is unlimited.

Figure 8: BUSD to USD Chart



Source: CoinMarketCap (2022).

9. Solana (SOL)

Solana is a blockchain platform designed to host decentralized, scalable applications (Picardo, 2022). Founded in 2017, Solana is an open-source project currently run by Solana Foundation

based in Geneva, while the blockchain was built by San Francisco-based Solana Labs (Picardo, 2022). In comparison to other blockchains like Ethereum, Solana processes transactions far more quickly and has much lower transaction fees. Picardo (2022) says that Solana can process as many as 50,000 transactions per second (hereinafter: TPS), and its average cost per transaction is \$0.00025, while Ethereum can only handle less than 15 TPS, while transaction fees reached a record of \$70 in 2021.

How does Solana work?

The Proof of History (hereinafter: PoH) and PoS models are used in Solana's network. While Proof of History enables transfers to be time-tagged and approved quickly, validators that add transactions to the public network can confirm transactions based on the amount of currency or tokens they hold. The goal of Solana's architecture is to show that there are a variety of protocols that, when used in combination to create a blockchain, eliminate software as a productivity constraint, enabling transaction volume to grow according to network capacity. Scalability, safety, and independence are all factors that Solana's architecture takes into account while designing a blockchain.

Solana today

According to data from CoinMarketCap, the price of Solana as of June, 2nd 2022 is \$40,82 with a market capitalization of \$13,874,556,946. As of today, there are 339 million SOLs in circulation, and the final number is limited to 511 million. The highest price of SOL was recorded on November 6, 2021, when it reached \$258.

Figure 9: SOL to USD Chart



Source: CoinMarketCap (2022).

10. Dogecoin (DOGE)

Dogecoin, launched as a parody money, is a cryptocurrency asset powered by an internet community network that promotes brand recognition and price inelasticity. In 2013, two computer scientists, Billy Markus and Jackson Palmer forked Litecoin to forge Dogecoin. Markus and Palmer are said to have developed the coin as a prank in response to the cryptocurrency market's wild speculation. The token is accepted as a means of payment by several well-known enterprises, featuring SpaceX, Kronos, and the Dallas Mavericks.

How does Dogecoin work?

A faster, highly flexible, and user-friendly version of Bitcoin was pushed for using its script technology and infinite supply, and due to its limited total supply, there is no limitation to the quantity of Dogecoin that may be mined. A »Dogecoin Faucet« is a website that will give you a small amount of Dogecoin for free as an introduction to the currency so that you can begin interacting in Dogecoin communities (Frankenfield, 2022c).

Dogecoin today

According to data from CoinMarketCap, the price of Dogecoin as of June 2nd, 2022 is \$0,0826 with a market capitalization of \$10,982,556,946. As of today, there are 132,6 billion DOGEs in circulation which is also the maximum supply. The highest price of DOGE was recorded on May 7th, 2021, when it was \$0,69.

Figure 10: DOGE to USD Chart



Source: CoinMarketCap (2022).

3.2 Regulation and legislation

Cryptocurrencies are among the most current legal challenges influencing and altering the way individuals trade and do business. The expansion and development of Bitcoin have attracted the interest of government bodies and other entities throughout the globe. Cryptocurrencies have formulated a new system of economic relations between parties from different countries, where the exchange of assets takes place without involving centralized financial institutions (Bolotaeva, Stepanova & Alekseeva, 2019). A distributed ledger, which represents the best and only accessible form of safety, provides the foundation for the security and reliability of these transactions. Since these cryptocurrencies spread rapidly, parties including law enforcers, tax officials, and regulatory bodies worldwide are trying to understand the idea and how rules fit into it.

The necessity for legal regulation originates mostly from cryptocurrencies' decentralized and anonymous character. Advisory bodies throughout the countries are distressed about the money laundering, terrorist activities, and tax evasion schemes that these particular currencies bring. Particularly dangerous is the use of cryptocurrency as part of criminal programs. There has been increased inactivity, and the use of this payment method is accelerating. However, the overall number and value of cryptocurrency transactions related to criminal activities still represent only a limited share of the criminal economy when compared to cash and other forms of transactions (Europol, 2021). In recent years, cryptocurrencies have been increasingly used to launder illegal profits. Criminal usage of cryptocurrencies has also become more sophisticated. They are being utilized as an investment fraud currency, in addition to being used to hide capital movements as part of complicated money laundering schemes. The criminal use of cryptocurrency is no longer primarily confined to cybercrime activities, but now relates to all types of crime that require the transmission of monetary value (Europol, 2021). With the emergence of new ideas and markets for such currencies, a few countries have officially banned the use of cryptocurrencies. Algeria, Bangladesh, China, Egypt, Iraq, Morocco, Nepal, Qatar, and Tunisia have entirely banned digital currencies, while Russia is on the verge of doing so, and some countries, including the United States, Japan, and Sweden, have made steps to control them by declaring them legal tender. There have been numerous challenges associated with the rise of new technology based on blockchain and currencies that arose as a consequence. The incorporation of such currencies into the legal system is a difficult issue, and legislators must address the legal issues immediately before several lawsuits develop. Let's have a look at how various countries and jurisdictions around the world incorporate them into their legal systems.

United States

Regardless of the fact that cryptocurrencies are legal in the USA with numerous investors and technology startups, there is no precise regulatory structure in place to supervise cryptocurrency activities. For income tax reasons, the International Revenue Service (IRS) considers cryptocurrencies as digital property. In the United States, cryptocurrency transactions and exchanges are governed by the Bank Secrecy Act (BSA), which demands them to enroll with the Financial Crimes Enforcement Network (FinCEN). They consider it to be a financial

transmitter as well. The Securities and Exchange Commission (SEC) classifies cryptocurrencies as securities, making them subject to the same regulations as other securities (ComplyAdvantage, 2022). They must comply with anti-money laundering (AML) rules as well as the liabilities that come with them.

Europe

Although each member state of the European Union has its own regulations regarding cryptocurrencies, they are widely accepted as legitimate across the union. Taxes on cryptocurrencies differ as well, however many of the members apply a 0–50% capital gains tax on cryptocurrency profits. The European Union is constantly looking at new cryptocurrency regulations. Many concerns have been highlighted about the risks associated with private digital currencies, causing the European Central Bank to confirm that it is considering establishing its own digital currency - CBDC or central bank digital currency. It is unclear how would cryptocurrencies fit into the present European Union's regulatory framework. The European Commission released a new proposal in 2020 named MiCA, which stands for »Markets in Cryptocurrency-Assets Regulation« (ComplyAdvantage, 2022). The proposal outlines potential cryptocurrency regulatory measures, including a new licensing system for cryptocurrency-asset issuers, industry conduct standards, and new consumer protections (ComplyAdvantage, 2022).

United Kingdom

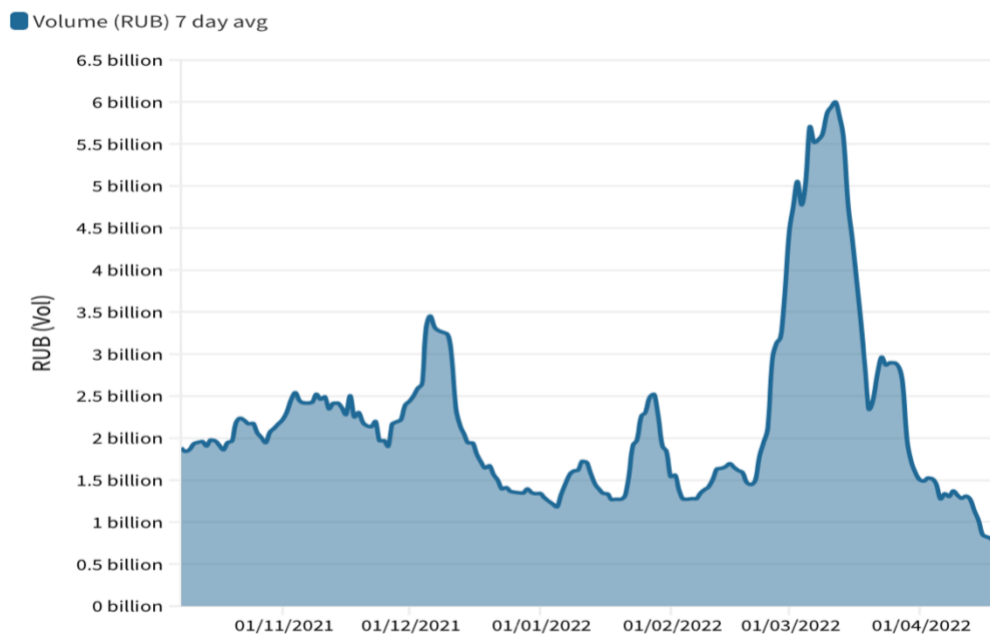
Cryptocurrencies are treated as assets rather than legal commodities in the United Kingdom. Exchanges of all kinds must check in and report to the Financial Conduct Authority, but they are not authorized to conduct cryptocurrency derivatives trading. However, regulatory authorities have established particular legislation for cryptocurrency-specific procedures like KYC (Know Your Customer) or AML (Anti Money Laundering). Investors still have to pay capital gains tax on the money they make from trading cryptocurrencies.

Russia

The Russian authorities have been unable to reach an agreement on how to manage the country's cryptocurrency sector. At the start of 2022, the Russian central bank recommended imposing a blanket ban on all digital asset activities within the country. The president and specific ministries disagreed with the idea, arguing that placing a regulatory framework on the industry would be a wiser approach, given the fact that cryptocurrencies, particularly mining, could provide significant benefits to the country. Russia is uniquely positioned to serve cryptocurrency miners due to its excess of cheap electricity, a cold climate that reduces demand for cooling systems, and reliable electricity grid according to the Cambridge Bitcoin Electricity Consumption Index. According to the latest updates, the new bill, which appears to be ready for introduction, offers a wide range of standards for cryptocurrency investors to complete for identity, accounting, and certification procedures. Russia has also recently successfully piloted a central bank digital currency, the digital ruble, which was expected to go live in late 2021

(ComplyAdvantage, 2022). The recent attack of Russian forces in Ukraine has triggered many sanctions imposed on Russia and transformed the financial system with G7 members removing strategically important banks from the SWIFT system thus making them unable to process bank payments. Because of that many people wonder if the users of financial services can switch their means of payment and lean towards the usage of cryptocurrencies. Although Bitcoin transactions are untraceable, sanctioned Russian individuals and enterprises would likely use cryptocurrencies to escape sanctions. This is particularly valid for decentralized exchanges and networks for decentralized finance that employ smart contracts to carry out transactions. In regards to anti-money laundering and counter-terrorist financing, DEX and DeFi are still unregulated, which implies that no client due diligence, restrictions screening, transaction monitoring, or other related measures are in existence.

Figure 11: Ruble / Cryptocurrency Trading Volume



Source: CryptoCompare (2022).

Ordinary Russian citizens are much more likely to turn to cryptocurrency to protect their wealth in the face of massive inflation, extreme currency fluctuations, and an inability to access cash, make payments, or move funds in and out of the country. The use of cryptocurrencies is now prohibited, but this hasn't interrupted Russian citizens from storing cryptocurrency assets: The government of Russia claims that \$5 billion in bitcoin transactions take place inside the country annually and that its 144 million residents hold around \$26.5 billion worth of cryptocurrencies across over 12 million addresses. However, converting cryptocurrency to fiat currency represents a challenge due to the sanctions in place and banks' wider reluctance to risk processing payments originating from Russia (ComplyAdvantage, 2022). This may all make it challenging to pay for real-world goods and services from vendors that do not accept cryptocurrency (ComplyAdvantage, 2022).

China

On September 24, 2021, ten governmental agencies, along with the People's Bank of China (PBOC), jointly published a notification stating that cryptocurrencies are not recognized as legal money. In addition, using offshore platforms to offer services to Chinese citizens is prohibited in China, as are any cryptocurrency transactions. As stated by the authorities, employees of offshore cryptocurrency exchanges who are based in China, along with any businesses that supply services to them, would be examined and punished. The price of cryptocurrencies is affected by changes in the Chinese market since China has one of the largest cryptocurrency markets worldwide. Meanwhile, the crackdown on cryptocurrency mining has already shown its effect. China reported using 75 percent of the world's Bitcoin energy usage in September 2019. By April 2021, this fell to 46 percent (Brooke, 2021).

