Effects of cryptocurrencies on financial markets

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1. Introduction

1.1. The aim of the paper

The aim of the paper is to provide deeper dive into effects of cryptocurrencies on financial markets. Moreover, goal is to present few definitions of cryptocurrencies, their development since the inception of the idea and introduction of Bitcoin. Also, to compare positives and negatives of cryptocurrency usage, and potential future outcomes based on used cases, incoming regulation, and behavior of investors. This topic is highly important because digital currencies are becoming a vital part of modern-day financing. With constant evolution of financial markets there is an everchanging development in the way we transfer funds, deal with our assets, as well as slight changes in definitions of terms such as money. Ever since 2008, and the creation of biggest digital currency Bitcoin, cryptocurrencies have been rapid rise in popularity as well as price. Introduction of terms such as Bitcoin, cryptocurrencies, and blockchain have initiated a new era of financial management. Increased use and interest for virtual currencies have also brought up multiple regulatory issues, as well as overall benefits. For past 12 years there have been numerous researches digging into Bitcoin's status as a currency, potential future usage by governments, different incentives of miners, among many others. Cryptocurrencies are now almost necessary part for developing projects, and many infant companies are trying to incorporate digital currencies as a part of transactions or products. Even governments and central banks have considered and evaluated different options and possibilities of implementing virtual currencies into their systems. Main reason for creation of cryptocurrencies is to allow for decentralized finance, no intermediaries and no governments overlooking the transactions and deciding who is allowed to participate in markets. Now days such technology could easily be considered mainstream, and with such popularity there is a big impact on overall financial markets. As a relatively new asset class, that lacks regulation, different types of investors are considering and including such digital assets into their portfolio for at least diversification purposes. Definitions for this new asset class are still vague, and there is no single definition that covers all the important aspects, and that is accepted by everyone. There are many concerns with implementation of cryptocurrencies, even though it is hard to counterfeit a token due to usage a cryptography, the issue and threat of hacking is still one of the main topics when discussing potential application of digital currencies such as Bitcoin. Throughout this paper we mention many

advantages, disadvantages and impacts on different sectors, countries, and the behavior of cryptocurrencies in crises such as Covid-19 breakout

1.2. Structure of the paper

This paper is divided into eight chapters. First, we define what is considered a cryptocurrency, and its history, as well as current and potential benefits, as well as drawbacks of cryptocurrency usage. In next chapter we take a look at overall digital asset markets, and fluctuations within the market. In further chapters we examine current regulation, examine some legal cases, as well as use cases of cryptocurrencies. With current regulation we inspect the behavior of different types of investors. Next, we take a closer look at impact on real world by investigating Tesla's recent investment in Bitcoin, the behavior of altcoins as well as importance of Bitcoin dominance index. Finally, in conclusion we provide subjective opinion and personal perspective that allows for better understanding of the topic.

2. General Overview of digital assets and cryptocurrency

2.1. Definition of cryptocurrency

A cryptocurrency is defined as a virtual currency or a digital asset that is supposed to work as a mean of exchange. Most of them are decentralized, which suggests that transactions are done securely online without the need of an intermediary, and without supervision. Idea was to create an environment in which governments cannot affect the value of a currency. They are based on blockchain technology which essentially provides a secure, non-hackable way of transactions. Cryptocurrencies are denominated in terms of virtual ''tokens'' that are traded and are also ledger entries internal to the system. The word ''crypto'' that has been recently popularly used for cryptocurrency, used to refer to multiple different cryptographic methods and encryption algorithms that safeguard these entries. Basis and foundation of digital assets relies mostly on cryptography advances. Cryptocurrency is a type of digital money, but not every digital money, or digital currency is considered a cryptocurrency. Crypto is considered

to be a sub-type of digital money. There are few major differences between these two terms. First, while not all digital money has high level of encryption, all the cryptocurrencies are highly encrypted. High levels of security of cryptocurrencies is achieved with cryptography. That term defines a method used for securing and protecting specific information in computer systems with the usage of different codes. Main goal is to prevent any third party to access certain message or data. It is used to transfer specific information from one person to the other in a way that only a expected receiver is able to denote that information. It is used both for protection of data as well as it could potentially be used for user authentication. Most common use of cryptography is encrypting as well as decrypting different text messages and emails. Symmetric system is the simplest technique, in which certain data is encrypted using a secret key, but if that message is somehow cut off, that third party has all needed tools to access that information. In order to solve this problem, cryptologists introduced asymmetric system in which both users have private as well as public key, and when that specific information or data arrives, only if the recipient has the needed private key, he will be able to decode it, which reduces chances for theft. In the past cryptology was any practice of changing a specific text into a tangled set of words that need to be decrypted, but nowdays cryptography is linked with mathematical theory as well as computer science. Increase in usage of cryptographic methods put a spotlight on numerous legal issues in this modern ahe, and many governments ended up marking it a weapon as it can be used for espionage and sedition. With cryptocurrencies being decentralized, the type of authority is difference, due to Reserve Banks controlling the entire banking system and digital money. Banks are able to have a close look and to monitor all the transactions no matter if it is a real physical, or a digital wallet. Also, one of the major differences are the transaction fees. Every time there is a transaction or a specific payment with regards to digital money, there are certain fees included. Unlike digital money, cryptocurrency have almost no fees, which makes them a perfect tool for transferring large volume of valuable assets. Finally, unlike the rate of digital money which is very constant and is steady, cryptocurrencies are extremely volatile. First real and most popular cryptocurrency is Bitcoin, but with advancements in this field came many different digital assets and tokens which are known as altcoins. Process of acquiring cryptocurrencies is either trading it for fiat or mining it. Mining a cryptocurrency is process of solving complex algorithms called blocks. It is scaled on hashes per second, and each time a block is solved a unique hash is formed. With more mining, blocks become more complex which in return requires more power and it is more energy expensive. Currently there is over 10000 different cryptocurrencies in circulation, each solving different problem and used in different cases, while most of them have no practical use and their value is mostly

speculative. Today cryptocurrency is by many considered to be a ‘’digital gold’’. It is a relatively new and risky asset class that just like investing in precious metals or stocks, is mostly looked at as a smart investment and a mean of making money. Cryptocurrencies are still in their adoption phase, and it is uncertain how long they will stay in that state. There is a lot of speculation and constant new rumors concerning digital assets which makes them extremely volatile asset class and an asset class that is considered controversial.

2.2. History of cryptocurrency

History of such digital assets is very short, even though there were attempts at creating a similar concept, the first real cryptocurrency was made in 2009, named Bitcoin. Prior to this current system, the earlies digital currency that could be noteworthy is Digicash. Transactions provided by Digicash were anonymous, so they were aiming at similar goal, but due to complications they declared bankruptcy just 11 years after their founding. Most popular and widely known currency that is Bitcoin was made by Satoshi Nakamoto. Satoshi was never proved to be a real person or just a pseudonym for a group that till this day is still anonymous. Even though prior to Bitcoin there were certain digital assets, there is still one big difference. Bitcoin was decentralized, hence it was revolutionary way of peer-to-peer cash system in which government was not involved. This type of digital money is very similar to the online storage of our general debit card accounts, the main difference is in the transfer path, which prevents any possible interference by governments, banks, and other intermediaries. Every trade, or transaction of Bitcoin is recorded in a public database called block chain. Every single individual Bitcoin exists within that database and there is not one coin that is held outside of block chain. Each Bitcoin ever created has an association to a distinct address or a key which in return makes every Bitcoin unique. Early attempts at creating similar concept had obstacles that are pretty obvious, main being the security. Even though it was not appealing having banks and government tracing your digital footsteps and monitoring your financial decision making, the main advantage was how secure those systems were. Block chain technology was not only the first to rival existing systems, but also the one that possibly revolutionized financial transactions forever. It is a ‘’triple entry’’ bookkeeping system. Receiver, sender and also a third-party have to confirm as well as agree on the new transaction. Every Bitcoin is easily traceable to a specific wallet, but the owner of that wallet has the ability to remain anonymous. First protocol that was similar to current

concept of block chain was proposed by David Chaum, who is a computer scientist and cryptographer mostly known for his contributions in this field, and his involvement with already mentioned DigiCash. Further innovations resulted in a system in which document timestamps could not be tampered with. Finally, more than 25 years post first ideas and concepts, the final product in the form of block chain was released. Main competitor to Bitcoin is Ethereum, the only token that reached success close to Bitcoin. Ethereum is just as much decentralized, it has smart contract functionality and it is open-source blockchain. If we take a look at market capitalization, it is second largest cryptocurrency. Ethereum was first proposed in 2013 by now widely known programmer Vitalik Buterin, who unlike Satoshi Nakamoto decided to go public with his identity, and he is by many considered to be the most influential face in cryptocurrency space. He is a co-founder of Bitcoin Magazine and a programmer. Ether was and is similar to Bitcoin, yet it differs in few main functions and operations. Unlike Bitcoin it allows for both permissioned and permissionless transactions, also they use different security protocols among other differences. To this day there are more than 10000 tokens with different functions, and different utility.

2.3. Advantages of cryptocurrency usage

In a world where majority of its population has a mobile electronical device it is really easy to gain access to a wallet and start considering cryptocurrencies as an alternative. It is estimated that there are more than 2.2 billion people on this planet who have access to internet but somehow don't have access to conventional systems of banking an exchange. For certain cryptocurrencies, their reproduction is extremely easy and cheap, which compared to printing money is always a better solution. Without a need to be printed, they can't be faked and counterfeited. There is a big incentive for business deals and more corporate proceedings to be conducted via transactions of digital assets. Such transactions would allow you to avoid having to deal with legal representatives, brokers, just as much as they would reduce the fees for each individual transaction. By removing the middle man, transactions gain on efficiency, pace, as they would be conducted on a secure network. According to founder and CEO of Pantera Capital Dan Morehead, cryptocurrencies will have an influence in basically every industry, and for them investing ''all in'' is a perfect way to be involved within this space, while spending more time understanding and profiting from this new marketplace. As the deals are done using cryptocurrencies, they would become transparent, which in return,