We can see that there is no worldwide coordinated response to cryptocurrency regulations as each country approaches the issue in its unique way. In the ultimate manifestation of RegTech, legislative procedures might be included into the architecture of DeFi, possibly decentralizing both finance and its regulation (Zetsche, Arner & Buckley, 2020). Many organizations and investors have yet to realize the full potential of cryptocurrency. It is difficult to propose or implement laws without such awareness and economists and regulators must come up with solutions to handle this fast-paced technology. Regulatory actions are essential to allow the nation's progress and countries should strive to work with it rather than against it, therefore, recognizing potential benefits. Several countries currently prove to be incapable of responding to innovations and technological progress. But the emergence of a decentralized system and cryptocurrency will surely lead to evolutionary changes in the international legal system (Cvetkova, 2018). Countries that will eventually show more openness to cryptocurrencies will be the ones that will see major inflows of related business organizations in the future. Those countries will enjoy the obvious benefits of additional business while also gaining a competitive advantage by better understanding and knowing the specifics of the cryptocurrency industry. With that information, they will most likely play a larger part in establishing a good, regulated cryptocurrency ecosystem, which may attract even more successful cryptocurrency enterprises. Digitalization is the future and blockchain will in one way or another take its place in financial systems and other economic sectors throughout the globe.

3.3 Market Bubbles

A financial bubble is a situation in which asset prices are much higher than the underlying fundamentals can reasonably justify (Segal, 2022). Speculative demand is often the sole reason for increasing asset prices rather than intrinsic worth, therefore, causing financial bubbles to eventually pop and cause massive sell-offs or price declines. Financial bubbles in particular frequently correlate with the notion that a quick profit may be made by simply selling an asset to another speculator (Griffin & Shams, 2020). Many cryptocurrency skeptics currently feel that the majority of cryptocurrencies have no real worth. The belief that Bitcoin exists only for the sake of speculation is typically at the heart of accusations of a cryptocurrency bubble. Skeptics point to the low levels of adoption of currencies like Bitcoin in the real economy

meaning it is still very difficult to buy anything or pay for most services with it, indicating that adoption of such currencies is still in its early stages. However, cryptocurrencies' applications and use cases are developing all the time, and cryptocurrency supporters believe that the technology and its underlying tokens will be proven to have actual value. The rise of decentralized finance (hereinafter: DeFi) is thought by many to be proof of cryptocurrency's real utility. DeFi advocates the use of blockchain technology to provide alternatives to traditional financial goods like loans and insurance, and many believe that this move indicates the bright future of decentralized technology.

The trading of real estate derivatives, followed by the global financial crisis of 2007–2008, has virtually everyone aware of the terms "bubble" and "financial collapse." Nowadays, practically everyone has heard of cryptocurrencies, regardless of their engagement in the sector. Once a relatively new industry that arose out of nowhere a few years ago, is now a topic of discussion in everyday conversations all over the world. One of Bitcoin's most notable rallies occurred back in 2017, when the currency surged from \$1000 to \$20000, triggering many questions not only from financial analysts but also from those who were back then unrelated to finance regarding the long-term viability of such an asset. Until June 2018, Bitcoin has lost more than half of its value since it peaked at \$20,000, and we can now see similar market behavior, with Bitcoin losing more than half of its value from its peak in late 2021 when it reached nearly \$70,000. Because of media coverage, a huge proportion of amateur investors have flooded into the market without the necessary understanding of asset valuations and other determinants which could justify such an uptrend. Numerous professionals who stand bearish and imply negative sentiment about the cryptocurrency world and preach about potential bubbles have had their ideology confirmed many times until now when cryptocurrencies came tumbling down in a matter of months. Nevertheless, the industry and technology behind it still stand today and many of those in favor of crypto assets claim that market cycles like these are nothing unusual, and investors will have to get used to hard times but Bitcoin and other cryptocurrencies will come out stronger and stronger every time, therefore representing a serious asset class and maybe one day in the future a store of value.

So are the cryptocurrency markets a bubble now?

The cryptocurrency market is chaotic recently and investors can observe huge daily swings. The market was typically down from its heights in March 2022, but it was still hanging on. Recent CPI inflation data, the Russian invasion of Ukraine, interest rate hikes, and massive public debts have all led to what can now be simply referred to as a new bear market. The bubble has burst once more, causing complete panic in the cryptocurrency space, where stablecoins are supposed to be a reliable source of value, accounting for around 90% of all digital asset trading volumes. The tokens serve as a primary medium of exchange for payments, trading, lending, and other blockchain-based operations (Sechler, 2022). Luna Terra, which was still in the top ten currencies by market capitalization at the end of April, has lost 99.9% of its value in less than a week. When its algorithmic stablecoin UST lost its peg and began a downward spiral, it wiped approximately 40 billion dollars in market capitalization. Tether, a 1:1 stablecoin pegged to the US dollar, dropped in value, falling below 96 cents on the dollar

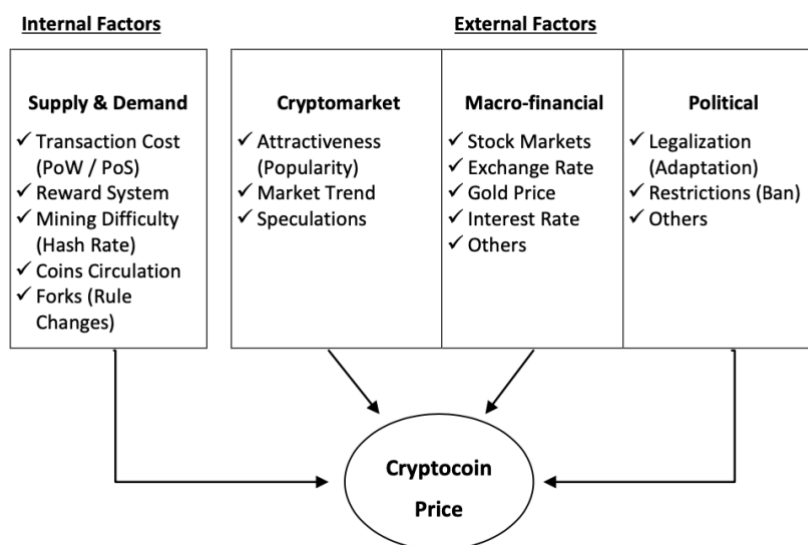
at one time before settling at 98 cents. During this bull market that lasted for the past 2-3 years, the number of Ponzi schemes, high-interest loan rates, and yield farming programs has surged once again. One of the most controversial groups of assets is non-fungible tokens (hereinafter: NFTs). They're essentially blockchain-based certificates of ownership. NFTs are used to register ownership of digital property, such as digital art, a video clip, or even a jpeg or gif.

For the past two years, anything that mentioned cryptocurrency had been on the rise. People are increasingly losing confidence as a result of the current slump and massive price declines of practically all cryptocurrencies. However, comparing Bitcoin and other potential larger-cap cryptocurrencies (except \$LUNA) to the bubble would be unfair. For one, they deliver on the utility value they promise (Drofenik & Kovacic Batista, 2018). We may draw comparisons between bubbles and NFTs since many of them are fraudulent, absurd, and extravagant, but there are some whose projects have the potential to deliver significant value to the community and investors, and these are the ones we should seek when investing in cryptocurrency assets (Drofenik & Kovacic Batista, 2018). Furthermore, the first two cryptocurrency hype cycles, or so-called bubbles, have passed us by, and we are currently in the midst of the third. Investors will have to get used to investing in this unregulated cryptocurrency environment and exercise maximum safety along the way if they want to financially survive in the long term.

4 DETERMINANTS AND FACTORS INFLUENCING THE VALUE OF A CRYPTOCURRENCY

There are two types of factors that influence the price of cryptocurrencies: internal and external. External factors reflect numerous geopolitical reasons, whilst internal ones indicate the currency's supply and demand. Poyser (2017) divided factors into two main groups and subgroups which are represented in the following figure.

Table 6: Factors that influence cryptocurrency prices



Source: Poyser (2017).

4.1 Internal Factors

Supply and demand

Transaction costs

Proof-of-Work (PoW) is a system Bitcoin and some other cryptocurrencies employ to control how blocks are made and how the blockchain is constructed. PoW provides an objective way for all members of the Bitcoin network to agree on the state of the blockchain and all Bitcoin transactions (River Financial). Miners using this particular mechanism are forced to make trillions of numerical guesses to conduct a valid block in the chain, and in the case of Bitcoin, the complexity adjustment allows miners to acquire a block approximately once every ten minutes.

Over time a few different cryptocurrencies have evolved that use Proof-of-Stake (PoS), a consensus framework that is a substitute for PoW. Stakers - the PoS version of miners - lock up money in a unique smart contract under the PoS framework. This method gives a particular staker the chance to post the following block whenever the network requires it. Depending on the share of the total stacked money that each staker possesses, the algorithm chooses the staker randomly. For instance, if one staker holds 30% of all staked money on a certain network, they have a 30% probability of mining the following block.

Levy (2022) claims that as long as mining costs increase, it necessitates an increased value of the cryptocurrency. Miners won't mine if the value of the currency they're mining isn't high enough to offset their costs. And, because miners are required to make the blockchain work, the price will have to rise as long as there is a demand for it. When supply and demand are equal, the market becomes balanced. The quantity of products and services offered equals the quantity required. Market stability reduces volatility, leading to equilibrium. In reality, no market can ever be totally balanced and cryptocurrency markets are much further from equilibrium than traditional markets because they are still relatively new. Many, if not all, cryptocurrencies today can deliver on the extreme volatility that many crypto investors seek, which is what attracts speculators to this industry. Rapid price fluctuations are a sign of higher risk, which also indicates greater potential for rewards.

Rewards, difficulties, and coins circulation

Unlike traditional money, which is governed by the government or another central authority that sets the general rules for price regulation, the value of cryptocurrencies is primarily determined by supply and demand, just like any other good or service. Cryptocurrency gains value when demand rises higher than supply. Supply mechanisms are determined by whitepapers and consist of token minting and burning plans in the majority of cases. Some, such as Bitcoin, have a fixed maximum supply (21 million Bitcoins is the maximum available token supply), others, for example, Ethereum, have no supply cap (Tikhomirov, 2018). Some cryptocurrencies have mechanisms that "burn" existing tokens to prevent the circulating supply

from growing too large and slowing inflation. Burning a token means sending them to an unrecoverable address on the blockchain (Levy, 2022). Each cryptocurrency has its own monetary policy, which is what makes the blockchain world so unique. On the blockchain, a certain quantity is added to the supply for every new block that is completed. For example, Ethereum pays a fixed reward per block mined, but it also pays for integrating "uncle blocks" in new blocks, which improves the blockchain's efficiency (Buterin, 2013). As a result, supply growth is less predictable. Demand rises with the growing interest in the project. The increased popularity of cryptocurrencies as investments raises demand while majorly reducing supply. When the majority of institutional investors went long in Bitcoin at the start of 2021 the value rose substantially as demand outran the development of new coins thereby diminishing the overall available amount of Bitcoin. Likewise, as more DeFi projects launch on the Ethereum blockchain, the demand for Ethereum increases. Ethereum and other tokens with the same mechanism are required to perform transactions on the blockchain regardless of what cryptocurrency you're transacting with (Levy, 2022). If a DeFi initiative becomes successful, its token will become more valuable, resulting in increased demand.

Forks (rule changes)

Two kinds of forks could potentially affect the price movement of a particular cryptocurrency after the event of forking or rule change. A hard fork is a type of software upgrade to a blockchain protocol that causes a network split by changing the way the network runs. The old chain sometimes ends, and the network's tokens are transferred to a new chain. In other cases, however, this might lead to the establishment of a new, independent chain and a new cryptocurrency, such as Bitcoin Cash, which was hard forked from Bitcoin. A hard fork is a change that makes the currency less secure, and hard forks occur when a sufficient number of users believe that a change to a blockchain network's protocol is somewhat crucial. This is similar to how individuals update their computer apps regularly. A large percentage of nodes in a network must install the new version of a blockchain's software for a hard fork to be successful. Changes to cell phone networks, for example, involve the agreement of multiple phone companies. The hard fork is generally the one with the most price-changing power among the two types of forks. A soft fork is a different type of software upgrade. Soft forks happen when a cryptocurrency's existing code is altered, an old version remains while a new version is developed, however, with a soft fork, only a single blockchain will remain verified as users adopt the updated version (Staff, 2018).