allows for easier establishment of the audit trails. As all of the transactions are done on blockchain ecosystem, they are all carried out safely and securely. Cryptocurrency agreements can also be structured to have third party approvals, have a deadline date that is stated in some time in the future, or make a reference to some external facts. All these functions allow for minimizing the financial and time expenditures in asset transfers. Frauds of direct stealing, and double spending are also hard to accomplish due to heavy security. Very same moment a transfer of a cryptocurrency is permitted there is no option of reversal, unlike the transactions that are authorized by credit card companies where you can have ‘’charge-back’’. The levels of high-end encryption techniques have risen to the point that any type of account tampering and frauds are near impossible to perform. As claimed by CEO of Digital Currency Group, Barry Silbert, privacy is the core of what they are building for future. Increase in ability to have privacy is the main threat to those whose goal is to control others, as well as it is the biggest hope for fair and open economy.One of the more prominent characteristics of cryptocurrency transactions is that they are not a subject to interest rates, country levies and exchange rates so they are a perfect solution for cross-border transfers. Without a risk of currency exchange fluctuations, certain cryptocurrencies impose themselves as an ultimate mean of international trade. Also, one major advantage of crypto transactions is that every individual transaction you do is a unique exchange between two people or parties, and all the terms are specifically agreed and negotiated in every different case. All the exchange of information is done on a ‘’push’’ basis, that means that nothing besides what you wish to send to recipient can be received by the same. The key component to development of any currency, whether a digital one or a fiat, is its governance and maintenance. Every transaction is stored by miners/developers on their hardware and in return they receive a reward in a form of a transaction fee. Those same people keep transaction records up to date and perfectly accurate in order to keep the record decentralized and retaining the integrity of the cryptocurrency. Another big advantage is the fact that no matter which cryptocurrency you possess, it can be easily transferred into another one. They can be easily obtained and bought using physical money like dollar, euro, pound and stored in the wallets. Every crypto you buy (unless it is a stable coin) is volatile, which can be stated as both an advantage as well as disadvantage, when entering a crypto market there is a great potential for high returns, Bitcoin alone in 5 year period has compounded at an annualized growth rate of 131.5% up to 2020. Many look at digital assets in terms of them being an ‘’digital gold’’, that characterization puts cryptocurrencies in the front as a great way of diversifying your general portfolio and expanding the number of assets and potential gains. With supply of coins being limited, there is a greater potential value in the future. With cryptocurrencies being

decentralized, hence ‘’removing’’ the banks from the equation, some people believe that crypto could be the key to eradicating global poverty and corruption. Since more people have access to the internet than they have to the banks this presents itself as an opportunity for underprivileged people to establish credit. All the uncertainty surrounding cryptocurrencies is due to the fact that it is ‘’happening now’’, not many regulations are posed, and still people are scared to enter the market, hence presents the opportunity to be at a forefront of a potential systematic financial revolution. Since there is no centralized governance of the market, markets are available to trade 24 hours a day and seven days a week. Typically, cryptocurrency market is considered to be very liquid due to the large numbers of transactions being dispersed across multiple exchanges. Liquidity basically measures how easily and quickly a digital currency can be transformed into cash, while trying to avoid any impact on the market price. It is very important to take a look at liquidity because it brings better pricing, increased accuracy for technical analysis and faster transaction times. There is an increasing number of companies all around the world that are using and starting to use bitcoin as well as other cryptocurrencies as well as digital assets for a host of investment, transactional and operational purposes. According to majority owner of Dallas Mavericks, Mark Cuban, since they declared that they are accepting Dogecoin as a payment method for merchandise, there has been a substantial rise in sales. More than 2,300 businesses in the United States currently accept bitcoin according to one estimate from late 2020, and that estimate does not include all the bitcoin ATMs. Even though there are many unfamiliarities there are still many incentives to using crypto in corporate world. By allowing transactions and purchases in cryptocurrencies, companies are expanding their reach, and are possibly getting provided an access to new demographic groups. A recent study suggested that up to 40% of customers who tend to buy products using digital currencies, are actually brand new customers of that company, and the amount of products they buy are double of those of credit card users. By enabling virtual currency purchase as well as transactions, it may be a useful tool in order to put the company in good position in this emerging space in the future that has the potential to introduce central bank digital currencies. Digital assets have certain abilities that are not available with fiat currency. This type of money that is programmable has the ability to enable real-time and specific revenue-sharing while at the same time promoting transparency to facilitate back-office reconciliation. With introduction of crypto it could help spur internal awareness about this new emerging technology. The easiest and fastest way for companies to enter into the use of digital assets is enabling cryptocurrency payments without bringing them into company’s balance sheet. This is called ‘’hands-off’’ approach. Companies simply convert the assets in and out of crypto to a fiat currency to receive or

make payments without having to actually own and touch it. This approach probably will require few adjustments in the spectrum of corporate function, and it could be used to reach already mentioned goals such as reaching new customers and growing the volume of sales. Typically, companies rely on third- party vendors, which act as an agent of a company. They accept and make payments in crypto through converting it in and out of regular fiat currency. As this is the simplest option to start using and introducing crypto, it causes relatively small number of possible disruptions to a company's existing internal functions due to it staying off the balance sheet. On the other hand by using ''hands-on'' approach it has a potential significant increase in benefits, but a larger number of technical problems they might need to address.

2.4. Disadvantages of cryptocurrency usage

Even though it is hard to directly steal crypto from somebody, there are always ways to gain access to someone else's assets. Due to crypto as a topic and an idea still being in an relatively early infant stage, people are not educated well enough and they fall for innovative scams. It might seem smarter to invest in something digital that can't be physically ''lost'', but any loss of data could in return cause a financial loss. A simple forgotten password, key or set of digits could separate you from your own assets, even though they are not technically stolen by someone. This seemingly naive mistake could result in massive financial loss for the user. Since we are talking about a decentralized system, which excludes the government, it is a lot harder for them to track down specific users by their wallet address or get access to their data. Even though this is one of the main positives, this system could result in increased number of illegal transactions. From buying illegal drugs, and online content, to many other instances in which Bitcoin was previously used as a transaction method, and the parties could not be located or identified. In the opinion of Warren Buffett, main issue with cryptocurrencies is the lack of intrinsic value. ''If you buy something like Bitcoin or some cryptocurrency, you don't have anything that is producing anything.'' On the other hand, even though the system is decentralized, and governments and banks can not interfere, the amount of certain cryptocurrencies as well as their flow are still controlled by certain organizations or their creators. What presents as an issue is the fact that these specific holders have the ability to manipulate the price of these assets, and cause large swings in the market. As Bitcoin is currently at the forefront of this financial revolution, it is hard not to notice and

highlight some obvious issues and shortcomings of it. First, mining Bitcoin requires great levels of energy expenditure which in return has negative effects on environment. As it was mentioned before, as the process mining progresses it is harder to gain additional Bitcoins, and this endeavor becomes less profitable. Not only that, but it is estimated that more money has been spent on electricity costs and equipment, than was earned and obtained from mining and gaining Bitcoin. As time progressed many initial issues were patched, such as denial of service attacks. Users were able to send large number of small transactions which would in return crash the network and hence allow for theft, but such problems are less common. Still, to this day environmental issues have not been solved. Another major investor that opposes the usage and acceptance of cryptocurrency is Charlie Munger. According to him, he doesn't welcome a currency that could be helpful for extortionists and similar people. He criticized Bitcoins extreme volatility as well as the obvious lack of regulation, as well as econolgical issues caused by mining. Majority of mining plants are in China, and just those plans are pushing the boundaries on their ecological and environmental goals. Since they use coal to produce electricity, China's carbon footprint has increased a lot. Every year we have new projects, new tokens and new cryptocurrencies that do not have the same issues and problems that Bitcoin has. Even though Bitcoin was primarily formatted as a transfer of value, currently it is used mostly as a store of value, or as it was already mentioned a ''digital gold''. Compared to some other cryptocurrencies it is really slow and expensive way of doing transactions, and process of acquiring it is way more costly, so it is not fair to attribute all these shortcomings to every single cryptocurrency. But some of the common complication that may occur involving every cryptocurrency is that technically the are susceptible to hacks. Even though it was mentioned that they themselves are very secure and hard to steal from a personal wallet, cryptocurrency exchanges are not that secure. Depending on each individual exchange, some data are easier to be stolen than others. If hackers and people with mal intent gain access to private information, and your account details, it is very easy for them to transfer the money stored on that exchange to their personal wallets. With improvements in this area many exchanges are at a high level of safety and low level of risk, but still, it is hard to predict and stop a hacking attempt. Also, cryptocurrency transactions have no refund or cancellation policy, which means that if someone sends by a mistake their funds or assets to a wrong wallet, that transaction can't be cancelled by the sender of the payment. Due to the fact that non refunds are allowed, many scammers manage to cheat and steal money from others. Again, each individual cryptocurrency encounters their individual obstacles, with their own pros and cons. For instance, some tokens are not available in all fiat currencies, which means that you need to convert them two times, which results in double charging the fees imposed

by the exchange you are using. Instead of selling your altcoin of choice directly to dollars, you are obligated to first convert it into Bitcoin for instance, and then that Bitcoin into fiat of choice. We are yet to have a set of regulations, future regulations depending on the government and country could boost the usage and the price of cryptocurrencies but just as much diminish both. With rising popularity of cryptocurrencies there is a larger number of novice investors. With their low risk-tolerance they tend to leave the market which can result in overall prices to bottom-out. Also, one of the major disadvantages that often gets overlooked is that majority of cryptocurrencies are solely backed by trust. They manage to sustain from the acceptance as well as trust from its owners and users of the instrument. Because there is no physical institution that you as an investor can walk in or a certain government agency that actually enforces cryptocurrency, the key is people's belief that cryptocurrency is part of the future. Financial institutions are usually insured and backed, that in return reduces the risk of the investor when it comes to overnight collapse. Basically, it has no insurance and it can't be guaranteed against liabilities as much as it can't be paid off by other assets. All these current issues bring us to most common problem with infant projects and that is the lack of acceptance. Currently there is still not enough crypto ATMs in USA to be comparable to regular ATM's, let alone in the rest of the world. A lot of financial institutions refuse to recognize such digital assets as real currency. Due to that lack of acceptance, it is hard to walk into a regular every day store and buy things with crypto, only specified shops and websites allow such purchases so buying groceries or clothing on a day-to-day basis with cryptocurrencies is still not a thing. Governing bodies not still accepting is also a great disadvantage alongside that. All these points, both positive and negative just indicate that future is uncertain. It is uncertain and unpredictable for a lot of other commodities. Big uncertainty arises due to lack of past market existence, and you have only a small-time reference which can turn people off investing into cryptocurrencies.

3. Cryptocurrency markets

3.1. Digital asset markets in general

To fully explain and display all the characteristics of Cryptocurrency markets, it is best to compare it with a traditional stock market, and to weigh up their properties. As stock markets

were prevalent for a longer period of time, it is easier to asses' properties and potentially make predictions about the relatively newly emerged cryptocurrency markets. First difference is the fact that cryptocurrencies are attracting a larger number of worldwide investors, while stocks are usually connected and traded inside the countries they are incorporated. As it was mentioned before, cryptocurrency markets are a less resistant to market manipulations due to the lack of regulations. The FUD (Fear, Uncertainty, Doubt) phenomenon is also easier to incorporate in your strategy within the cryptocurrency markets as an experienced investor and trader. Also, if we take a Bitcoin as an example, there is a limited supply unlike in the case of stocks. Once there are 21 million bitcoins in the market the mining will be stopped. Since stocks can be issued at any given time, under corporate finance rules, the number of stocks is basically unlimited. The limited amount of certain cryptocurrencies cold indicate potential larger future demand which is why this situation might encourage investors into purchasing such digital assets in hopes with higher potential returns in the future. Due to already mentioned high volatility with cryptocurrencies, investors are more keen to make fast and quicker profits. In stock markets it is a bit slower process that requires more patience. Current market capitalization of the global crypto market is 1.29T. Current ten Cryptocurrencies with the largest market capitalization are Bitcoin (BTC), Ethereum (ETH), Tether (USDT), Binance Coin (BNB), Cardano (ADA), Dogecoin (DOGE), XRP (XRP), USD Coin (USDC), Polkadot (DOT) and Binance

Table 1 - Market Capitalization as of June 2021

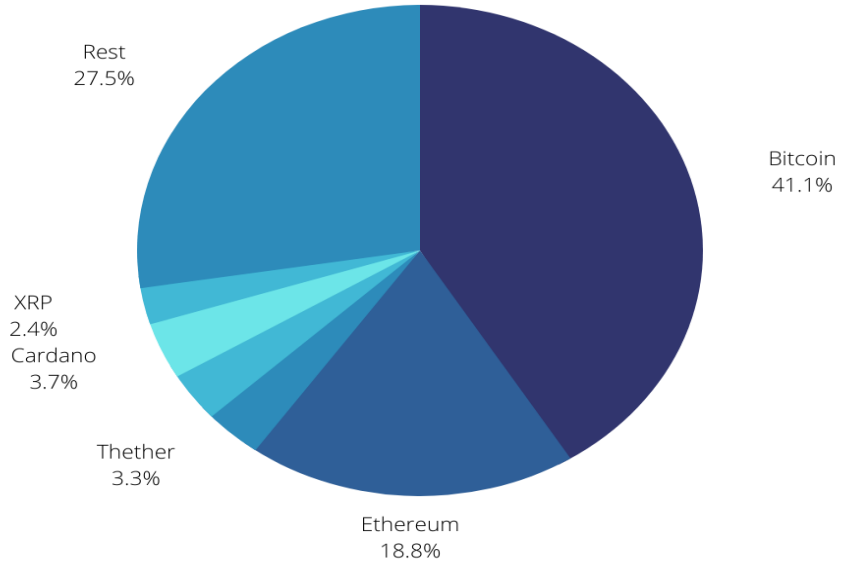
MARKET CAPITALIZATION	NAME
$625,309,173,269	Bitcoin (BTC)
$216,810,154,509	Ethereum (ETH)
$62,528,845,700	Tether (USDT)
$44,775,479,797	Binance Coin (BNB)
$42,962,770,203	Cardano (ADA)
$32,763,813,431	Dogecoin (DOGE)
$29,736,309,539	XRP (XRP)
$25,553,860,665	USD Coin (USDC)
$14,548,452,134	Polkadot (DOT)
$9,463,196,463	Binance USD (BUSD)

As ofJune 2021

Trait that characterizes cryptocurrency markets is sensitivity of currency holders and potential investors to the market news, with a surge if information coming in an out daily, on media outlets and social media, greed and fear get just as much amplified in given times.

Reports show that more than 96% of cryptocurrency market involvers are male, and around 45% of that number are people aged between 25-34. Even though it is considered a relatively new thing, share of elderly people (45+) is around 16% which ensures that digital asset markets attract larger spectrum of people than it is believed. Frequency for Google search for Bitcoin or BTC and related terms such as ‘’blockchain’’ shows relatively significant correlation with market prices of Bitcoin and other cryptocurrencies. Bitcoin’s price peaked at 63,503.46 in mid-April 2021; while currently it is trading at a price of 31,842.32 which is a 50% price drop in a 80day period. Still, if we take a look at yearly graph, the price is currently more than 300% higher than in the same period previous year. Majority of altcoins followed peaking in period of mid-April to mid-May led by Ethereum. There are many market analysts conducting different types of technical analysis trying to compare this market behavior to 2017. bull run, and trying to predict future movement of the market. The peak of market capitalization to this day was May 12th with a number of over 2.5T dollars which is explained with an extreme increase in demand for cryptocurrencies. As it was mentioned before, this asset class is still relatively new, but not only that it has proven itself to be very unique compared to other markets, so some standard market metrics that were used in other cases and other environments can hardly be used here to come to precise or at least somewhat accurate predictions. There are numerous unique indicators that are constantly being developed for further and more precise market analysis. One of the most popular is comparing Bitcoin dominance index.

Figure 1 – Total Market Capitalization Dominance



3.2. Fluctuations in the market

It is important to highlight drivers of prices in the market as well as what influences the prices of cryptocurrencies. There are generally three types of crypto price drivers. Primarily, and most importantly, supply and demand. Amount of supply and demand is the main internal factor with direct impact on market price. Secondly, one of the main drivers is attractiveness of a cryptocurrency, possible positive speculations that follow market trends. Alongside that, the amount of adoption (legalization), legal clarity, any possible restrictions or bans or legal cases might influence demand for a certain digital asset and in return cause price fluctuations. Finally, there is a number of smaller macro-finance factors that would be considered external factors such as interest rates, prices of gold, stock markets and even possibly exchange rates. It is considered to be a big challenge to predict future prices, due to past results not being strongly accurate even with numerous statistical variables like transaction volumes, historical returns, and closing price time series. To have as objective assessment of fluctuations in the cryptocurrency market, it is necessary to go over the dynamic of the daily turnover for this sector. Usually, market turnover increase is and indicator for rise in the liquidity of such digital assets, which in return has mostly positive effect on their rate as much as their value. But still, due to great volatility of majority of cryptocurrencies they are most often applied only for speculative purposes, which basically doesn’t contribute to their development as partakers in the payment system. This type of

capital is regarded to be fictional capital. It realistically doesn't have any contributions for the development of overall economy, but it partakes in the general redistribution of capital. Just like other markets, cryptocurrency markets were hit by COVID-19 crises, which emphasized volatility. The larger the number of countries affected in return brought higher financial volatility. Price of Bitcoin actually increased with spread of coronavirus, that potentially could be due to 65% of mining being done in China, and increased mining activity could be a reason that drove prices in upward trend. Occurrence of such pandemic awoke a conscious decision by many people and now new investors to diversify their assets into multiple lanes.

Figure 2 – Bitcoin price from October 2013 to September 13, 2021 (in U.S. dollars)

With potential global financial crises or recession there is an ongoing anxiety in financial realms of society, and more and more people are seeking new paths to secondary income, hedging options and revenue generating investments. Just like stock market, cryptocurrency market is characterized by similar events such as Crashes, Crises and Bubbles. The most basic way to describe a bubble is a price in upward direction that tends to implode after extended period of time of growing. Majority of investors in the case of bubble are

speculators that are interested mostly in profits from quick trades of a certain asset rather than actually usage and utility of the same asset. With large number of such investors and an outbreak of novice investors there occurs a steep increase in the price of digital asset which has to result in potential popping of the bubble. To spot a forming bubble it is important to recognize that price diverges systematically away from what its true value and worth should be based on the market fundamentals. Market fundamentals are theoretically the most important valuation engine of any type of asset based on few factors, such as: performance, cash flows, discount factors. Fundamentals are one of the most reliable sources that provides understanding of the long-term equilibrium prices. So, with great understanding of fundamentals, it is relatively easier to spot a bubble due to an asset not being equal to the probable equilibrium prices. Still, it is hard to truly detect the presence of speculative bubble because, '' the most fundamental problem is determining what is fundamental'' (Rosser, 2000). In the case of cryptocurrencies, and to be specific Bitcoin, it is even harder to recognize a forming bubble. Primarily, it is still a new asset class and still not as common medium of exchange which has been on the markets less than 10 years. Up until 2014 prices were pretty stagnant which signifies a lack of high volatility. It is very hard to calculate historical risk for Bitcoin and make secure predictions and assumptions. As it was stated by Keynes (1930) for an asset to be more liquid than another asset, than ''it is more certainly realizable at short notice without loss''. Based on this statement, liquidity can be calculated by two points: risk level of that asset, and the markets ability to absorb larger volumes of sale, without it affecting the price substantially. For purchasing and selling transactions to be meaningful and impactful on the price of an assets, a larger number of investors have to engage in large volumes of daily transactions of continuous base. ''Floor traders'' are special type of speculators and investors that deal with high volumes of transactions hence making the market more attractive. More active trading, attracts new speculators that engage in even more active trading, which raises the level of volatility of a certain asset. If we take a look at bitcoin and its most volatile periods, those are in 2014 where there was an increased number of transactions by traders and investors. At the point that a presence of a bubble is more apparent, the driving factor of prices for the most part becomes emotional investing. More people, with shorter investment plans, trying to get rich quick. Their main goal is to sell asset at prices as high as possible in a short time frame. Once a stage of panic selling occurs, large majority of investors start selling their digital assets at the same time which results in steep drop in price. A bubble can be divided into four stages. First stage is stealth phase, it consists of only small number of experienced investors with advanced network and larger number of quality and relatively confidential information realize possible prospects of fundamental

increase in price. After that phase comes awareness stage, in which there comes an increase in the number of institutional investors with awareness of potential of certain asset or asset class which in return drives prices in upward motion which causes a potential increase in speculators. With second stage being done comes the mania stage, a exponential growth of small investors, speculators and traders trying to make ‘’a quick buck’’, media coverage and exposure drives prices and the ‘’hype’’ to the limits. In this phase fundamentals are not the driving factor but purely emotion, greed, and fear, which tends to lead us to the final stage of a bubble which is crashing or ‘’popping the bubble’’. In this phase massive wave of selling occurs, which in return brings prices to their relative normal values set by the usual market or even below. Sometimes market movements are not tied to fundamentals or human emotion but there are external factors. Most recently there has been a news that China is planning to shut down over 90% of its Bitcoin capacity, which resulted in approximately 20% drop on prices of large majority of digital currencies.