So how does the hard fork affect the price of the cryptocurrency? A hard fork in cryptocurrency could be a disruptive event that divides traders from miners. As a result, a hard fork will have a major impact on the price of a cryptocurrency. The first version of a cryptocurrency is still in use, and many users will likely accept the new version. The coins are split in half after a hard fork, and each coin has its own value. The value of the original coin might depreciate as a result of this. According to Singh (2022), the potential for a new version to be a disruptive force in the cryptocurrency market will likely drive up the volatility of the price of a new forked cryptocurrency coin. While the fork is intended to strengthen the system, its effects on the price are usually unknown and could have unfavorable consequences for investors. Even if the most

recent version of a cryptocurrency is beneficial to traders, it can have a significant impact on its price. In addition, the severity of the price change depends on the community's perception of the fork, the perceived value of the forked coin, and how well the forked coin is executed (Singh, 2022). Bitcoin, for example, has had several hard forks over the years, including Bitcoin XT, Bitcoin Classic, Bitcoin Unlimited, Bitcoin Gold, and Bitcoin Cash, which is still the most popular hard fork of the primary cryptocurrency, thanks to the support of many important members in the cryptocurrency industry and popular exchanges.

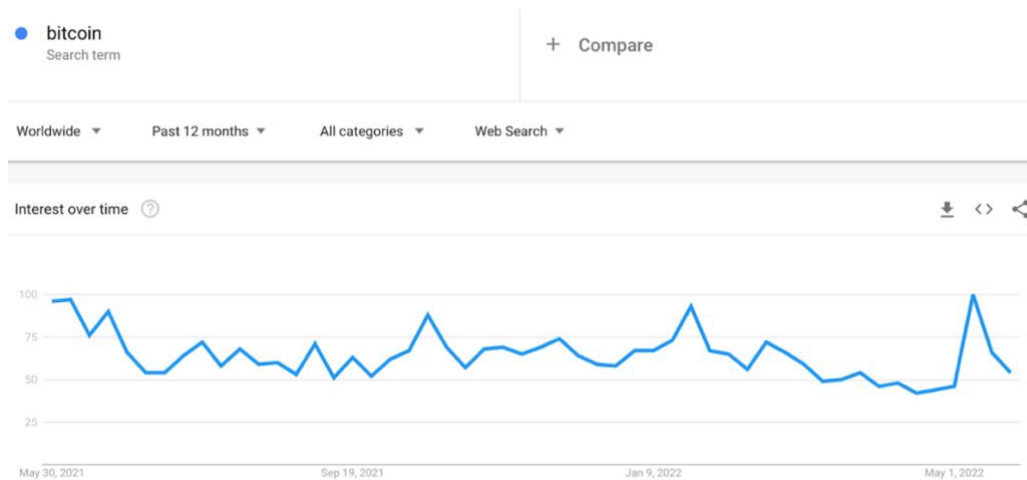
4.2 External Factors

Cryptocurrency Market

Attractiveness (Popularity)

Recent research demonstrates a statistically significant correlation between cryptocurrency price and user interest. A recent study suggests that there is a bidirectional causation link between both, despite some articles' claims that the correlation is from price to popularity. In other words, when the value of cryptocurrency grows, so does its attractiveness, and the price rises as a result of its popularity. According to Google Trends, web searches for the price of Bitcoin (or any other cryptocurrency) can help anticipate large market swings to the upside. In 2017, Semrush, a search engine marketing agency, reported that Bitcoin prices had a 91% correlation with the volume of Bitcoin-related Google searches (Goddard, 2022). This suggests that the value of Bitcoin fluctuated in perfect sync with the number of searches for Bitcoin (Goddard, 2022). The study was based on Bitcoin prices, but the findings apply to any cryptocurrency token in the market. The significance of attractiveness as a factor in price formation grows larger with smaller-cap cryptocurrency assets because lower market capitalization tokens have a higher probability of price spikes or general volatility. According to the data, an increase in cryptocurrency-related search interest preceded the market's boom, but this doesn't always mean that a spike in searches would affect pricing. Goddard (2022) also claims that according to the most recent research by Semrush, the correlation between Bitcoin-related searches and price was 82% globally and 79% in the U.S. Bitcoin search popularity was also higher than fiat currencies. In 2021, Bitcoin was 42-fold more widespread than the Euro and seven times greater than the US Dollar. The Bitcoin boom contributed to increased interest throughout 2021 and the start of 2022. The top Bitcoin-related websites reported an increase in site visits among which were websites that received the highest visits including CoinMarketCap, Binance, and Coinbase, additionally CoinMarketCap reported 60 million average monthly visits between 2017 and 2021. In 2021, the number increased to 194 million (Goddard, 2022), but analysts are now witnessing a reverse trend. Cryptocurrency-related web searches are slowly fading away as the recent market downtrend unravels and people continue to be led by fear and caution.

Figure 12: »Bitcoin« Google Trends searches chart



Source: Google Trends (2022).

During the 2017 Bitcoin boom, and more recently, the "Bitcoin" keyword in Google Trends reached 100, which marks the highest value (value between 0 and 100.) Between January and May 2021, the search phrase had a score of 70, which corresponds to huge Bitcoin value growth to an all-time high of \$69,000. The searches generally increase as more people watch the increasing price and are fueled by fear of missing out and decrease when there is an outflow of capital and low investors' sentiment (Goddard, 2022). This illustrates that when Bitcoin was trading above \$50,000, interest was higher than it is now when it is trading just below \$30,000. Intriguingly, Bitcoin has dropped below \$35,000 considering that as of May 28th, 2022, the Google trend value for the term "Bitcoin price" was 53. People have lost interest, at least in the short term, as seen by the declining price and Google searches. The price of Bitcoin and other cryptocurrencies is highly correlated with searches for them. The value rises as the number of searches grows. It's a good idea to keep a watch out for terms linked to the token of interest in Google searches. The next price rally will almost certainly be preceded by an increase in web searches.

Market Trends

Trends are what provide traders and investors the opportunity to profit from market asset fluctuations. Either over a short or long time horizon, in a market that is generally moving, or in a situation where prices are range-bound, profits and losses are produced by the movement from one price to another. Market trends are shaped by a variety of variables or subcategories, ranging from government regulations and policies through supply and demand to investor speculation. Virtual assets and financial markets are becoming closely interconnected. Bitcoin was previously stand-alone security with a modest fan base, but today's image shows that it is a crucial part of the revolution in digital assets, raising questions about financial stability because of its growing ties to traditional asset classes. While Bitcoin played a crucial role in the

early development of the cryptocurrency industry as a whole, it has lately experienced a sharp decline in market share as other cryptocurrencies, or so-called altcoins, have quickly surpassed it in popularity. From January 2017 to January 2022, a market-cap-weighted index of the 100 next-largest cryptocurrencies outperformed Bitcoin by more than 75 percentage points yearly, as seen in the chart below (Hume & Pagan, 2022). Despite returning 103 % on average each year, Bitcoin's market share has fallen from nearly 90% in December 2016 to less than 43% in January 2022, while Ethereum and altcoins have grown in popularity (Hume & Pagan, 2022). Ethereum accounts for the first leg of that growth pattern. And though altcoins are often overlooked, their market share has grown substantially over the past five years (Hume & Pagan, 2022).

Figure 13: Relative Market Share of Bitcoin, Ethereum, and Altcoins 2015-22



Source: CoinGecko (2021).

According to Adrian, Iyer, and Qureshi (2022), the correlation of cryptocurrency assets with traditional holdings like stocks has increased significantly, which limits their perceived risk diversification benefits and raises the risk across financial markets. Before the epidemic, cryptocurrency assets like Bitcoin and Ethereum exhibited no association with conventional market indexes. They were put in place to mitigate risk and serve as a buffer against changes in asset classes. This reversed with the massive central bank crisis reactions in early 2020. With less tight global financial conditions and increased investor risk appetite, cryptocurrency prices and US stock values both soared in the last two years. In their IMF research Adrian, Iyer, and Qureshi (2022) found that returns on Bitcoin did not move in a particular direction with the S&P 500, the benchmark stock index for the United States, in 2017–19. The correlation coefficient of their daily moves was just 0.01, but that measure jumped to 0.36 for 2020–21 as the assets moved more closely, rising together or falling together. A stronger correlation implies that Bitcoin has been acting as a risky asset.

Figure 14: Bitcoin and S&P 500 index price chart



Source: IMF Blog (2022).

The rising cryptocurrency-stock correlation increases the risks of investor sentiment spillovers between asset classes. The analysis conducted by Adrian, Iyer, and Qureshi (2022) also examined the spillovers of prices and volatility between cryptocurrency and global equity markets, suggests that spillovers from Bitcoin returns and volatility to stock markets, and vice versa, have risen significantly in 2020–21 compared with 2017–19, therefore Bitcoin volatility explains about one-sixth of S&P 500 volatility during the pandemic, and about one-tenth of the variation in S&P 500 returns. A dramatic drop in Bitcoin prices could lead to a drop in the stock market. In difficult market times, such as a pandemic drop in equities prices or significant fluctuations in the cryptocurrency market in early 2021, spillover effects between cryptocurrencies and equity markets will tend to intensify.

Figure 15: Correlation between Bitcoin returns and S&P 500 index



Source: CryptoCompare (2022).

Market trends can be difficult to identify and analyze. Traders and investors must be able to read cryptocurrency charts, and technical analysis is one of the greatest approaches for identifying patterns and making predictions of the prices of certain currencies. Technical analysis is the study of statistical trends over time to determine how various factors of a particular asset influence future price fluctuations. Reading cryptocurrency market charts can help investors in making well-informed predictions about when bullish and bearish moves are forecasted to stop. Technical analysis can help traders spot trading opportunities by studying price trends and patterns on charts. Experienced investors are familiar with the phrase "Never go against the trend," representing a clear image of market trend as a crucial value factor and near-term indicator of cryptocurrency prices. Bull and bear markets, which are typically triggered by massive volume activity in Bitcoin, shift quickly to other altcoins as investor sentiment and high selling or buying pressure make it inevitable for lower cap coins to stay out of the picture. The rising co-movements and spillover effects between the cryptocurrency and equity markets reflect a growing concern about shocks that can disrupt financial systems (Adrian, Iyer & Qureshi, 2022). Cryptocurrency assets, with their relatively high volatility, valuations, and correlation, may soon pose risks to financial stability, particularly in countries with widespread cryptocurrency adoption, therefore, studying not only cryptocurrency assets but also indices and other correlated assets may be useful in identifying potential risks and mitigating through difficult times when market conditions are not friendly to investors and the general public (Adrian, Iyer & Qureshi, 2022).

Speculations

Every investor and beginner with their feet firmly on the ground would likely agree that the cryptocurrency market is highly speculative. We might simply ask an average cryptocurrency investor to describe the basics of blockchain and the benefits of the projects they invest in to prove this assumption. Because the basic knowledge of the whole digital currency environment is limited, high-potential returns frequently result in significant losses for the people involved. Cryptocurrency returns are driven and can be predicted by factors that are specific to cryptocurrency markets (Yukun, Tsyvinski & Lu 2022). One example of pure speculation is the recent drop in the price of the Luna token being tied directly to algorithmic stablecoin Terra, which had no actual value or utility and was part of a family of historically inefficient algorithmic coins that have all failed miserably in previous years.