4. Regulation

4.1. Behavior of conservative investors

Conservative investors are defined as a specific type of investors that tend to prioritize preservation of capital compared to earning additional money and increasing risk. As a new and relatively infant asset class compared to others, conservative investors usually stay away from such investing opportunities and tend to stick to more researched markets and more familiar fields to put their money in. On the other hand, cryptocurrencies and especially Bitcoin, as it is most popular and researched the most, can present themselves as great diversification tools. Cryptocurrencies are with each passing day becoming a more serious and reliable option for passive investors that tend to dollar cost average. Researches have shown that in well diversified portfolio of which around 5-10% is Bitcoin tend to not increase risk significantly while providing potentially a lot higher return. Even though on the first glance cryptocurrencies as an asset class seems very volatile, most of it is day-to-day swings, while holding them in long term, historically brought mostly profits. Those conservative investors that are capable of embracing its volatility and look at it from the perspective that it is a natural occurrence considering it is a new asset class, and that it is still lacking regulation, have a great option to invest in. With higher degree of fluctuation and risk bullish periods for

Bitcoin don’t have exact same meaning as bullish periods in shares markets. Even though it may be a bullish behavior it is still highly volatile, such environment just marks a time of a lesser volatility. There are different technical analysis that allow for a more thorough and cautious approach to investing. Such tools are often used by veteran, conservative investors, that don’t like investing based on their own speculations and possible predictions of future. As years progress, conservative investors tend to leave a larger part of portfolio dedicated to cryptocurrencies, from just 1% few years ago, today it is not that uncommon to see even a 5% investment in digital assets, with rest being stocks and bonds. Another benefit for conservative investors is the past behavior in crises of cryptocurrencies. According to a few academic researches more popular tokens such as Ethereum and Bitcoin can be very beneficial to hold in times of crises and economic uncertainty. Most notably in the University of Bath they did a research to provide proof, as well as to examine different diversification benefits of cryptocurrencies in this health and economic crises caused by the COVID-19. They examined the performance of 9 different cryptocurrency asset categories, which in total considered 553 cryptocurrencies. Out of those nine, they all use a different algorithm to generate new blocks of blockchain. Those include most popular coins such as Ethereum, Bitcoin as well as proof-of-stake coins, proof-of-work coins as well as a alternative to proof-of-work coins that are more energy efficient. The empirical results of this study suggest that majority of cryptocurrencies do actually provide diversification benefits to potential investors. Another conclusion that was highlighted by this study was connection between risk aversion and increasing benefits. Since conservative investors are obviously risk averse, the results from the study do show that the higher the risk aversion of an individual investor is, diversification benefits are smaller and less prominent. Final results showed that cryptocurrency markets do provide very similar diversification benefits in these uncertain times, as well as they to in relatively ‘’normal’’ economic environment. For other asset classes it is very normal in such periods of economic uncertainty to drop, but cryptocurrencies outperformed them due to not being exposed to the same variables that impact bonds, equities and other asset classes. Still, investing in cryptocurrencies is obviously more beneficial for aggressive investors compared to conservative investors, but experimenting even with smaller investments could have good results, and could turn one from conservative into a bit more enthusiastic and bit less risk averse investor, at least when cryptocurrencies are involved.

4.2. Current and future regulations

Cryptocurrency and digital asset regulations are one of the main topics and issues that are in constant state of development and discussion. Many regulations are either unclear, or have loop holes, and many insist on introducing new regulations, and are taking this issue seriously. Every country is dealing with this issue at a different pace and with different tools. If we take United States of America as an example, cryptocurrencies have been one of the primary focuses by both state and Federal governments. Focus has been mainly concentrated at the administrative and agency level within the Federal government, including the SEC (Securities and Exchange Commission), FTC (the Federal trade Commission), CFTC (Commodities and Futures Trading Commission), FinCEN (the Financial Crimes Enforcement Network, and IRS (Internal Revenue service). All these agencies have praised this new technology that is blockchain and cryptocurrencies, highlighting the fact that it is an essential part of the future infrastructure of US, and they have stressed out the need and importance for the US to establish themselves and maintain a leading role in the development and implementation of such technology. Up until now there hasn't been a large amount of formal rulemaking, considering this topic. There are multiple agencies that are highlighting the risks of further over-regulating, and they have cautioned different policymakers from passing legislation that could potentially as a result drive investment in such technologies outside of the United States. Even within the United States there isn't an uniform opinion regarding regulations. Some states tend to promote usage and development of such technology by passing regulations that are considered favorable, usually by exempting digital assets from state securities laws, or money transmission statutes. Their goal is to leverage investment in this type of technology in order to stimulate smaller local economies, as well as to try to improve public services. One of the examples is Wyoming passing a bill exempting digital assets from digital taxation. So far Wyoming is the state in US that has been considered the most crypto-friendly jurisdiction. Other states passed bills to promote the usage of blockchain technology for government-record keeping, as well as taken the steps to allow and legalize Bitcoin as one of the payment options solely for taxation purposes and many other beneficial bills while on the other hands some states issued warnings regarding investing and dealing with cryptocurrencies. All these ideas and beliefs are still in infant stage and are mostly based on speculation, to be exact there isn't even a uniform definition of cryptocurrency. Some jurisdictions have tried to make a formal and detail definition for this asset class, still most opted for broader and not clearly defined definition, which leaves space

for change and additional intervention. Currently in the US the sales are only regulated in two situations (I) if certain sale constitutes the sale of specific security under Federal or state law, or (II) is considered money transmission under state law. Options, futures, and similar derivative contracts that make specific references to the certain digital currency that is considered a commodity, are subject to regulation by the CFTC under the Commodity Exchange Act. CFTC also has jurisdiction over attempts to cause market manipulation of such digital assets that would be considered commodities. The regulatory authority over potential resale or even insurance of any digital currency that constitutes a security is SEC (Securities and Exchange commission). If an investment contract is defined by the Supreme court as an investment of money it is deemed a security in the case of a common enterprise with rational expectations of returns caused by managerial or entrepreneurial efforts of certain people. When determining if a certain digital currency is potentially a ‘’investment contract’’, SEC alongside courts examine all the circumstances in order to determine the substance of the transaction, and not its form. SEC firmly believes that even if token that was issued in a form of ICO (initial coin offering) has somewhat of a utility, it will still be recognized as a security that is regulated under the Securities Act under the circumstance that it meets the elements of Howey test. With vague policies and regulation there is a possibility that a digital asset that was primarily sold in a type of transaction constituting the sale of a security, could be after sold as a non-security where the conditions have changed. If such digital currency is deemed a security, then the issuer has an obligation to register it with the SEC or to make an offering pursuant to an exemption from certain registration requirements. If you are considered an accredited investor, the SEC places fewer restrictions on the sale of securities. To be recognized as an accredited investor you need to fulfill one of the four criteria, either be a director or maybe a executive offices of some company that actually deals with issuing the securities. Second possibility is to have a net worth that exceeds $1 million, third is to have an individual whose income exceeds $200,000 in two recent year separately, or finally that has a joint income with spouse that exceeds $300,000 in previous two years separately. With regards to different anti-money laundering requirements or money transmission laws FinCEN regulates MSBs. It has been stated that any virtual exchange, or a specific administrator of a centralized repository of digital asset who has the authority for both issuing and redeeming the same digital asset. FinCEN regulations call fir MSBs to initially develop, as well as implement and maintain a specific written program with goal to provide prevention to MSBs from being used to facilitate things like money laundering or possibly financing of terrorist activities. AML (anti-money laundering) program is required to be implemented by MSBs after a necessary risk assessment. There is a set of characteristics

that have to be included in AML program: (i) to assure ongoing compliance they need to incorporate procedures and written policies, along with internal controls that are reasonably designed, (ii) in order to assure day-to-day compliance they need to designate an individual compliance officer, (iii) they need to provide training for personnel with mandatory training in the detection of potentially suspicious transactions, (iv) independent review is necessary to maintain as well as monitor an adequate program. In the U.S. there is a SDN List, of countries that people within the U.S. are prohibited from doing business with. Office of Foreign Assets Control requires all United States citizens to block all the assets of individuals or companies that are engaging in certain transactions with countries that are blocked, specific companies that act as agent for such countries, or a possible individual that acts as agent for such blocked country. Taxation of digital assets was also a big problem to solve, in 2014, the IRS declared that every digital asset like Bitcoin and the rest of the cryptocurrencies will not be taxed as currency, but as property. It is declared that every company or a specific individual that holds cryptocurrency will need to: (i) keep a record of all digital currency sales as well as purchases, (ii) pay taxes on every profit made of transferring cryptocurrency for cash, (iii) pay taxes for all the profits that could be made upon the purchase of specific service or good than with digital currencies, and (iv) pay taxes for any mined cryptocurrency. If the profits are realized on a cryptocurrency that has been held for a period longer than one year as a capital asset by a certain individual, are subject to capital gains tax rates. On the other hand if such digital currency is held for a period of one year or less as a capital asset, then they are a subject to ordinary income tax rates. For every single different digital asset transaction, the IRS requires specific information such as: (i) detailed description of the type as well as amount of cryptocurrency sold, (ii) the acquired date, (iii) specified date at which that digital asset was sold, (iv) the amount of proceeds from sale, (v) cost, (vi) the amount of loss or potential profit. With all the information that IRS requires, this process can be potentially problematic for cryptocurrency holders that tend to make numerous trades and small purchases within a year. On the other hand, for mining a specific cryptocurrency the regulations are very simple, if you are legally allowed to possess and use a digital currency at your location, you are permitted to mine cryptocurrency just as well. In United States, jurisdictions where owning a digital currency is illegal are very rare. The only city to impose a temporary ban on mining digital currencies is Plattsburgh in New York. Ownership and licensing requirements are a bit more intricate. Mostly due to unclear regulations and definitions. Until the SEC provides clearer way of classifying and identifying a certain digital currency as commodity or security, there is a high likelihood of large number of digital assets being deemed securities. There is very small number of laws that are specific