With the arrival of NFTs and all promotional campaigns, especially in the world of celebrities and influencers, the phrase manipulation comes up frequently. Places like Twitter, Reddit, and TikTok have become viral information sources for cryptocurrency investors and enthusiasts which also makes these platforms and subsequently followers an appealing prey for the pump-and-dump schemes which are a specific kind of fraud. Also known as "rug pulls," these scams took in more than \$2.8 billion worth of cryptocurrency in 2021 and accounted for 37% of the year's cryptocurrency scam revenue, according to research from cryptocurrency data firm Chainalysis. Several initiatives have failed in the last two years, with platforms disappearing in a short period and scammers gaining greatly from the general public's lack of knowledge. A comprehensive review of the literature found that unethical gain efforts such as pump and dump

or whale activities typically have unfavorable outcomes like hyper volatility in addition to research showing that cryptocurrencies are indeed the topic of speculative activity. Many speculators have been drawn to cryptocurrency exchanges that promise a huge return in a short period. Cryptocurrency exchanges are less reliable than authorized exchanges due to the absence of a legal response to unlawful revenue efforts. In the world of finance - speculation or speculative trading refers to the act of conducting a financial transaction that has a substantial risk of losing value but also holds the expectation of a significant gain or other major value (Chen, 2020). Investing as a method of increasing earnings over time differs from speculating, which typically involves short-term market volatility rewards (or losses). The amount of risk involved is the major difference between the two. All investments include some element of risk, however, speculative buying actions with cryptocurrency assets have a much higher potential for huge gains or losses. These price changes are what a speculator seeks to profit from. As previously said, speculative buying is fueled by opinion-based decision-making, fear of missing out (FOMO), and short-term time horizons, which increases risk and emotional biases including overconfidence and loss aversion.

Table 7: Key features of investment and speculation

	Investment	Speculation
Time-horizon	Medium to long-term	Short-term
Level of risk	Moderate	High
Investor attitude	Balanced and strategic	Aggressive
Decision criteria	Based on fundamentals	Based on charts, psychology, and opinions
Examples	Stocks, bonds, mutual funds	Derivatives, and cryptocurrencies

Source: Shadforth (2021).

So, how can an investor foresee speculative assets and minimize the potential effect of this determinant when making investment decisions? According to Ferber (2022), there are 4 main principles investors should follow to avoid scams and fraudulent projects in the market:

1. **Education about the project** - learning about the coin's purpose, history, and community and understanding the agenda behind it.
2. **Playing before paying** - starting with caution and investing smaller amounts, following the rule of not investing more than can be lost.
3. **Sticking with strategy** - applying valuation models and comparing tokens to traditional assets. Identifying strategy and risk tolerance and applying different forms of analysis.
4. **Avoid celebrity promotions** - try to follow reliable financial professionals in the field and avoid celebrities with a lack of knowledge and trust based on a community of other amateur investors or followers.

Macro-financial

Stock Markets

Cryptocurrencies and their correlation to market indices and traditional equities were explained in the “Market Trends” section above.

Interest rates and exchange rates

Interest rates have a positive correlation primarily with Bitcoin. Increased demand for imports, as well as potentially more online shopping, could be expected as a result of the growth of the USD exchange rate. Because cryptocurrencies are widely accepted as a form of payment in some nations, they make it easy to conduct online shopping. According to historical data, Bitcoin's price will continue to increase in value with the falling interest rates. Because of its price volatility concerning interest rates, Bitcoin is classified as a speculative asset. An increase in the interest rate may deter investors from investing in risky assets since they will prefer assets that are more stable and have smaller risks. An increase in the interest rate might affect the foreign exchange rate, the movement of the country's market capitalization, and the price of Bitcoin (Zhu & Li, 2017).

Gold

Gold has historically been a long-term asset that has been used to protect against market downturns. Bitcoin is frequently mentioned when people discuss inflation hedges and other safe-haven assets, but it has proven to be completely unviable in recent months as inflation continues to rise and cryptocurrency markets continue to witness significant capital outflows. For many years, investors have believed that cryptocurrency assets are a store of wealth and a hedge against market corrections and recessions and many analyses proved this in the past but things have changed massively with the on-growing correlation of big cap cryptocurrencies with the stock market. Gold has historically performed well during market dips because its value is protected since its price remains relatively stable, then rises when investors shift their assets from stocks to gold in the case of a recession. This makes it a good hedge against market corrections or recessions (an investment that moves in the opposite direction). These two asset types are frequently compared, although they differ in numerous ways, including regulation, utility, liquidity, and volatility.

Table 8: Key differences between Gold and Cryptocurrencies

	Gold	Cryptocurrencies
Money functions		
Unit of account	No. Common in the past.	No. High volatility.
Store of value	Yes. Central banks' gold and foreign currency reserves, private investments.	No. Too volatile, exposed to fraud and cyber-attacks.
Means of payment	No. Common in the past, but today fiat currencies are used.	No. Used by a limited group of sellers in the non-prohibited countries.
Other features		
Market price volatility	14.9% (2021 average) 14.4% (5-year average)	81.0% (2021 average) 78.5% (5-year average)
Substitutability	Few substitutes (silver, platinum)	Unlimited number of substitutes
Finitude	Finite resource	Finite resource
Divisibility	Can be divided into parts	Can be divided into parts
Trade requirements	Does not require specialized computing hardware to create power	Rely on computing power and miners' involvement
Regulatory risk	Long regulated market	No globally established regulatory framework
Alternative use	Used in manufacturing and jewelry	No.

Source: Bank of Russia (2022).

Many gold-backed cryptocurrencies have appeared in recent years. These cryptocurrencies are derivatives that get their value from gold's price equivalence. The gold backing is done to connect the derivative asset to a tangible asset and so prevent price volatility, which is common with cryptocurrencies. The gold used to back that cryptocurrency should be kept in gold reserves, such as with banks or custodians. The backing of each cryptocurrency differs but usually, one unit of cryptocurrency is equal to one unit of gold meaning that the ratio is 1:1. Gold pricing benefits token investors because tokens can be exchanged for gold by individual investors. A few examples are Tether Gold, DigixGlobal, Paxos Gold, Gold Coin GLC, and The Perth Mint Gold.

Political

Legalization and regulation

The main question recently has been how do/will regulations affect investors and the price of cryptocurrency assets? When it comes to proposed legislation and regulatory changes to the cryptocurrency environment, investors usually take two sides. Cryptocurrency regulation,

according to enthusiasts, would protect investors, minimize fraud, and limit speculation among cryptocurrency assets, resulting in increased confidence and a ripple effect in the markets with more trustworthy projects and fewer scams. New rounds of cryptocurrency regulation are seen as critical in the development of the cryptocurrency economy. New rules might help bring Bitcoin, stablecoins, other cryptocurrencies, and NFTs into mainstream markets, as well as provide them more credibility and security. However, many members of the cryptocurrency community remain concerned that regulation will limit innovation and growth, as well as damage the primary concept of blockchain, which is decentralization. Governments have numerous options for influencing the price of cryptocurrency. First, they can control the price of digital assets by purchasing and selling them on international exchanges. Second, they can impose restrictions that would inevitably result in cost increases. Governments could make some changes in these two methods, but they are unlikely to have a big impact in the long term and would still prove to be harmful to several cryptocurrency assets. Because cryptocurrencies are traded globally, the regulation would require a collective effort from several governments. A final decision may increase cryptocurrency values, bring better transparency, and pave the path for even more widely traded financial products tied to cryptocurrencies.

Regulation may increase the accessibility of cryptocurrency activity. For instance, ETFs and futures contracts increase investors' accessibility to cryptocurrencies and boost their prices. The use of futures contracts or options to gamble against the price of cryptocurrencies may also be made feasible by regulation. This would boost trading activity and minimize volatility. However, laws can also reduce the demand for cryptocurrencies. The value of cryptocurrencies may decrease if a regulatory body modifies its regulations to prohibit cryptocurrency usage or investing. Cryptocurrency prices are sensitive to regulatory efforts that impact trading and storage activities, and if a lack of oversight by centralized authorities is indeed one source of the value of these assets, efforts to regulate the market will probably not treat investors kindly (Amand, 2018). While most investors agree that digital assets are the future, others are still afraid of making the switch and are skeptical that laws will give effective protection. Whether there are restrictions or tight rules in place, cryptocurrency cannot and will not be shut down. Even without a centralized exchange, there are still ways to purchase, sell, and trade suchlike assets. Any government would have to put in a lot of effort to truly decentralize something like Bitcoin as a trendsetter in the industry. Regardless, innovative techniques to avoid government influence are likely to emerge fast.

5 VALUATION MODELS

5.1 Model 1: Fundamental Analysis

Analysis of the Model

Fundamental Analysis is an important stock market valuation method for traditional assets. To arrive at assumptions about the present and future market value, along with determining similar risks, several important qualitative and quantitative measures of the stock issuer are analyzed. Fundamental analysis can easily be applied in cryptocurrency markets as well and determines

the intrinsic value of a cryptocurrency asset, which is meant to be an objective measure of its worth, while evaluating the underlying information about cryptocurrency projects provides guidance on whether the coin is undervalued or overvalued as an asset (Bybit Learn, 2021). Fundamental analysis of cryptocurrencies is primarily used to calculate possible returns and reduce investor exposure. The three basic categories to which fundamental analysis can be applied are blockchain metrics, financial metrics, and project metrics.

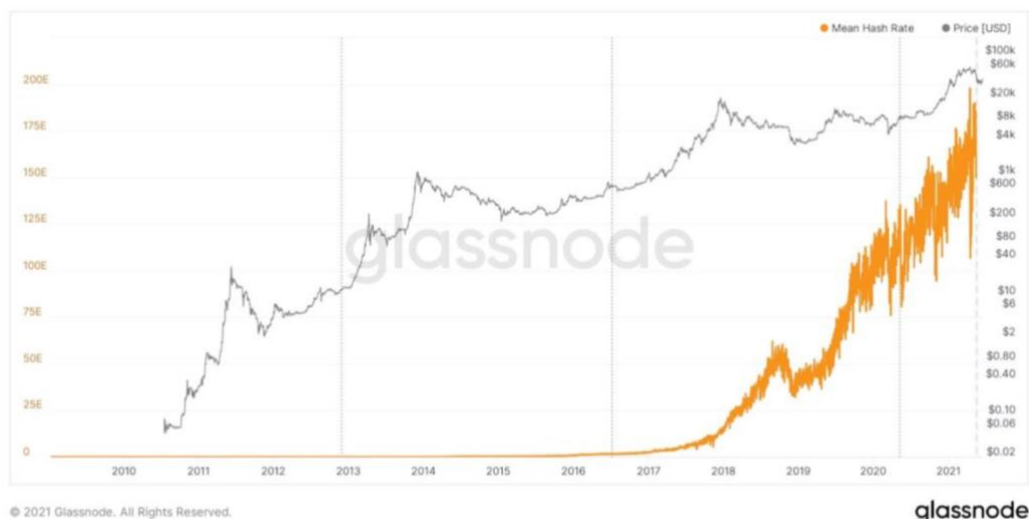
Blockchain Metrics (On-chain Metrics)

Following determinants represent the most crucial blockchain metrics.

Hash Rate

The hash rate is the combined computational power used in mining to perform calculations on a PoW blockchain. Hash rates are estimated based on publicly accessible data, but the true hash rate is never actually known (Bybit Learn, 2021). The health of a particular cryptocurrency is expressed through a hash rate. The higher the hash rate, the more miners are incentivized to mine for-profit and the more secure the network becomes (Bybit Learn, 2021). Determining one's hash rate through calculation might also assist miners in determining their profitability. On the other hand, if the computational power - hash rate keeps dropping, miners could stop trying to generate income from the coin, which would lead to miners resignation. Market declines frequently result in capitulation, which puts pressure on miners to liquidate their equipment. A fall in investor sentiment is shown by declining hash rates.

Figure 16: Bitcoin Mean Hash Rate

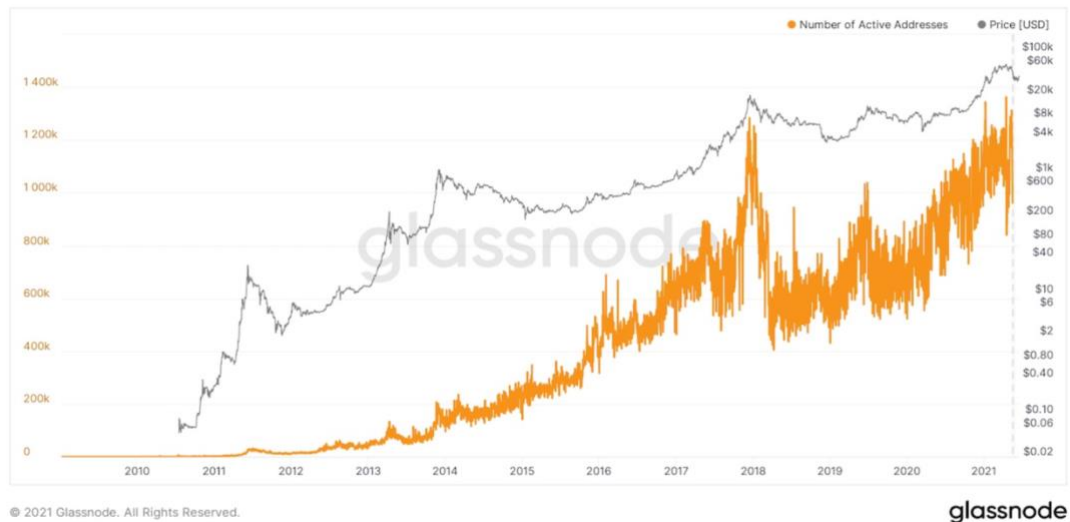


Source: Glassnode (2022).

Status and Active Addresses

This is an important measure that provides insight into the daily transactions of cryptocurrency assets that are done by unique wallet addresses, similar to Daily Active Users (DAU) for stocks of service-based technological firms.

Figure 17: Bitcoin's Number of Active Addresses



Source: Glassnode (2022).

Transaction Value and Fees

Fundamental analysis, like technical analysis, prioritizes the evaluation of transaction values. A currency in constant circulation has a consistently high transaction value. Fees paid over time are an indication of how secure a coin or token is. Transaction fees can naturally increase over time, with the block subsidy or block reward reduced relative to the mining difficulty. Without adjusting the reward, cryptocurrency miners would begin working at a loss and start dropping off the blockchain (Bybit Learn, 2021).

Financial Metrics

For the economic feasibility of cryptocurrency tokens, it is necessary to comprehend the trading conditions of assets, particularly their liquidity, surrounding variables, and how the market responds.

Market Capitalization

The market capitalization value represents the value of a network. It is determined by multiplying the current price by the total number of coins in circulation. Market capitalization

can provide false valuations if other indicators, such as liquidity, are not included. In general, investors may feel that currencies with lower market capitalizations have greater growth potential, whereas coins with higher market capitalizations may indicate better infrastructure and long-term strength.

Liquidity and Trading Volume

The simplicity with which an asset can be bought and sold is measured by liquidity. A liquid cryptocurrency coin or token will have a large number of buyers and sellers in an order book waiting for their orders to be filled, thus reducing the bid-ask spread, which is a good indicator of liquidity (Bybit Learn, 2021). Cryptocurrency trading volume measures how many times a coin changes hands over a given time frame, and the most common timeframe for measuring volume is 24 hours, and the most common format used to show this metric is a bar chart (Nibley, 2021).

Project Metrics

A qualitative technique is utilized to assess project parameters of a particular cryptocurrency's efficiency. Focus is placed on both internal and external factors, including the principle of the cryptocurrency and the functioning of the system.

Whitepaper

The whitepaper released by the creators demonstrates the comprehensive research that introduces the unique ideas and approaches proposed by the blockchain. It also provides quantitative data and explanations of the blockchain's functionality. Whitepapers stand as the first impressions that a new blockchain proposing a type of cryptocurrency asset creates. The document is highly technical, yet it is necessary for comprehending the blockchain's concept. Details on indicators such as hash rate, supply rate, block duration, consensus algorithm, and degree of centralization are also released and displayed.

Team

The creators or team behind the blockchain are identified and a thorough analysis of their background, as well as core competencies, is conducted.

Utility

This can be defined in many terms. In terms of demand, one has to judge what proposition the particular cryptocurrency puts forward that will differentiate it from the competition, particularly in the case of utility tokens (Gore, 2020). Stability and volume of trade should be assessed through the price history, therefore, showing the real nature of utility in trade.

Market sentiment and media coverage

The enthusiasm around cryptocurrencies frequently drives up their values and trade volumes. The token's growth possibilities are determined by analyzing market sentiment. The creation team's partnerships can be used to obtain an assurance of authenticity. Due diligence and background checks will be required for any project that is linked with well-known exchanges such as Binance and others.

Regulatory frame

The laws regarding cryptocurrency assets are not laid out but a new token should follow and encourage its users to follow all the general laws and regulations regarding trade, cyber-security, and issuance of securities (Gore, 2020).

Review of the Model

Even though it is mostly qualitative, this model is vital and highly favored when analyzing traditional assets. This is because, unlike technical analysis, which is simply data modeling based on historical pricing, fundamentals are real-world facts. Because of their extremely speculative nature, fundamental analysis works particularly well as a valuation methodology for cryptocurrencies. A complete view of their market position is formed and a prediction about the market reaction is made. Every token has its unique positioning. Utility tokens are said to be particularly valuable because each one has its own set of blockchain uses. The “Daily Active Addresses” or DAA measure may be used to figure out how many addresses are utilizing the cryptocurrency as a payment method rather than a store of value. The fact that one address does not equal one user is one way in which this metric might be misleading. A single user can have several addresses, and a single address can be used by multiple users, as in business blockchains or organizations that pay their employees in Bitcoin. Overall, the Fundamental Analysis method is effective with cryptocurrency assets, although it lacks quantitative modeling for future prices.

5.2 Model 2: Market Cap Method

Market capitalization, often known as »Market Cap«, is one of the simplest ways to analyze a financial asset. It is computed by multiplying the share price by the number of outstanding shares. The market capitalization of any cryptocurrency, on the other hand, is defined by the following simple equation:

$$\text{Market Capitalization} = \text{Total Supply In Circulation} * \text{Price Of Each Token} \quad (1)$$

Supply

When it comes to the stock market, the business decides how many stocks to offer to the public and keeps throughout the process called Initial Public Offering or IPO. In late 2017 Initial Coin Offerings or ICOs were a popular fundraising mechanism during which the company or any

other cryptocurrency foundation determined the number of tokens issued to the public. For example, Satis - a security token advisory firm claims that over 80 percent of ICOs in 2017 were scams (Li, Cong & Wang, 2020). Tokens distributed to investors may exhibit inflationary features, which are often generated by the creation of coins via mining, or deflationary traits, which are generated through a variety of coin-burning methods. The details vary quite a bit and tokenomics and token supply mechanisms can be quite complex. Due to the article from the Cryptocurrency.com website supply is controlled by the company/foundation or the token's pre-defined algorithm. It is not a variable that the marketplace can influence in general.

Figure 18: Inflation rates for selected cryptocurrencies



Source: Cryptocurrency (2019).

Price

The agreed-upon transaction value among both buyers and sellers is known as the price. For measuring profit and loss, return on investment, and asset performance, it is the value that is the most reasonable. It is also an element that fluctuates every day in response to market movement. Nevertheless, the price of some tokens tied to fiat (or other assets) could not be regulated by market pressures in the cryptocurrency industry. Tether (USDT), for example, has a price that is always equal to one dollar. Cryptocurrency developers wishing to peg their tokens to a fiat currency must be able to back up their claim, typically by holding that currency in reserve at all times (Reiff, 2021). The thinking is that if the cryptocurrency fails for some reason like a blockchain error, fraud, or some other issue, the cryptocurrency tokens that investors hold are only worth \$1 each if investors can then go to the developers to claim their share of fiat currency in exchange for the tokens they held (Reiff, 2021). There are also tokens tied to other asset classes, such as traditional commodities, most commonly gold.

This basic equation to calculate market capitalization represents a crucial metric that provides cryptocurrency investors with an indication of the overall market size, scarcity, and how much money is flowing in or out of each cryptocurrency. Traditional asset valuation and market capitalization are often found through the multiplication of the most recent share trading price by the total number of shares in public circulation. Traditional equities' realistic value is supported by economic fundamentals such as total assets, liquid assets, tangible assets, intangibles, and projected future cash flows. As a result, investors gain a somewhat accurate picture of the overall position of the firm or organization under consideration. This relationship is significantly more complicated with cryptocurrencies. Cryptocurrencies lack any kind of assets that can support and justify their current price and market capitalization. Another interesting phenomenon can be seen when comparing equities or bonds to digital currencies. There are several dividend-paying shares in the corporate world. As a result, stocks owned by the company's owners will earn dividends and dilute shares owned by normal shareholders. In the case of cryptocurrency assets, tokens owned by individuals who hold them but do not use them as currency are not diluted over time unless the token's price falls. As a result, owners may never utilize their tokens and instead store them. All of the above makes the cryptocurrency market notoriously volatile, presenting unique opportunities for rewards while also carrying the highest levels of risk. Assets are classified into three groups based on market capitalization, and multiple risks and investment opportunities. Gore (2020) says that the cap size is usually inversely proportional to risk/volatility and hence there can be generally lesser returns:

1. **Large-cap:** market cap of more than \$10 billion. Considered lower-risk investments due to their growth track record and higher liquidity.
2. **Mid-cap:** market cap between \$1 billion and \$10 billion. More growth potential but higher risk.
3. **Small-cap:** market cap of less than \$1 billion. Susceptible to stronger market swings based on market sentiment.

The current market capitalization as of June 2nd, 2022 of all cryptocurrencies combined is \$1.24 trillion, representing a more than 50% fall from the previous year's peak of more than \$3 trillion, and is calculated by simply multiplying the last price of each cryptocurrency trading with its total public supply. This method has several drawbacks, including the fact that not all of the coins were traded at the latest recorded price, making up a relatively small part of the total volume of assets. For example, a single token can be traded at ten times its previous price, increasing the overall market cap of that cryptocurrency tenfold in just a few seconds. Such a use of trading volume is simply incorrect and misleading.

Figure 19: Overall cryptocurrency market capitalization from June 2016 to June 2022



Source: CoinMarketCap (2022).

Review of the Model

The market cap model is important because it takes into account the initially relevant price discovery mechanism and provides a classification of cryptocurrency assets in terms of valuation. However, the model is extremely simplified and one-dimensional. Due to the hoarding of tokens, the important variable of actual »Total Supply in Circulation« may never be correctly estimated, leading to incorrect valuation (Gore, 2020). In the end, it all ultimately comes down to brand value or buyers' collective belief in the current pricing of the token in which they are investing, as well as its long-term potential. It also raises the issue of the actual present and long-term value of a certain cryptocurrency, which is best addressed by clarifying the design and techniques for calculating the correct market capitalization metrics. A model is thus a useful tool for calculating and comparing the prices of cryptocurrencies, but investors considering it should also consider market trends, a cryptocurrency's stability condition, and other risk factors.

5.3 Model 3: Quantity theory of money or Token Velocity Model

According to the Quantity Theory of Money, the money supply, also known as the quantity of money, increases at the same pace as prices throughout time. Its primary argument is that changes in the money supply are related to price changes. Consumers become less responsive to adjustments in prices and, thus have a greater inclination to spend more when money is simpler to obtain, and interest rates or taxes are lower. Its origins date back to the late 19th and early 20th century, but the most common version of this theory, which is used in economic literature, was published in 1911 by a Yale University economist, Irving Fisher in his book, *The Purchasing Power of Money* (Weber, 2018).

Analysis of the Model

Burniske and Tatar (2017) presented the Token Velocity Model, initially based on the Quantity Theory of Money (QTM), which is used to value traditional currencies. This approach is only relevant for some cryptocurrencies and platform tokens, not all cryptocurrency assets. Platform tokens, for example, can be traded for value outside of the platform in exchange for other assets. It is based on the following definitional relationship:

$$M * V = P * Q \quad (2)$$

According to Weber (2018), the components of the equation represent:

$M * V$ = money side of the equation (also presents nominal GDP),

M = total averaged amount of money in circulation or money supply during a time period,

V = transactions velocity of circulation,

$P * Q$ = goods side of the equation (also presents nominal GDP),

P = price level expressed in terms of currency per unit of output in the economy,

Q = quantity of output in units of output in the economy.