to cryptocurrencies if any, and due to nature of digital assets, typical wills and revocable living trust are probably not best suited to transfer this new type of asset as efficiently as possible. Due to it being an infant asset class it is hard for it to shake up already established legal structures to provide a completely new set of regulations and new rules. To have a greater certainty in these times of passing your assets to your heirs, you are required to provide very detailed written and specified instructions in estate planning. The requirements needed differ depended upon the type of wallet you own. Most popular types of wallets are (i) paper wallets that provides your private keys written on a paper, (ii) hardware wallet that holds your personal keys, (iii) non-hosted software wallet that does hold your private keys, as well as (iv) a hosted software wallet that does not hold the keys. To provide extra security, storing that same private key in a specified safe-deposit box or potentially vault could be a great solution. Due to Bitcoin wallet transfers being irrevocable, all the private key information about your digital asset accounts will need to be secured. As it was mentioned regulation is still vague, not mostly because of lack of clear classification and definition. Future regulations need to work on more detailed ruling, and clarity. There are many ongoing cases and lawsuits that upon their results may actually benefit virtual assets, by bringing more clarity. FinCEN has classified every convertible digital currency as possessing the currency attributes. Main differentiator for them between regular and digital currency, is that digital currencies are medium of exchange that serves like a currency only in some environments, but does not have every attribute of regular currency. In already resolved cases some bigger more popular currencies such as Bitcoin and Ether have gotten clarity, and have not been deemed securities, unlike some like XRP, which is still waiting for legal clarity in an ongoing legal case. CFTC hasn't officially ruled, on their definition of cryptocurrencies. Since there is no specific entity that provides insurance for potential future value of Bitcoin, and since its value derives only from peoples will to invest in it, it is arguably not a commodity. Type of classification that IRS on the other hand is mostly interested in is does it classify as a property. Yet again, as it has been stated by IRS, for every individual taxpayer, the nature of their use of digital assets, may implicate completely different results under the federal tax code. After IRS classification, there have been attempts to amend it as property, and they were pointing out that it should be treated as foreign currency for federal tax purposes. With all these issues numerous companies were thinking about creating a new digital currency that would be backed by gold or any other commodity that has intrinsic value. The goal of such idea is to be able to swap that unit of such digital asset for a fixed already predetermined quantity of some commodity such as gold. Some made actual physical coins that would represent certain digital asset. In order for them to have some sort of an inherent value they

would be made of gold or precious metals. Main example is the Casascius Bitcoin, which is a physical representation of a bitcoin, it is actually a collectible coin that is in fact backed by regular bitcoins that are embedded inside. Underneath the hologram within that physical coin is the address of specific coin as well as a redeemable private key. One of the main reasons for this project is to allow usage of bitcoins without using a computer device. On the other hand, with it becoming a physical representation of certain value it can potentially be a subject to different regulatory issues. One of the examples is case in 2013, where a person received a letter from FinCEN regarding his possession of such Casascius coins. They stated that since that person is operating as MSB, coins have to be registered with FinCEN. After the warning the owner ceased offering those coins, and no formal action was taken against owner by CFTC. At this moment, the sale of any coin that has embedded bitcoins is suspended. Another topic that could provide regulatory issues, as well as new regulatory framework are smart contracts. They are a specific way of writing code, to implement programmatically different stages of contract negotiation and execution. Code could be written to cause a specific event to occur under right conditions, if the requirements of the contract are not fulfilled. To have a guarantee, digital escrows usually are something of value. With introduction of such smart contracts, it is very hard to find loopholes around these codes, and agreements within the contract. Since there can always be disputes between two contracting parties, mediation is a good solution. By introducing a mediator, it two parties disagree, and mediator agrees with one of the parties, they can provide 2 out of 3 signatures which would meet the needed criteria. When two parties decide to enter a smart contract, they need to make sure that they formatted a contract that is valid, which could bring different issues. Since these smart contracts are hand written codes, errors or potential bugs within the code can occur. It is hard to reverse such errors, and if the case ends in court, it is questionable how to resolve such issue if one of the parties try to exploit the error for personal benefit. One of the benefits of Bitcoin is that transactions are usually irreversible, but in these cases, this can present itself as a problem if there actually is an error or a bug. Due to smart contracts being a new way of contracting, all the potential issues may have not still arisen, and we are yet to see the future potential problems that may occur. On the other hand, in Europe, more precisely European Union, EU Commission issued a motion to introduce regulation of cryptocurrencies called ‘’Markets in Crypto-Assets Regulation’’ or MiCA. Goal of such proposal is to set new global standards in order to regulate and oversight cryptocurrencies as well as other assets based on blockchain technology. They are doing it with an aim not to restrict usage and development of cryptocurrency, but to promote and attract crypto talent into EU, as well as multiple different companies and investors across the

globe. There are some fears that these regulations could end up hurting the development as it is inevitable to put certain constraints. In transition from 2017 to 2018, EU Commission have issued instructions to the different European financial supervisory authorities in order to inspect possible application of EU financial laws to the cryptocurrencies. According to the report of EBA in 2019, they suggest that such digital assets should not fall under EU law for majority of cases, while highlighting potential risks of such technology, especially in regards with money laundering. As a result, EU commission obligated the member states to act promptly, but incentive resulted in multiple countries adopting different rules, while still others not taking any action at all. This behavior brought realization that there needs to be a legal framework that will be harmonized for the entirety of EU in order to prevent any flaws within the regulation. Any issuer of a specific cryptocurrency is obligated to publish and send in advance a white paper in order to notify national financial supervisory authority for their respective countries. That authority has the ability to allow or prohibit the issuing of such tokens. In case all the obligations and requirements are met, those cryptocurrencies can be offered within the whole EU market. Just like for issuers, there are regulations for providers, and any acts such as, trading, brokerage or providing financial or investment advice will need to be approved by the national supervisory authorities, in order to provide such services under MiCA. Nation within the EU that have such service providers, have a potential competitive advantage, since certain licenses are already in existence and they just need to be upgraded. There are also push for rules that prohibit market manipulation as well as similar methods such as insider trading. This new legal framework will allow for entry of more investors that will help enlarge entire market. Due to its size, MiCA has the ability to set worldwide standards that could accelerate the process of regulating this asset class throughout whole world. With inconsistent regulation within US that is different for each state, as well as current negative position towards such asset class by majority of Asian countries, EU has the ability to be a leader in proposing and pushing new framework, which could in return attract many people into EU. Crypto assets is a topic that also brought many discussions within central banks. Such discussions resulted in exploration of the CBDCs (central bank digital currencies). Such digital currency would be issued as well as backed by a central bank. Over 80 countries from all around the world are interested and are exploring the possibilities with CBDCs, and those countries represent more than 90% of global GDP. Central banks have stated that such technology is not introduced in order to replace physical cash, but more so to be used as a supporting tool that will not cause any instability within financial markets. Blockchain technology is being considered a solution for creating such assets. It is estimated that around 14 countries are in the infant stages of preparing and releasing CBDC and they

are aiming for possible launch. Asian countries, as well as Sweden are most commonly mentioned with proposal of e-krona. Many reasons for suggesting and exploring central bank issued tokens are the same as the advantages of cryptocurrencies overall, such as transaction speed, efficiency, transaction fees, etc. CBDC could provide and encourage financial inclusion to all those that are unbanked. Main difference between CBDCs and other crypto assets is obviously the factor of centralization. As the central banks will be able to monitor many aspects of such financing, the privacy of citizens is at risk. There are also risks of people pulling an excess of money from banks and use it to buy CBDCs, which could in return trigger an event such as a run on banks.

4.3. Ripple and the SEC lawsuit

The ongoing Ripple and the SEC lawsuit could be used as a benchmark for many future cases and with future resolution might provide with clarity not only to XRP, but the whole cryptocurrency world as a whole, and could massively benefit cryptocurrency markets. Since 2013 Ripple company has sold over 15 billion units of virtual asset called XRP in return for cash. All these transactions have a worth over $1.4 billions USD. In this case the defendants are Ripple (Delaware corporation founded in 2012), Garlinghouse (Ripple's chief operating officer), Larsen (co-founder of Ripple, and CEO until 2017). In 2012, Ripple was advised that under certain circumstances, digital asset called XRP could be considered as an investment contract, which implies that it would be considered a security under the federal securities laws. Those recommendations were ignored by Ripple in order to initiate a large-scale distribution of XRP. Ripple was stating that XRP due to its nature and usage is not a security, and shouldn't be treated as such, their belief is that XRP is virtual currency. Reason why this lawsuit could be really influential is due to the fact that if Ripple loses this case, and SEC were right that it should be considered a security, it could broaden the definition of the Howey test, which could as a result change classification of similar digital assets into securities. Due to nature of securities, it could be problematic for some digital assets to be deemed securities. Securities tend to have stricter regulations compared to commodities and currencies. If something is used as a representation of partial value of some entity, then it should be characterized as security. Some cryptocurrencies are actual securities, most of them were sold to investors via ICO's. Such tokens are representation of a promise to buyers that such company that issued Initial Coin Offering is truly planning on delivering their promises

and plans, which in return gives a higher value to the issued tokens. These tokens are not exactly the same as shares of a certain stock, but the still have very similar characteristics which would make them securities under the United States law. This lawsuit is only impacting dealing with XRP within the U.S. but potential price swings, and previous price drops do impact the whole world. In some countries such as U.S. laws on securities are very strict, which means that a lot of investors within those countries stay away from ICOs. SECs main point is not only that XRP is a security, but they are claiming that it is an unregistered security which has been sold illegally. Their claims could really stretch the definition as well as broaden the definitions found in the Howey test. Purpose of Howey test it to determine whether the value of a specific asset being invested in, is dependent upon the efforts of some other third party. For cryptocurrencies this could be a major issue, since it is very hard to claim that a specific digital asset is not dependent on some third party, yet they all have creators that have a relative ability to influence the worth of such virtual currency. On the other hand, since it is a decentralized network, technically there does not exist a single entity behind the project. Some argue that XRP network is centralized, but that simply is not true and should be put in the same legal category as Bitcoin, that got its legal clarity along few other bigger cryptocurrencies. It is common that legal systems decide based on legal precedent. By taking a look at similar cases that were resolved it could be easier to make connections and similarities and decide upon ruling on the new case. SEC provided with Wells Notice, which is a specific document that explains SEC's intention to seek legal action and the reasoning behind it. In their response, Ripple stated that due to XRPs nature that is similar to Bitcoin and Ether, it should be declared a currency just like them. Ripples main points were that: (i) XRP has been traded on more than 200 exchanges around the world, and the vast majority of them have no connection to Ripple, (ii) all the XRP transactions take place on the XRP Ledger which is decentralized, it is powered by a network that is not owned nor controlled by anyone, (iii) every single actor is prevented from owning or controlling the XRP Ledger by consensus validation process, (iv) it has been trading in secondary markets which operate separate and apart from Ripple. Ripple's goal is to provide ODL product (On Demand Liquidity) that uses XRP as a bridge currency. Their aim is to improve and address different inefficiencies in cross-border payments. Even though SEC is in charge of determining whether an asset is security, in 2015 FinCEN settled a different case with Ripple. In that case it was concluded that XRP was in fact a convertible digital currency, and that Ripple was just a money transmitter of XRP. Approximately 90% of their XRP holding are held in a inaccessible escrow that was proposed by Ripple themselves in order to be transparent, and it can't be unilaterally terminated. The goal of such escrow is to standardize