M represents the availability of money in the market, while V denotes the velocity of money, or how frequently money is used in transactions and as a payment method in the economy rather than being held as a store of value. It is known as token velocity in the context of cryptocurrency assets. P is the current price level, and Q indicates the quantity of the cryptocurrency in question. It should be noted here that P , the price level, is not equivalent to the price of the token. The approach is built on fiat-based currencies as an external reference point. In fiat currency, the unknown variable P is also represented. The right side of the equation represents demand, while the left side represents supply. According to this theory, monetary value is inversely related to money velocity. This means that any cryptocurrency with a low velocity - that is, one that is held as a store of value rather than a currency will have a greater value. Because value is obtained from the ownership of an asset, the value may be related to the velocity of tokens. There should be internal and external incentives for users to keep their assets for the long term. When the classical assumption of economic theory - V is constant in the short run is not applied, this proposition holds. Monetarists have explained that a fast expansion of the money supply and V causes inflation and drastically decreases the buying power of the asset class. For a cryptocurrency, the terms in the equation may be redefined as follows: V is the token velocity, PQ is the total transaction volume, and M can be replaced with Total Network Value (Gore, 2020).

Review of the Model

The most significant shortcoming of this theory is the inability to forecast all of the variables involved, particularly the velocity of money. This is why, while the valuation approach may be valid, it is impractical to implement. Changes in token velocity raise the question of how the other variables are adjusted, and the decision can be arbitrary, resulting in different token prices

with arbitrary values. The money supply of cryptocurrency assets (M) is difficult to calculate, as shown by various valuation methods. Gore (2020) says that tokens may be stored or burned, and while the average block time is x minutes, the difference in time to mine each block is clearly larger, and as a result, the supply rate is never accurate, but rather a measure of central tendency. Many utility tokens have tried to emulate the success of cryptocurrencies and platform tokens by implementing ways to slow down the token velocity in their market. This can lead to degradation in their environment and strip them of their purpose as the focus is shifted from providing utility (Gore, 2020). This method is also questionable on a fundamental level because it is assumed that tokens have a high velocity, to begin with. Finally, the arbitrary character of the values and the dynamic interaction between them should be improved. The model's methodology could result in quantitative measures.

5.4 Model 4: Stock-to-flow ratio

Analysis of the Model

The Stock-To-Flow (S2F) model is a fairly new model invented in 2019 which gained immense popularity as a reliable price theory for Bitcoin. Introduced by Dutch analyst PlanB in his paperwork »Modeling Bitcoin Value With Scarcity« its main agenda is to leverage scarcity – one of the most fundamental characteristics of most cryptocurrencies as the primary contributor to their value. The S2F model has been traditionally used to value scarce physical commodities like gold and silver. Gold and silver usually stand as benchmarks when modeling for digital assets like cryptocurrencies. Perceived as a widely-accepted method, the S2F model is the prediction of Bitcoin's price by quantifying the scarcity that would stimulate its value, therefore, dividing the reserved resources in stock by the number of resources produced on an annual basis (Zipmex, 2022). PlanB (2020) says that scarcity refers to the combination of “lack of something” and “unforgeable costliness” - incurred costs in producing Bitcoin, including resources, limitation of duplication, or anything making Bitcoin valuable. The same can be applied to any cryptocurrency with a finite supply that uses the Proof-of-Work consensus protocol. But why do we need to compute the Stock to Flow Ratio? It is required to determine the long-term valuation of a specific item. In other words, a resource like gold has a larger Stock to Flow Ratio since the annual supply is often low in comparison to the stock in reserve. Consumable items, on the other hand, have a low Stock to Flow Ratio since their reserves are usually just there to meet demand and cannot be held long-term, making them poor investment alternatives.

$$S/F \text{ Ratio} = \text{Stock}/\text{Flow} \quad (3)$$

S2F Model: Gold

Let's first examine how the concept is applied to the valuation of more conventional asset types, such as gold. The World Gold Council estimates that approximately 190,000 tons of gold have been mined till the year 2020 (World Gold Council, 2020). This amount of gold is referred to as the »stock« or the »stock reserved«. Whilst annual gold production or the amount of gold

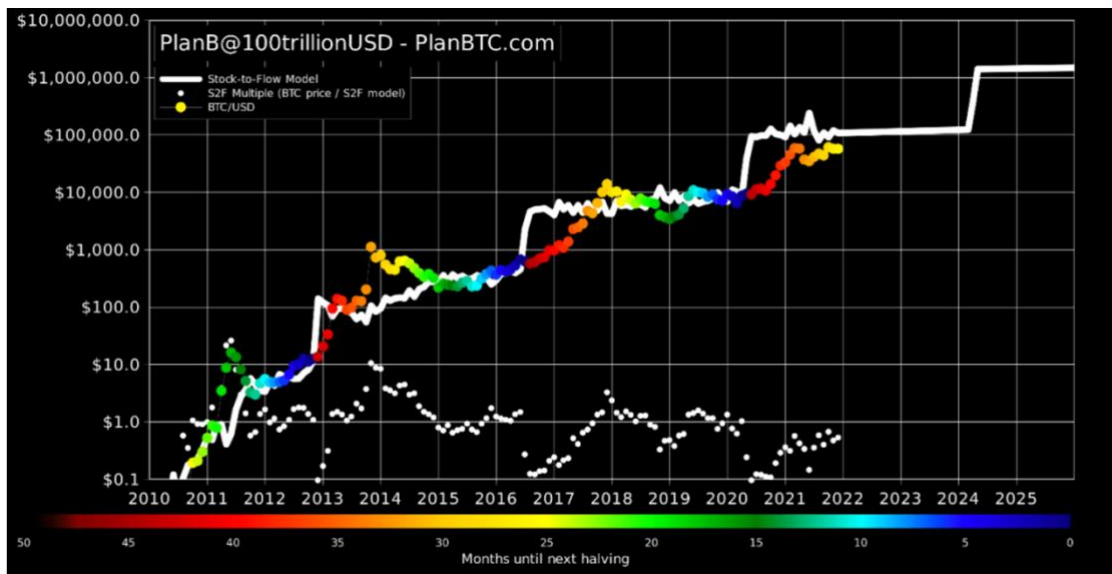
mined globally is around 2500-3000 tons represents the »flow«. As a result, the Stock to Flow Ratio of gold is calculated by dividing the total stock reserved by the annual flow. In other words »stock« is defined as the existing reserves of the asset, and »flow« is defined as the quantity produced each year. Gold has an S2F ratio of 62 meaning it takes 62 years to produce an amount equivalent to the present reserves. The higher the value the scarcer some commodity or asset class is.

S2F Model: Bitcoin

As mentioned before Bitcoin and other traditional assets like gold or silver, for example, have unforgeable costliness because of the production difficulties: A huge proportion of computational power is needed for BTC mining, which uses a great deal of electricity. Bitcoin is a deflationary asset by its design. A limited supply of 21 million coins implies scarcity in contrast to fiat money. Underperforming as a medium of exchange, Bitcoin makes it up in the field of storing value just like traditional precious metals which had throughout history stood as viable protection against hyperinflation. Cryptocurrencies, with their predefined and decreasing rates of production, are shown to have an extremely high S/F ratio, comparable to silver (and after enough halvings, comparable to gold). Further proof emerges when we analyze the Stock and Flow variables and see that any given asset class or commodity with a given standard rate of supply (i.e. normal flow) will suffer a huge decrease in price if its supply is, let's say doubled as it will overshadow the existing Stock and with constant demand, its value will greatly decrease (Gore, 2020). With commodities like gold and cryptocurrencies, doubling the Flow will still result in a relatively modest net supply, and existing Stock is already recognized to be large, so the Flow will not overwhelm it. Let's now apply the S2F model to Bitcoin.

To calculate the BTC S2F we use the basic equation of the model, therefore, dividing existing Bitcoin (Stock) by the annual flow of production (Flow). There are currently close to 19 million BTC tokens in circulation - around 90% of all Bitcoins ever minted and a flow of 328,500 BTC per year corresponding with the present block reward size. Calculating the S2F ratio following the use of the formula mentioned before we get a number close to 58 meaning that without taking into consideration halvings, it will require 58 years to mine all of the coins. Bitcoin follows a regular schedule. BTC blocks are created roughly every ten minutes. The miner receives bitcoins whenever a new block is discovered. This compensation equals 1 BTC. To maintain its scarcity, the Bitcoin blockchain is halved when it reaches 210,000 mined blocks. The scarcity grows when the frequency at which new Bitcoins become available is halved. The following halving, which is planned for 2024, will increase BTC's S2F ratio to around 116.

Figure 20: Bitcoin Stock-to-Flow Model (S2F)

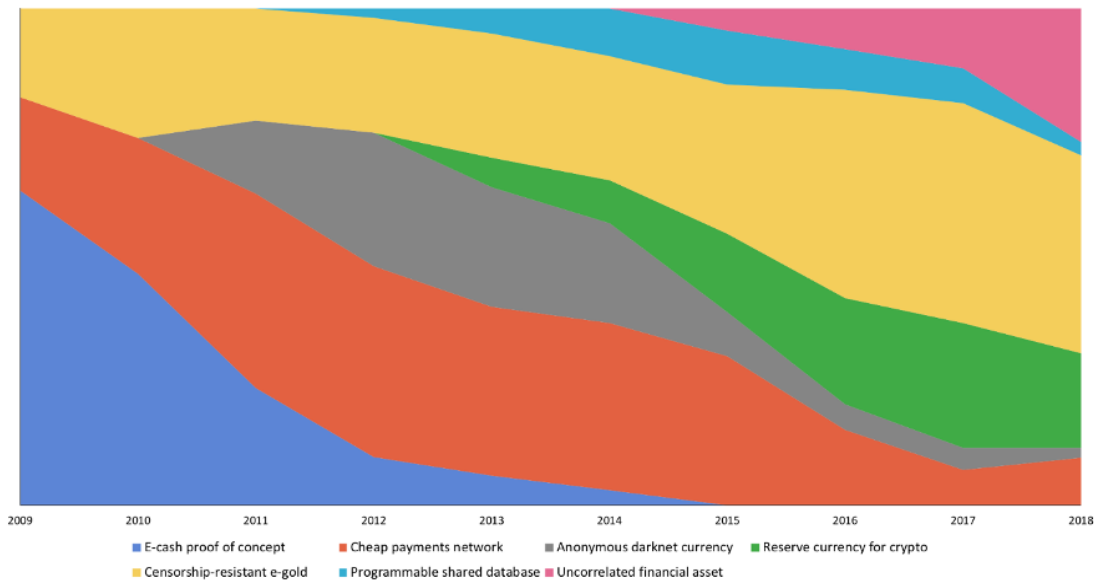


Source: Zipmex (2022).

The chart illustrates a linear relationship between Bitcoin's market value and S2F value, indicating that the link between these two values has a constant ratio direction. Every few years, halvings have a major impact on S2F values, lowering the available supply of tokens in circulation. According to an article from 2022 published on the Zipmex website the questions on S2F accuracy arose after witnessing BTC's market value fail to hit \$100,000 in January 2021, hurting S2F's price expectation with the actual value of \$40,000. Questions have emerged on the possibility of BTC hitting the \$1,000,000 mark after the next halving which will occur in 2024.

Plan B eventually determined in April 2020 to develop his model known as 'Stock-to-Flow Cross Assets' or S2FX by addressing the transition of BTC narrative terms as a fundamental formula. The model, as the title suggests, is based on data from numerous assets, with data from silver and gold being introduced into the equation. As a result, the new model is no longer a time series because the data points used are no longer ordered in time. The BTC narrative terms are distinguished by fresh viewpoints on Bitcoin, such as Proof of concept, Payments, E-Gold, and Financial asset. He also stated that the 5th Bitcoin phrase is on schedule. According to Carter and Hasufly (2018) phase transitions of Bitcoin look like this:

Figure 21: Different Phases of Bitcoin



Source: Zipmex (2022).

In the renewed model PlanB (2020) says that phase transitions are an important perspective in understanding the S2FX model, as it happens that during phase transitions, things get different properties. In the chart, these BTC concepts appear to be extremely consistent. However, when combined with financial milestones and later S2F and price data available, they reflect phases with more severe transitions according to PlanB (2020):

1. Proof of concept - after the Bitcoin white paper.
2. Payments - after USD parity (1BTC = \$1).
3. E-Gold - after 1st halving, almost gold parity (1 BTC = 1 ounce of gold).
4. Financial asset - after 2nd halving (\$1B transactions per day milestone, legal clarity in Japan and Australia, futures markets at CME and Bakkt).

It is critical to consider not just continuous time series but also phases with sudden transitions. In developing the S2FX model, BTC is seen in each phase as a new asset, with totally different properties (PlanB, 2020).

Review of the Model

Since its adoption by the cryptocurrency community, the S2F formula has been widely debated. A few of PlanB's prognoses for Bitcoin proved to be correct during 2021, but others failed. The Stock-to-Flow model makes use of a strong correlation between asset value and scarcity. Other researchers/analysts confirmed the concept using co-integration studies. The model's predictive nature is a significant advantage when comparing Bitcoin values with silver and gold using the S2F model, suggesting a smaller chance of errors. The model has proved the existence of a power law link between market value and the S/F ratio. This is consistent with price changes

after halvings in the case of Bitcoin. Including phase transitions into the model makes well accounted for forks and improvement proposals to the protocols of the blockchain network on which the cryptocurrency asset in question is based (Gore, 2020). However, the model also has many flaws. Firstly, Bitcoin is seen as a scarce digital resource. Bitcoin's unique characteristics should make it an asset that sustains its value over time. However, every model is only as good as its assumptions, and it may not account for all factors of Bitcoin valuation. Bitcoin has only been in existence for slightly more than ten years. Some may claim that long-term valuation models, such as the Stock to Flow, require a larger data set to be more accurate.

The Efficient Market Hypothesis comes into account as a second possible argument against the viability of the S2F model which is usually interlinked to the valuation of traditional assets. The theory itself is very well known and often taught in financial economics. EMH is based on the ideas of Friedrich Hayek and others. According to Hayek markets are information processing systems that deliver the best possible price discovery meaning all useful information about equities is already priced in and there is no chance for exploitation in the marketplace. Efficient markets exist at three levels: weak, semi-strong, and strong, and in such markets, EMH implies that S2F and the model forecasts should be already priced in by the market because the S2F model uses publicly available S2F data (PlanB, 2020). This could lead to the development of a risk-return-based pricing model for cryptocurrency assets, similar to the Capital Asset Pricing Model (CAPM). The current Bitcoin market doesn't offer easy arbitrage opportunities according to PlanB (2020) who says also that the inefficiency of the market and pricing in the S2F model is indeed true but people mainly overestimate the risk factor.

Finally, the cryptocurrency society and its enthusiasts have split opinions on whether the S2F ratio is a trustworthy indicator to use when it comes to investment opportunities. Certain people only have faith in it since it assesses the present supply and flow of production; in principle, the greater a cryptocurrency's S2F, the greater its worth. But that reasoning does not hold in the current market. In times of bearish sentiment, investors frequently disregard models and valuation criteria and »run for their life«. Given the previous information, it is not the best idea to utilize the S2F formula to purchase Bitcoin just because a less supply would potentially drive up the price. Other factors to consider include demand, a severe or acceptable regulatory climate, the global geopolitical landscape, and so on.

5.5 Model 5: Metcalfe's law

Several cryptocurrency analysts advocate that the value of a particular currency or token for that matter lies in the underlying connection it provides between a community rather than the traditional intrinsic physical value that other asset classes like company stocks or commodities hold. This is where this model comes in handy, exploring connections between people and applying them to the valuation of cryptocurrency assets. So how do we value a network of machines or nodes or people? The process is complex and difficult but there have been models trying to quantify the connections between devices and people in the past. By figuring out the value of the connection among the community of users we can identify or determine the factors needed to value cryptocurrencies. Quantifying the value of a connection may be difficult, but

one useful example is the connection between fax machines, which could be applied to cryptocurrencies. A single fax machine, for example, is useless because the user cannot send anything to anyone. Because there can only be one connection between two users, two fax machines are of little use. Five linked devices can provide 10 connections, whereas 12 linked machines may produce 66 (IG Analyst, 2018). The greater the number of users, fax machines, computers, or network nodes on a network, the greater the number of connections and the greater the value. This assumption however only stands if the network consists of users or people that possess a common motivation to be connected. Linking machines between strangers becomes useless. A global network of millions however is incredibly valuable, whether we are talking about people connected on the internet, or people connected using a cryptocurrency (IG Analyst, 2018).

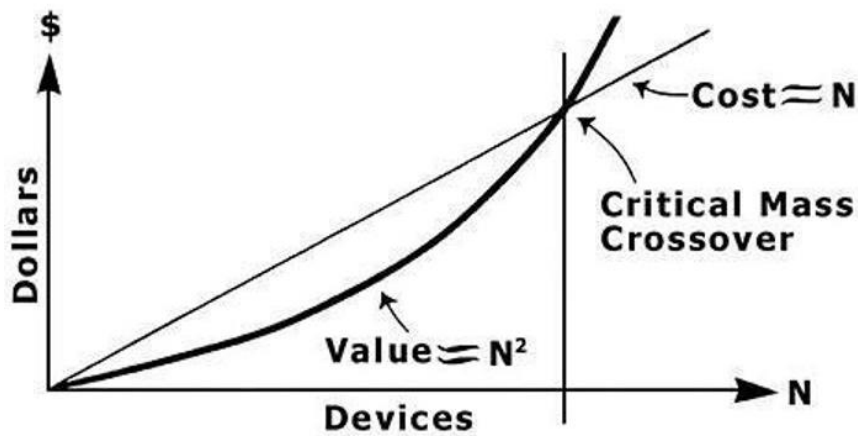
Analysis of the Model

Metcalfé's law states that the value of a network is proportional to the square of the number of nodes, or members, in the network (Alabi, 2017). A network is made up of a set of nodes that are linked together via a protocol or set of rules. Because each extra node can provide value to all existing nodes, the value of a network increases parabolically as more nodes join it. The law can be used inside both centralized and decentralized networks. For example, social media platforms are used by users (nodes) who contribute to the network by actively posting and adding content making it more advanced and appealing to other users. Metcalfé's law also applies to monetary networks. Money that is accepted by more people will have a higher value because there is a stronger guarantee that an individual can buy the goods they want using that money. Knowing it will purchase the goods they want in the future, individuals can feel more secure in holding that money (River Financial). The model itself can also be applied in reverse fashion. The overall value of the network falls sharply with additional nodes leaving it meaning that for every node that leaves the network, the remaining node has one fewer possible connection. The devaluation of collapsing fiat currencies is an example of this. When citizens or foreign investors lose faith in a government, those participants quit the currency network, and demand for the currency declines. The network's remaining members are left with a less valuable currency, which encourages them to exit as well. The Metcalfé's Law equation defines the proportional efficacy of a given network and the square number of users:

$$\theta = n^2 \tag{4}$$

As previously stated, the value is in the amount of data that can theoretically be transmitted with the exponentially increasing number of connections formed as more adopters or nodes join the communications network. The cost of adding another node/user to the network is eventually offset by the increase in Total Value, which cancels out the effects of Marginal Cost.

Figure 22: Metcalfe's Law in Action – Systemic value of compatibly communicating devices grows as the square of their number



Source: Kocovic (2009).

So how does the system apply to the blockchain?

Many analytical types of research were made to confirm if blockchain networks satisfy Metcalfe's Law for networks. The value of a payment network was mostly modeled based on the price of the digital currency in use on the network, and the number of users by the number of unique addresses each day that engage in transactions on the network (Alabi, 2017). Metcalfe's Law identified the value of a network is proportional to the number of its nodes, or the number of its end users. It proved the proportionality to the exponential of the root of the number of users participating in the network and showed good agreement as well (Alabi, 2017). Not many other researches included various cryptocurrencies as Bitcoin was mostly used and therefore an extremely important factor explaining the results of the model. Bitcoin node analysis was taken into account as an initial factor of a blockchain network. According to an article from River Financial, a Bitcoin node is a discrete member of a network that interacts with other nodes to form the network. Bitcoin nodes store and validate the blockchain and exchange blocks and transactions with one another to maintain consensus.

Review of the model

This model has been quite successful in predicting the price of cryptocurrencies in the past, as technological adoption by new users contributes heavily to the adoption of these assets. However, as the market matures, the valuation system cannot rely solely on this metric. Because adoption is currently low in quantity, this value model holds up well. Beyond cryptocurrencies, there are more networks today than there were 3-5 years ago, and many more applications have been developed. The development of additional public, private, business, and partnership systems has made central bank digital currencies a significant issue. The model predicted price crashes based on the assumption that continuous development is impossible at the current scale of the cryptocurrency market. Market and network crashes are unavoidable, however, to further

validate the model, a quantitative relationship must be built to identify the exact frequency of crashes. Individual contributions are not taken into account by the model, which accounts for the volume of information given by each new user/node that joins the network. A single user, for example, institutional investors causes larger changes in the market. Their information transmission patterns are different from regular users and hence the valuation might be affected differently (Gore, 2020). Given that all of the information on the networks was created with final consumers in mind, considering the market's maturity over time, there will be more opportunities to test, improve, or greatly enhance the model in the long term. The future will likely present greater motivation and scope to study the growth of these digital networks, and the network effects of users participating in them (Alabi, 2017).

5.6 Model 6: Discounted Cash Flow Model (DCF)

Analysis of the Model

The Discounted Cash Flow Model (hereinafter: DCF) is frequently used in traditional finance, and there have been multiple deviations from the model created in the past by many analysts. It has advantages and disadvantages, just like any other valuation model. In the traditional equity market and with classical asset classes DCF analysis attempts to figure out the value of an investment today, based on projections of how much money it will generate in the future. This applies to the decisions of investors in companies or securities, such as acquiring a company or buying a stock, and for business owners and managers looking to make capital budgeting or operating expenditures decisions (Saidi, 2018). Computing the NPV through the calculation of future discounted cash flows at a specific discount rate is challenging due to the difficulty in selecting the right interest rate (McGlone, 2022). Generally, it should represent the high risk of cryptocurrency asset investments, therefore discount rates of at least 30-50%, similar to high-risk venture capital stocks, seem to be accurate. It's also difficult to account for the effects of the coin's appreciation. Moreover, (unlike fiat) the mined asset, does not depreciate but quite the opposite. This poses questions on whether it is appropriate to discount cash flows of tokens that are not inflationary (Saidi, 2018). So, how can we apply the DCF model to cryptocurrency assets as investors? The majority of existing tokens do not provide any cash flow.

The model itself is therefore not applicable to the majority of cryptocurrencies, notably payment tokens. The DCF concept's initial version, however, might potentially be applied in some instances. Security tokens, for example, can have characteristics that are similar to traditional assets like securities. The DCF model can be used for these types of tokens if they pay investors dividend-like returns. Furthermore, there are some staking and master node tokens (such as NEO or VeChain) that guarantee the investor certain payments as a reward for holding the token that is used to process payments, as well as asset tokens such as Binance Coin or Huobi Token that generate cash flows due to the token burn mechanism and can thus be measured using the DCF model. If the DCF model was to be applied to other tokens than security tokens such as staking tokens or asset tokens a slightly different approach should be used. For example, utility tokens provide a value to the investor based on a certain utility, which could be file storage,

identity validation, or supply chain trackability (McMahon, 2022). As a result, one may assess the worth of future monetary benefit also known as utility, and discount it but should think seriously about the appropriate discount rate in such an equation.

Ethereum's transition and DCF model application

With Ethereum's transformation from a PoW to a PoS consensus mechanism, analysts will be able to apply a traditional cash flow analysis model to calculate the value of the second largest cryptocurrency in the market. The conversion to a proof-of-stake mechanism will bring long-awaited improvements to the network, such as lower energy consumption, lower gas fees, and faster transaction speeds (McGlone, 2022). With the change in mechanism, Ethereum will transform into an equity-like financial instrument with supply/demand, monetary, and commodity features which would severely boost the interest in the asset. Individuals contribute their cryptocurrency to validate transactions under a proof-of-stake mechanism, and they receive a reward when the blockchain is updated with the data. The block production will be redirected from one source to another in the event of a mechanical switch, and the new system will rely on the Beacon Chain. The significance for investors will be in staking ETH tokens and so adding to the verification of the blockchain, for which they will be entitled to a portion of the network's earnings. Around 70% of the fees will be burned, which is similar to a buyback, while the rest will be distributed as a reward, or dividend, to the stakers. If demand for block space and total fees paid increases, stakers will enjoy both higher payouts and reduced issuance (McGlone, 2022). Therefore the coming changes in the consensus mechanism with investors and stakers receiving payouts in form of cash flows will open the world of traditional valuation models such as DCF analysis to finally determine the fair value of some cryptocurrency tokens.