the supple of XRP that comes from Ripple. Since it is not just Ripple on trial, but their founders as well, SEC wants them to forfeit the 1.38 billion dollars they have earned from issuing and selling those XRP tokens. Their goal is also to stop future selling of XRP by these three parties, as well as to make them pay additional fees that could be ruled by the court. That is just a tip of an iceberg of demands and accusations thrown out by SEC. Primarily they had an issue with the was XRP was distributed, according to SEC, even before one XRP was sold, Ripple were warned and advised to contact the SEC for classification, and that was not done. They stated that Garlinghouse and Larsen intentionally tip-toed around this issue, and continued to promote and sell XRP. Next, they made it clear that they have an issue with Ripple selling high quantities of XRP below the market value to the corporations with no lock up conditions. Those same companies had the opportunity to immediately sell their XRP holdings for instant profit for retail price, due to getting it cheaper. SEC mentioned that Ripple would pay digital currency exchanges in XRP in order for them to list it for trading. They accused all three involved parties in selling the tokens over the counter while keeping retail investors in the dark. Trying to boost the price of XRP and promote it, while at the same time getting rid of their XRP holdings under the table. SEC also cited the words of involved parties saying that every buyer of XRP is depended upon efforts of Ripple to make their investment potentially successful. Those words could easily be interpreted in a way to prove that even the defendants believe, XRP is potentially a security. Two core accusations in this lawsuit are that XRP is an unregistered security, but also, that involved parties used that same token to enrich themselves. This lawsuit and its outcome are one of the main focuses of main investors, as well as the whole cryptocurrency world. Charles Hoskinson (Cardano founder) said that even though it is very close to being classified as a security, he believes that XRP is indeed a currency and should not be traded as a security. He clarifies his stance on his topic with the fact that even if Ripple were to shut down, and other two parties Garlinghouse and Larsen were to put in prison, XRPL (XRP Ledger) would not cease to exist, and would continue to operate. In their counterargument Ripple compared relationship of Ripple and XRP, to the relationship Exxon and oil. Their point is that even though that company is depended upon oil, holding oil realistically wouldn't be equal to owning a share in a company. There is a great possibility that defendants manage to keep XRP defined as a currency, but with other issues, some other regulatory bodies could try to press new charges for all of their past actions exposed in this case. At the beginning of the lawsuit, the price was heavily negatively impacted, since then it has bounced back following market patterns, but it is still believed that it is carrying heavy burden of the lawsuit. Defendants provided with data, that suggests that their behavior and selling of XRP wasn't sufficient enough to impact the

price of XRP. This case has been active for over eight months, and it is not known for how long will this lawsuit prolong. This battle has been fought for longer than some experts expected, each party filing motions in order to put the opposition on thin ice. There is a popular belief that this lawsuit could end up in a settlement which could relatively benefit both parties as well as the investors.

4.4. Examples of use cases of cryptocurrency

Even though Bitcoin is by far the most popular cryptocurrency out there, it isn't very efficient for many things, except to serve as a store of value. On the other hand, Ether and Ethereum as second biggest and most influential name in this industry, has more used cases. Ethereum is defined as decentralized software, that is blockchain-based with smart contract functionality. Its main use is to support Ether, which is the second biggest digital currency in the world. In 2016 it actually split into two separate blockchains named Ethereum and Ethereum Classic. Reasoning behind such decision was a hacking incident, in which a person took an advantage of few flaws and ended up taking 50$ worth of Ether tokens. Ether is proof-of-work, that suggests that when a specific block of a transaction is created, in order to get the accurate value of that block, miners generate values until they get it. If the miner manages to discover the hash, in return he receives Ether. Again, due to inefficient energy usage there is a plan to move to a new algorithm that is called proof of stake. Ethereum can be used for multiple purposes. Primarily it is usable in the Defi (decentralized finance) environment. That term refers to financial services as well as specific products that are available to people that are able to make use of Ethereum. Main advantage of such system is that there is no authority that can deny access, and markets are constantly open. Since everything is governed by a specific code, and everything is automized, there is no risk of potential human errors. There are no financial services that are able to potentially prevent a certain person from getting paid. Also, since it is a decentralized system, no centralized institutions have the ability to shut down the markets at their own will, unlike with traditional finance. With decentralization as a main factor, there isn't a limited number of trading ours that are specified for some time zones, and you can't be denied to partake in use of such financial services. The idea is for investor to be able to have total control over their own money, and all the transfers of belongings are done in the matter of minutes. There are no location restrictions which suggests that any user is able to send money anywhere around the globe, as well as trade their

tokens, be able to have access to stable currencies, be able to purchase insurance, as well as many other benefits. Ethereum blockchain secures NFTs. NFTs (Non-fungible tokens) are a specific type of a token that could be attached to a unique item, which makes them non interchangeable for some other. Since there is no possibility for two NFTs to be the same, they can only have a single owner. Due to them being secured on the Ethereum blockchain, it makes them compatible with anything that exists on Ethereum platform and they can be sold at any place. Ethereum finds its use with DAOs (decentralized autonomous organizations) as well. DAOs are internet based, and there are no CEOs or specific people of power. They are managed collectively by members included. This allows for fair treatment of all member, ability for transparent voting, and inclusion of every member. No changes inside the organization can be executed without specific requirements within the code are fulfilled which makes for fair and democratic government. Their functionality is based on smart contracts. They are both automatically executed when specified conditions within the code are executed and met. Even though smart contracts are not exclusively tied to Ethereum technology, they are mostly connected with their usage of Ethereum. Unlike all these volatile digital currencies, there are cryptocurrencies with stable prices. Those are called stablecoins. They are pegged at the value of US dollar or in some cases a Japanese yen. Stable coins are not necessarily pegged to physical currency, but they could be pegged to some other cryptocurrency, or some other real-world assets. Those currencies and assets are regulated by specific financial entities. Most popular stable coins are USD Coin and Teather, they are both pegged to the US dollar. Their main purpose is to allow traders to switch rapidly between different digital currencies on cryptocurrency exchanges. Such coins provide the benefits of cryptocurrencies but avoiding the volatility. Stablecoins provide a potential participation in global financial system, to all the people that live in locations that have unstable domestic currencies and lack of access to banking. Some tokens and projects have used cases in many different industries, and that is the case with IOTA. IOTA has been involved in gaming, finance, automotive and many other areas. It is designed for the Internet of things (Iot) as an open-source distributed ledger. Now days vehicles are not just a mean of transport, they have basically become digital platforms. With each passing year, more and more emphasis, and importance will be put on the digital content and digital capabilities of a car. IOTA can be used to provide real-time payments that don’t require fees, it basically provides an ecosystem with unlimited mobility. Such technology builds interfaces, and enables secure data transfer. The clear direction we are globally moving towards to is standardizing usage of electric vehicles. With more demand for energy, and energy grids, you can supply the energy with the usage of IOTA tokens. IOTA also enables you to build your own instruments for frictionless

machine to machine communication, that creates an environment between multiple vehicles as well as creates economy among them. It would consist of microtransactions that come without any fees. In automotive industry one of the examples is IOTA's partnership with Jaguar. They implemented ''Smart Wallet'' technology that utilizes something called IOTA Tangle for data, which enables micropayments, services, potentially earning money as well as exchanging information. It is used for exchange of data and funds between every element within the system. All the payment transactions are sent at high rate, which is enabled by IOTA's secure and scalable systems. Some of most recent used cases for IOTA is a blockchain-based cybersecurity to verify the Corona tests in airports in Germany. ''Digital Corona Test Certificate'' provides a verification for COVID-19 of each passenger, while following the rules and procedures of European data protection standards. IOTA's technology is obviously capable enough to cover multiple sectors. They are currently involved in finance, automotive industry, communication and social media, eHealth, gaming, product traceability, sensor networks, building smart cities, smart energy, smart farming, smart home, dealing with supply chains as well as sustainability. Bitcoin had and still has several use cases, but its energy consumption and transfer fees outweigh the utility, on the other hand XRP has pretty similar usage. Main difference is that XRP is one of the most ecofriendly cryptocurrencies, which makes it perfect for large number of transactions due to fast speed of transaction, and close to no fees. RippleNet is powered by XRP, it is a payment platform that facilitates cross-border payments. It is used by multiple institutions as well as businesses, but it can also be used by individuals. RippleNet is not limited just to fiat as a type of currency, it can use even gold or airline miles as currency. Alongside RippleNet, XRP is used with companies such as Coil. It allows web monetization as a second option to traditional paid advertising. As users consume specific content, Coil uses ILP (interledger protocol) in order to stream micropayments. XRPL is ideal to provide a low cost, high speed and reliable payment channels. XRP is involved also in asset custody with companies like BitGo as well as payment processing with bitpay. Their idea is to promote and empower businesses to integrate multiple different virtual currencies such as XRP into emerging and also existing financial systems. One of the main tasks is to provide on-demand liquidity, due to its characteristics that were already mentioned, it is perfectly suited for global payments, and due to its scalability, it is one of the more suited cryptocurrencies to perform such tasks.

5. Impact on real world

5.1 Main tokens

Cardano (ADA)

Multiple cryptocurrencies were mentioned and explained throughout this paper. Bitcoin as a leading force, and most prominent digital asset that is mostly used as a store of value. As well as digital assets such as Ether and XRP that have a wide range of use cases, solving real world problems, and being implemented in new projects daily. Still, there are multiple tokens that were not yet mentioned. Most notable one is Cardano. It is a proof-of-stage blockchain platform with a goal to bring positive global change in multiple areas. It was founded by Charles Hoskinson, a co-creator of Ethereum. Currently it is considered one of the fastest-growing projects in digital assets world. Team involved in this project does extensive research as well all publish its results in peer-reviewed academic papers. Goal is to establish a scalable, efficient and secure decentralized network, achieving such goal requires systematic approach to blockchain development and its research. Due to internal disagreements Charles left Ethereum Foundation, and started a new business Input Output, which later on launched the Cardano network as well as ADA token. What separates Cardano from most other blockchain platforms is their dual-layer system. CLS (settlement layer) grants ADA token holder ability to both receive as well as send transactions at high speed with extremely low fees, while on the other hand CLL (computational layer) is used as the foundation of the rest of Cardano's functionality. Such flexible layer operates separately from the CSL as it is composed of numerous different protocols. To write the Cardano blockchain they used programming language known as Haskell. It does use PoS (proof-of-stake), and they aim to offer higher level of reliability as well as security than PoW (proof-of-work) chains, while being much more energy efficient. Native token of the Cardano blockchain is ADA, it is used to provide and conduct peer-to-peer transactions all over the world. In Initial Coin offering, 57.6% of the total 45b token supply was distributed to multiple investors. As of August of 2021, ADA has appreciated more than 1000% since the beginning of this year. Token can be used for more than just transfer and trading, it allows users to take part in staking as well as the platform's governance systems. Users are also considered validators, due to them functioning as nodes that record the current state of network. To earn token rewards it is

necessary to either run a stake pool or to delegate a stake to a stake pool operated by some other validators.

Binance coin (BNB)

Another token that should be mentioned is BNB (Binance coin). It was launched in 2017, currently Binance is considered one of the largest cryptocurrency exchanges. Their goal is to put cryptocurrency exchanges in spotlight, as well as to bring them to the forefront of financial global activity. It evolved from being just the biggest cryptocurrency exchange, to now having a whole Binance network. It consists of Academy, Research projects, Binance Chain, Trusted Wallet, which all use blockchain technology, in order to participate in revolutionizing the finance world. Founder of Binance is Changpeng Zhao, and he is the CEO of Binance. Ever since 2013, he has been involved actively within blockchain technology as well as cryptocurrency world. In 2015 he founded BijieTech as a head of development at Blockchain, finally in 2017 he launched Binance. Most of its popularity was due to Binance being a leading cryptocurrency exchange, but as time progressed, their side organization and applications are bringing even more attention. Now it is a ecosystem of numerous blockchain based networks that are considered decentralized. One of their main goals is to provide infrastructure services to the blockchain ecosystem as a whole. Maximum supply of BNB coins is 170,532,785 coins. As stated by their whitepaper, specifically half of maximum possible supply of BNB tokens was allocated in ICO, with another 40% being given between founding members. The last 10% was divided among angel investors. At first the company didn't have their own blockchain, and just like a majority of tokens it started as a token on Ethereum blockchain. As the company evolved it finally introduced blockchain, and there were numerous tokens that were issued from the Binance blockchain. Those issued tokens are secured by the BFT consensus mechanism. When first version of BNB token was created on Ethereum blockchain it used PoS (proof of stake) consensus. With PoS consensus they were able to create smart contracts and it made token extremely scalable, but when Binance blockchain was introduced, it switched to PoW consensus (proof-of-work), compared to PoS it is far more limiting and it is less energy efficient.

Dogecoin (DOGE)

One of the coins that recently broke top 10 and even top 5 spot based on market capitalization. It was created by Billy Markus and Jackson Palmer as an open-source digital currency. Actually, in December of 2013 it was forked from Litecoin. It wasn't a real attempt at providing a useful token that would eventually solve real world problems, instead it started as a joke, a light-hearted token that could interest broader audience, and not just hardcore ''geeks'' that were dominant in cryptocurrency space. Traction started recently in 2021 with Tesla's CEO Elon Musk publicly promoting, and claiming that Dogecoin is his favorite coin, and the future of cryptocurrency world. Dogecoin uses Scrypt technology, which actually differs from Bitcoin, which uses PoW (proof-of-work) protocol. There is no limitation to the number of Dogecoin that can be mined which means that total supply is actually uncapped. There are two ways of mining Dogecoin, by joining a mining pool, or to mine the individually. They managed to merge the process of mining Litecoin as well as its fork Dogecoin, and anyone that would like to mine them can do it on Mac, Windows or even Linux. As it was made primarily as a ''meme'' and a joke, there wasn't a particular usage for such token. In the beginning it was used to reward and tip selected content that you like on social media sites like Twitter and Reddit. There are web sites such as Dogecoin faucet which encourage involvement within crypto space and Dogecoin community by giving free Dogecoin as an introduction. Since the big boost of more than 800% in the span of one day in January 2021, Dogecoin became a mainstream phenomenon. Trading and investing in Dogecoin was encouraged by many famous people like Elon Musk, Gene Simmons, Snoop Dogg and even Mark Cuban, who announced that Dallas Mavericks which he owns, will allow buying tickets and products with Dogecoin. With over 20,000 transactions at the time, Cuban's franchise was declared the top Dogecoin merchant. One of the great milestones for Dogecoin as well as cryptocurrency space as a whole was when SpaceX announced first mission to space that would be funded by cryptocurrency, in this case Dogecoin. As it wasn't taken seriously at first, Dogecoin had history of scams and thefts. Some even consider it a pyramid scheme, where initial holders of this token lure new investors in order to boost the price of their investment. With block time of 1 minute, it allows for creation of 5 billion new separate Dogecoin each year. Ever since Jackson Palmer left Dogecoin project, has been criticizing it and describing it as capitalistic technology that was built to increase the wealth of its proponents by avoiding taxes and working around regulations. With all the negative speculations and connotations, it still managed to become fourth-largest virtual currency that has market capitalization of over 78$ billion. With new popularity and recognition, it is seriously being taken in consideration by numerous projects due to its small energy consumption for transactions.

Polkadot (DOT)

Polkadot managed to make a wide range of different blockchains interoperable among each other since it facilitates transfer of any asset and data, not being limited to just tokens. Polkadot's main goal is to provide and allow individuals to protect their interests as well as to allow them to take back ownership of their digital information from different third parties by securing the data from central authorities. By unlocking a secure cross-chain communication they are aiming to allow separate types of chains to exist, interact and work perfectly and securely within a single ecosystem. They describe themselves as blockchain of blockchains. First trace of Polkadot was in whitepaper published in 2016 by Gavin Wood, who was formerly a CTO of Ethereum. At first it was PoA (proof-of-authority) network, but in June 2020 it evolved to a PoS (proof-of-stake) network. With that action, they transitioned the governance from a single Sudo account into the hands of new holders of DOT token. These different multiple blockchains that are in a single ecosystem are called parachains, as they manage to process transactions in parallel, those same blockchains are connected with Polkadot Relay Chain. The Relay Chain is key for network's shared security and interoperability, its main goal and responsibility is to provide security and to coordinate the whole system. Due to its multiple chains, Polkadot has an ability to process. numerous transactions on several chains at the same time. That ability significantly improves scalability as well as it provides perfect conditions for future adoption and potential growth. DOT, which is the native token of this network, primarily has three main functions. First, it gives holders an ability to have a voice in the governance of the Polkadot network. Next, DOT token can be bonded to connect a specific chain to Polkadot as a parachain. Finally, it can be staked for security of the network. There is no fixed set number of DOT's that can be created. DOT tokens that get generated are used for rewards to validators, while the remaining number of DOT's go to the Treasury.

5.2. Tesla investment

In January 2021, Tesla purchased $1.5bn worth of Bitcoin. In their filing to the SEC (Securities and Exchange Commission), they stated that the reason for including Bitcoin into their portfolio is for diversification, and future maximization of cash returns. Also, another reason for such investment is to prove and to bring attention to the fact that they will start to

accept payments in Bitcoin in exchange for their products. Such act would make Tesla at a forefront of revolution, making them the first major automaker to accept cryptocurrencies. As soon as they decide to accept payments in virtual currencies, the already purchased $1.5bn will give them instant liquidity. When you take a look at Tesla's cash investment, Bitcoin purchase is actually a significant percentage of it. According to the most recent filing, Tesla had more than $19 billion in cash as well as cash equivalents at the end of 2020. When Tesla revealed that they invested in this particular digital currency, Bitcoin's price hit new all-time high price. They commented on this move as a potential game changer, they believe in their power to cause ripple effect across multiple corporations all around the world, and that such public investment could mean a great change for potential future use of Bitcoin as well as the rest of cryptocurrencies. This move by Tesla was welcomed with mixed emotions and comments. While some experts and people in the field where ecstatic due to the fact that such behavior is a catalyst for development and for global acceptance of cryptocurrencies, others were a bit more skeptical. A lot of people were questioning Tesla's CEO Elon Musk's behavior on social media, his tweets and public opinions were a direct cause for spikes in the price of Bitcoin as well as Dogecoin which he endorses. He encouraged the purchase of both digital currencies, as well as promoting cryptocurrency asset class as a whole. In his Twitter biography, Elon Musk added the hashtag #bitcoin, which resulted in upwards move in digital currency by as much as 20%. With all the positive feedback, as well as influx of new investors into crypto space, as well as investors into other assets, even Tesla's shares were up more than 2%. Still, in the filing to the Securities and Exchange Commission, they issued a clear warning, and highlighted the volatility of Bitcoins price, as well as similar virtual assets. Such behavior by Musk can potentially be deemed dangerous enough that SEC has to get involved, his tweets are obviously directly causing spikes as well as drops in virtual currencies, and it is currently unclear how the rules apply to this case with the lack of regulation. This wouldn't be first time Elon Musk was SEC's target, back in 2018 he was charged with fraud because of his tweets about taking the company private at a price of $420 per share. That case ended with Elon Musk having to settle with SEC, as he was obligated to give up his position as chairman of the company's board, as well as paying $20 million from his pocket with additional $20 million fine for Tesla as a company. By the end of March, Tesla announced that their investment in Bitcoin was at that time worth around $2.5bilion, which was just few months after the initial investment. They achieved record high net profits for first quarter of $101 millions from Bitcoin sales. Their realized gains were $128 million with included impairment of $27 million. There are other companies that are moving in the same direction in recent years like Tesla by endorsing cryptocurrencies, like PayPal and