Ether cash flow analysis

According to the article from Market Insider, the strategists come up with a valuation range for Ethereum using three different discounted cash flow analysis approaches in the paper. They use both base and priority transaction fees in their cash flow estimates. However, they exclude the staking rewards that come from transaction fees, or new issuance and also exclude any deflationary burn from the buyback that should occur once the merge is complete (McMahon, 2022). The perpetuity growth technique, which predicts that the free cash flow growth rate in the last year of the first forecast period would continue indefinitely, is the most important scenario. Using this strategy, ether is worth \$6,128, compared to its current price of \$1,812 (as of June 2nd, 2022). The second, more conservative estimate comes from the "H-model," which pegs ether's value at \$5,539, 68% greater than today. The final approach is the use of a price-to-earnings exit method, which estimates cash flows using a series of multiples. Based on an exit multiple of 25 times, similar to that of Apple, ether should be valued at \$9,328, about 400% higher than where it is right now. And considering that Ethereum has a higher growth profile than Apple, this multiple is conservative (McMahon, 2022). Triangulation of the three DCF methods provides an average value of \$6,998, 250% higher than current levels (McGlone, 2022). However, any delays in the merger could affect how much the price changes. The primary risk to revaluation is the lack of proper aggregate transaction fees. The merge will not

automatically allow the Ethereum blockchain to support all increased network activity. The merge will not introduce scalability; rather, it will introduce the preconditions for scaling in and of itself.

5.7 Model 7: Qualitative Analysis

Tomaino (2018) and his team of analysts developed a viable framework to value cryptocurrency tokens based on an approach without the use of complex formulas defining the exact value. The model is qualitative but nevertheless takes significant time and effort. Their common belief is that every token-based project in the market should possess 4 fundamentals that determine an underlying token's long-term worth, and in order for them to engage in it, all four project parameters must be outstanding. The four pillars are:

1. Team

To begin, investors must identify the project's founding team. Surprisingly, this is commonly overlooked at first. What are the qualities of the project's leadership team? Are the members technically sound, inclusive, transparent, unbiased, and capable of fostering a dynamic global community? Tomaino (2018) and his colleagues believed that just by answering that one question, investors can eliminate the bulk of the top ten cryptocurrencies at any given point in time. All token-based networks require buy-in from a large number of people to achieve global adoption, and the creating need to act in a balanced, transparent fashion and deeply grasp the philosophy of the broader blockchain community. In contrast, in traditional firms, entrepreneurs may concentrate on creating a fantastic product rather than on marketing it. To assess the quality of the team a scale of 1 to 10 should be used to determine the overall “aggregate founding team” score and the target score of >9 should be the goal.

According to Tomaino (2018) founding team is evaluated based on:

1. History of success, demonstrated ability to overcome obstacles to success, and strong desire beyond money.
2. Attract and surround themselves with top technical talent who are inspired by vision and leadership.
3. Obsessive about the problem they are solving.
4. Mature thinkers who are deeply thoughtful about problems and realistic about the growth plan.
5. Uniquely suited to tackle the technical problem.

To achieve high scores throughout the board, an outstanding founding team is required.

2. Product

When considering a product as a quality factor, investors must assess its utility and ability to address problems for a group of people that may be small or large. Once again the authors of the framework emphasize how many projects simply fall out of the »equation« when investors try to answer this question. The majority of token-based projects lack problem-solving mechanisms and operate solely for the purpose of speculation, adding no real value. It's important to note that when this framework was created in 2018, the team behind it concentrated mostly on products that solved existing cryptocurrency challenges, rather than those beyond it, such as supply chain management or real estate applications. They anticipated that they would be useful in 2-4 years (today), but it appears that the cryptocurrency market hasn't progressed far from existing community issues. Products are given a total score ranging from 1 to 10, with >9 being the desired value.

According to Tomaino (2018) the product assessment is based on:

1. The technical specification describing the product. Is the technical specification thorough and does it demonstrate mastery of the subject matter?
2. At least two customer or potential customer reference calls — are there people out there who want and need this product right now?
3. Does the product benefit from network effects?
4. Is there a core technical or product advantage that is likely to lead to competitive differentiation?
5. Does the product surprise and delight users?

3. Community

In the cryptocurrency field, communities are critical to the success of projects. Investors need to identify if a community is forming or if there exists a segment within the current community that appreciates the advantages of the project. Also important to take into account is the core team's long-term ability to create and maintain a dynamic and healthy community. A total score from 1 and 10 is used to evaluate the community factor, with >9 being the desired value.

Tomaino (2018) says that the community assessment is based on:

1. Reddit community (# of subscribers + daily engagement).
2. Slack, Rocketchat, Gitter, Telegram (# of members + daily engagement).
3. Has the founding team demonstrated the characteristics necessary to build a healthy community? Have the public or private interactions by the founding team been balanced and unemotional, or have they been emotional and irritable?

4. Token Mechanics

Because cryptocurrency assets differ, investors must first determine which type of token we are referring to. A usage token, a work token, a security token, or something else entirely? Tomaino (2018) identified 4 principles on which to analyze token mechanics:

1. If it's a usage token, is the digital service being offered useful, and does the network underlying the digital service aggregate resources?
2. If it's a work token, is there a strong network emerging that wants to contribute, and is the UX well thought through?
3. Does the security token, if it is one, have any fundamental technology that offers it a long-term competitive advantage?
4. Is the team optimizing for long-term utilization of the product instead of short-term fundraising? Is the token being distributed properly and evenly, taking into account all market participants?

When the author created this framework back in 2018, there were fewer tokens accessible in the market, and today investors distinguish between exchange tokens, non-fungible tokens, stablecoins, asset-backed tokens, and privacy tokens, among many others. Each has its unique characteristics, and if investors want complete evaluations, valuation methodologies should be tailored to a particular token.

CONCLUSION

A new asset class called cryptocurrency was defined in this research work. Detailed background on its functioning was provided, as well as some of the principles of assets in this category, including blockchain technology, mining, and wallets available in today's crypto market. It is critical to understand what is beneath the blockchain as the technology that supports all cryptocurrencies. Learning about it can help anyone appreciate the importance of technology as long as it solves the problem of trust and double-spending. The greater the acceptance of blockchain technology by governments, businesses, and individuals, the greater the impact blockchain will have on E-payments services and the investment world. The cryptocurrency and DeFi markets were studied, as well as a thorough analysis of the market's largest cryptocurrencies and their characteristics, which assisted me as an author in better understanding which problems these specific currencies solve, and which perspectives they have in terms of demand for them.

As there are many existing variables affecting a token's price, categorizing determinants and factors influencing the value of each crypto asset has proven valuable. Later in the paper, the established frameworks for valuing these crypto-assets were carefully examined. When the valuation models were reviewed, it became clear that each crypto asset was unique because there was no general theory for all crypto assets. There was also a lot of parallelism between crypto-asset valuation models and standard asset valuation methods.

In the end, the nature of a cryptocurrency asset determines its value, with the most crucial difference being the degree to which the asset grants its owner an entitlement to a future cash flow. There are no better or worse models because each one has some value in the cryptocurrency market, although expert opinions are frequently divided and broad. Tokens vary greatly, and each approach to valuation should be tailored to a specific type of tokens, such as security tokens, utility tokens, nonfungible tokens, or any other form of cryptocurrencies.

Finally, the best approach will be determined by the facts and circumstances of each situation, the amount of time available for study, the purpose, and the necessary level of trust in the valuation. A thorough examination may lay down the light on the process of value creation, and quantitative research built on reasonable hypotheses can give investors useful context for evaluating more straightforward market-based information when making decisions about potential investments. I believe it is reckless to quickly deploy a particular quantitative assessment model because there are many variables and the volatile nature of this asset makes it impossible to compare it to conventional instruments. One advantage of tokens is that we can use a more qualitative approach to assess the fair value of a token when there is a lack of quantitative data or assumptions. On a lot of occasions, valuation calculations give a false sense of precision. Token valuation will eventually require sensitivity analysis and a realistic mindset and it is important to remember that these assets have a relatively high risk - volatility which increases the possibility that their value will fall as well as rise over time.

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APPENDIX

Summary in Slovene language

V tem raziskovalnem delu je bil opredeljen nov naložbeni razred, imenovan kriptovaluta. Preučeno in analizirano je bilo podrobno ozadje njegovega delovanja, kot tudi delovanje teh sredstev, vključno s tehnologijo veriženja blokov, rudarjenjem in denarnicami, ki so na voljo na današnjem kripto trgu. Ključnega pomena je razumeti, kaj je namen veriženja blokov kot tehnologijo, ki podpira kriptovalute in hkrati doumeti kaj je pomen te tehnologije, ki rešuje problem zaupanja in dvojne rabe valute. Bolj kot bodo vlade, podjetja in posamezniki sprejeli tehnologijo veriženja blokov, večji bo vpliv na storitve e-plačil in naložbeni svet. Pregledani so bili trgi kriptovalut in decentraliziranih financ ter opravljena temeljita analiza največjih kriptovalut na trgu in njihovih značilnosti, kar mi je kot avtorju pomagalo pri boljšem razumevanju, katere probleme rešujejo te specifične valute in kakšno je povpraševanje po le teh.

Ker obstaja veliko obstoječih spremenljivk, ki vplivajo na ceno kovanca, se je kategorizacija determinant in dejavnikov, ki vplivajo na vrednost vsakega kripto sredstva, izkazala za uspešno in uporabno. Kasneje v članku so bili natančno preučeni vzpostavljeni okviri za vrednotenje teh kriptosredstev. Skozi proces pregledovanja in učenja o modelih vrednotenja je bilo ugotovljeno, da je vsak kripto kovanec edinstven, zato ne obstaja splošna teorija vrednotenja za vsa kripto sredstva. V svetu vrednotenja digitalnih valut obstaja tudi veliko vzporednosti med modeli vrednotenja kriptovalut in standardnimi metodami vrednotenja sredstev.

Na koncu narava kriptovalute določa njeno vrednost, pri čemer je najbolj ključna razlika stopnja, do katere sredstvo lastniku daje pravico do prihodnjega denarnega toka. Ni boljših ali slabših modelov, saj ima vsak od njih določeno uporabnost na trgu kriptovalut, čeprav so mnenja strokovnjakov pogosto deljena. Kripto kovanci se zelo razlikujejo in vsak pristop k vrednotenju mora biti prilagojen določeni vrsti žetonov. Končno bodo najboljši pristop določili dejstva in okoliščine vsake situacije, količina časa, ki je na voljo za študij, namen in potrebna stopnja zaupanja v vrednotenje. Temeljit pregled lahko osvetli proces ustvarjanja vrednosti, kvantitativne raziskave, ki temeljijo na razumnih hipotezah, pa lahko dajo vlagateljem koristen kontekst za ocenjevanje preprostejših tržnih informacij pri sprejemanju odločitev o morebitnih naložbah. Menim, da je nepremišljeno na hitro uvesti določen model kvantitativnega ocenjevanja, ker obstaja veliko spremenljivk, zaradi spremenljive narave tega sredstva pa ga ni mogoče primerjati z običajnimi instrumenti. Ena od prednosti kriptovalut je, da lahko uporabimo bolj kvalitativni pristop za oceno poštene vrednosti, kadar primanjkuje kvantitativnih podatkov ali predpostavk. Velikokrat dajejo izračuni vrednotenja napačen občutek natančnosti. Vrednotenje bo sčasoma zahtevalo analizo občutljivosti in realistično miselnost, pri čemer je pomembno vedeti, da imajo ta sredstva razmeroma visoko tveganje, ki povečuje možnost, da bo njihova vrednost sčasoma padla in narasla.