Fidelity Investments. Some people called this investment a publicity stunt, due to their controversial past, but $1.5 investment in a risky asset would be considered pretty big and reckless stunt if it was just it. Their move actually made them more profits in the first quarter than actually selling cars did so if it was just a ‘’pump and dump’’ stunt, it actually worked. Since they initially made Bitcoin purchase, that same digital asset has risen about 60% which presented itself as a great opportunity to sell some Bitcoins in the portfolio in order to cash in the profits. Sale of Bitcoins made almost 25% of their profits, and if we take a look at their main business of actually selling cars as well as solar panels in that quarter, they financially did worse than was expected if we ignore Tesla’s gain on regulatory credit and Bitcoin. As it is obvious, Tesla doesn’t simply rely solely on the selling of cars and solar panels, and they are covered on multiple fronts, another example is Tesla selling regulatory emission credits to other companies that produce cars. In California and other different 13 states within the U.S. there are Zero Emission Vehicle programs that force automakers to produce electric vehicles, if a certain company doesn’t have enough credits, they have an option to buy credits or they could potentially risk getting fined. Since Tesla’s only produces and sells electric vehicles, they have a surplus of credit which they sell, and add as almost pure profit without even needing to sell a single car. In May 2021, Tesla’s CEO Elon Musk put out a public statement that they suspended all vehicle purchases using Bitcoin, main reason for such action was concerns over use of fossil fuels for Bitcoin mining. In very first few minutes since that tweet, price of bitcoin dropped around 5%. In his statement, he still encouraged and highlighted cryptocurrency as a good idea, with bright future, but he believed that current effects on environment were to great to proceed with such notion at that time. Another notable thing in the statement was a promise that Tesla will not further sell any Bitcoin as their goal is to use it for transactions when mining becomes more eco-friendly and more sustainable, as well as the fact that they are potentially looking at few different cryptocurrencies that have an ability to use less than one percent of energy that Bitcoin uses per transaction. For some this statement was pretty surprising, but for others it was expected, as enormous energy consumption and lack of sustainability of Bitcoin was previously known. These actions triggered a dip of over 17% in the value of the digital currency. All these events were expected by many experts as Bitcoin mining used around the same amount of energy on yearly basis as did Netherlands in 2019 by a recent study. Since that move both Tesla and Musk were heavily criticized. Some accused him of manipulating the markets in order to achieve greater profits, while other criticized his ‘‘careless’’ decision to invest in such volatile project. Few experts have stated that many stated positives of Bitcoin usage remain unproven, while on the other hand negatives are clearly present. With Musk breaking

all the headlines front pages, it served as a gateway for scammers to seek unknowledgeable victims, promising them large financial returns like some experienced in this Tesla-Bitcoin period. Since then, Tesla and Musk revisited the issue, and in July of 2021 they stated that Tesla will most likely again start to accept Bitcoin as payment, once they increase the amount of renewable energy that is used to mine that same cryptocurrency. Musk said that when renewable energy usage exceeds 50%, they would most likely consider to resume accepting Bitcoin as payment method. One of their main goals is to accelerate and to act as a catalyst in the process of introducing more renewable energy usage to provide more eco-friendly cryptocurrency mining for further transactions and usage.

5.3. Bitcoin dominance index

Bitcoin dominance index keeps track of past and current Bitcoin's total market capitalization in comparison to the total market capitalization of all cryptocurrencies and it is provided by CoinMarketCap. Goal of such metric is to display foundational nature of Bitcoin to the entire cryptocurrency market, as well as to highlight its unproportionate size and value compared to the rest of virtual currencies. Since it reflects overall dominance of performance of Bitcoin as main cryptocurrency in the market it is a great tool for investors and traders to track and monitor sentiment in digital asset market. It is clear that market capitalization of Bitcoin is very helpful indicator of how investors in general are feeling, but another helpful measure are Bitcoin's price fluctuations as they often indicate changes in sentiment within the cryptocurrency market, which not only indicates possible trajectory of Bitcoin, but it is also applicable for altcoins as well. Back in 2013, due to lack of competition Bitcoin dominance was around 94%, at that time Ethereum was not a thing, ERC-20 tokens did not exist, and stable coins like Tether were not an existing thing either. In 2017 first obvious major changes begun with the arrival of first altcoin season. In February 2017, dominance of Bitcoin was approximately 85%. Also, the arrival of initial coin offerings managed to increase market capitalization by a large margin, which led to BTC dominance hitting 40% by the June of that year. In January 2018, due to a bull run in a previous year, Bitcoin's dominance managed to hit an all-time low of 32.8% which was a sign of incoming bear market. Since then, many ICO projects fell off, investors lost significant amount of money invested in altcoins, which ignited a wave of questions about regulations and laws. Bitcoin dominance, managed to surpass 70% again in September of 2019, but it seems unlikely that we'll witness Bitcoin to

pierce through such levels in near future. Still, there is not a general consensus and acceptance for such index, some analysts suggest that market cap is not a perfect metric. Their argument is that there is a large proportion of Bitcoin that is dormant, which suggests that particular holders either lost the wallets, are not using them, or have completely forgotten that they possess such wallets. According to some estimates there are potentially up to 30% of all mined coins that are in dormant stage, which in return can make this unreliable metric at times. Still CoinMarketCap's metric remains a great tool and a powerful illustration of the current growth size of the largest cryptocurrency known, and its behavior compared to other cryptocurrencies. There are some other metrics provided by different sources such as The Real Bitcoin Dominance Index. The Real Bitcoin Dominance Index measures Bitcoin's market share while only taking into consideration PoW (proof-of-work) tokens that are attempting to be money, which means that it excludes stable coins, ICOs as well as other centralized projects. Formula for calculating The Real Bitcoin Dominance index is:

Market Cap of Bitcoin / Market Cap of Bitcoin + Market Cap of coins included

coins included: Bitcoin (BTC), Litecoin (LTC), Ethereum (ETH), Bsv (BSV), Bcash (BCH), Monero (XMR), DASH (DASH), Zcash (ZEC), Bitcoin Gold (BTG), Ethereum Classic (ETC), Dogecoin (DOGE), Decred (DCR)

Since ICOs are controlled as well as issued by different central entities, they cannot act as a hard money. Even in the case in which ICO tries to act as money, it generally does not offer any improvement compared to the current fiat system that consists of centralized banking as well as money printing. On the other hand, stable coins are excluded due to their nature of being solely used as a point in between fiat and cryptocurrencies, as well as them just being an extension of government controlled actual fiat money. Since The Real Bitcoin Dominance Index is only taking into consideration the performance of cryptocurrencies that have a potential to be used a global money replacement someday, due to stable coins being pegged to already existing fiat money, they cannot be included in the equation. The reason why only PoW coins are taken into consideration is because such consensus algorithm is the only known that has ability to keep a network decentralized. Since the goal is improving and evolving from current system of centralized banking, there is a big emphasis put on

importance of decentralization of such coins. When taking a look at Real Bitcoin Dominance Index there is an option to exclude Ethereum, reason for that is even though Ethereum is proof-of-work coin, many people assume that Ethereum goal is not to be money, but instead a version of a global decentralized internet. Binance as the largest cryptocurrency exchange provided with a similar measure Binance BTCDOM Index. Again, it is used to reflect the dominance of Bitcoin within the market, but main difference compared to the Real Bitcoin Market Dominance index, is that it is not capped within 0-100%, BTCDOM index being uncapped makes it a bit more appropriate for derivatives trading. As soon as altcoins start to gain unproportionally more value, BTCDOM index starts to lose value, just as much as it rises when Bitcoin is on a steeper uptrend compared to the rest of the market. In case when Bitcoin is rising or falling in approximately the same rate as the rest of the market, then the dominance measure remains the same. In this index they include top 20 digital currencies by market capitalization that are listed on Binance, not including stable coins and Bitcoin. It is calculated using the weighted average prices of all cryptocurrencies used as a sample.

5.4. Altcoin Behavior

The term altcoin refers to every virtual currency excluding Bitcoin. The name altcoin suggests that those cryptocurrencies are alternative to the largest one, Bitcoin. Currently there is over 9000 cryptocurrencies that would be considered altcoins. First alternative to Bitcoin, and hence the first altcoin was Namecoin. In 2017, there was first great bull run of Bitcoin followed by its big crash, by the end of 2017 such events triggered a big drop in the overall capitalization volumes of all other digital assets. Such phenomenon is called correlation, which suggests that behavior of one specific asset, in this case altcoins, depends on the behavior of some other asset, which would be Bitcoin as a leader of cryptocurrency market. Due to Bitcoin being considered the main cryptocurrency, its trends are largely repeated by the rest of cryptocurrency market. While looking at the chart post-crash by the beginning of 2018, it suggests that second biggest digital asset ETH lags following BTC by approximately a month. In the short run correlation might not seem as obvious, as there could always be temporary spikes due to certain market news, either positive or negative, but in general over a long run there is a visible trend which suggest that correlation between altcoins and Bitcoin is present. Correlation among different assets ranges from –1 to +1. In case in which correlation is equal to 1, those two assets, in this case digital assets move exactly the same, and they

react identically to every single external factor. When correlation equals 0, it suggests that those two digital assets move independently, which means that there is no correlation. Finally, if correlation is –1, those two assets are moving in completely opposite directions.

Table 2 - Cryptocurrency Correlation Matrix, 90-Days

	ETH	XRP	BCH	XLM	LTC	XEM	DASH	XMR	GOLD
BTC	0.5	0.25	0.19	0.52	0.57	0-46	0.45	0.6	-0.1

Even though some altcoins have smaller correlation to BTC compared to others, as a whole market, it is proven that they move synchronously even though none are perfectly correlated to BTC. Reason why knowing the correlation between digital assets, as well as assets in general is important, is to build a balance portfolio that is able to minimize loses in cases of specific strong market impacts. It is important to have assets with negative correlation because they allow for compensation of price drops by the growth of another asset, or to at least try to include assets with very low correlation. If we take Ether es an example for an altcoin as second leader behind Bitcoin, and compare their movement, trends suggest that Ether is a high beta version of Bitcoin. That means that whenever the price of Bitcoin rises, price of Ether tends to grow more, on the other hand, when Bitcoin's price is falling, Ether falls even further. Notable thing is that Bitcoin's supply is limited to a number of 21 million coins that can be produced, with over 18.7 million already mined. But if we take a look at Ether, it doesn't have a set limit of total coins that can be created, even though it is limited by yearly creation amount of 18 million. With such flexibility, it could be expected that Ether's volatility should be smaller, but that is not the case. Every time price of Ether rises due to rise in Bitcoin price, it incentivizes the creation of more Ether tokens relative to pre-ordained amount of additionally created Bitcoin. This behavior suggests that Ether is responding to its price relative to Bitcoin, more so than new Ether supply. These actions suggest that Bitcoin does actually have a role of a first mover in the cryptocurrency market. Even though Bitcoin is used mainly as a store of value, while Ether is the currency of Ethereum which has multiple used cases and smart contract network, investors still use Bitcoin as the first point of entry to cryptocurrency market, and it still remains a main indicator for prices of other virtual assets

Conclusion

Cryptocurrencies are here to stay, as time progresses, and we gain more and more legal clarity, there will be an increasing number of companies, banks and governments dealing with digital currencies. Implementation of renewable energy while mining could be a saving grace for those currencies that demand extreme levels of energy consumption. In the future advantages could heavily outweigh the negatives, and lead to mass adoption and mass implementation of cryptocurrencies. It is hard to predict whether digital assets such as Bitcoin have the ability to replace traditional payment methods, but it being a decentralized systems that allows everyone to take part is really promising. With incoming legal battles, and future regulation it is possible that we are witnessing financial revolution with introduction of blockchain technology. Still, as legal questions and answers are still vague, this potential massive change is unlikely to happen in short period of time. But, with many advantages in facilitating trade as well as reduction of costs, governments and banks should take a close look at this technology, that could provide more efficient way of transfer of value in the long term. High volatility is the proof that it is still a project in work, and while many people support this new era of financing, there are many safety concerns, which leads to some people ultimately avoiding digital currencies.

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