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FUTURE OF CRYPTOCURRENCIES AND BLOCKCHAIN TECHNOLOGY IN FINANCIAL MARKETS

BUDUĆNOST BLOKČEJN TEHNOLOGIJE I KRIPTOVALUTA NA FINANSIJSKIM TRŽIŠTIMA

Sumary: In this paper we are presenting scope and restrictions on the use of cryptocurrencies in international business, banking and in financial markets The subject of this research is to analyze utilization of cryptocurrencies in the international business. The goals of the research are to provide to the researchers and to practitioners and to the scientific and professional public, an overview of current research on blockchain technology in the economy and to determine the impact of the wider use of cryptocurrencies in international business and their impact on the future of financial markets..The research was realized by the method description, literature analysis and conducted research. The selected examples are presenting the possibility of earning, buying and storing cryptocurrencies, paying with cryptomoney and invest in them. In the paper we are searching for an answer to the question "What are the advantages and disadvantages of using cryptocurrencies in international payment and what is the security of using cryptocurrencies in the future?" In the answer, this paper will present in what direction the use of crypts will develop in the future. Results are presenting the blockchain technology, though background technology, which would not be known that cryptocurrencies did not gain popularity, has a bright perspective. Conclusion presents that as long as the transaction costs are lower than the cost of payment transactions, the rational behavior of legal and natural persons requires that they should encourage the use of cryptocurrencies among themselves in order to reduce the costs of the transactions when paying and to overcome the existence of an intermediary.

Keywords: financial markets, digital currencies
JEL classification: E4, E42, G12, G15

Rezime: Rad prikazuje domete i ograničenja upotrebe kriptovaluta u bankarstvu i na finansijskim tržištima. Predmet rada predstavlja korištenje kriptovaluta u međunarodnom poslovanju. Ciljevi istraživanja su da kako istraživačima i praktičarima tako i stručnoj i naučnoj javnosti ponude rezultati dosadašnjih istraživanja blokčejn tehnologije. S tim u vezi, utvrdićemo uticaj šire korištenja kriptovaluta u međunarodnom poslovanju i njihov uticaj na budućnost finansijskih tržišta. Istraživanje smo sproveli opisivanjem, analizom literature i sprovedenih istraživanja. Na odabranim primjerima pokazali smo su mogućnosti za sticanje, kupovanje i čuvanje kriptovaluta, plaćanje kriptovalutama i ulaganje u njih. U radu tražimo odgovor na istraživačko pitanje „Koje su prednosti i nedostaci korištenja kriptovaluta u međunarodnom plaćanju te kakva je sigurnost korištenja kriptovaluta u budućnosti?" Odgovor će pokazati u kojem smjeru će se razvijati korištenje kriptovaluta. Rezultati istraživanja pokazuju da blockchain tehnologija, iako ne bi došla do izražaja da kriptovalite nisu stekle popularnost, ima svijetlu perspektivu. U radu smo zaključili da sve dok je trošak transakcije sa kriptovalutama niži od troška platnog prometa, potpuno racionalno ponašanje pravnih i fizičkih lica navodi na to da između sebe treba da podstiču upotrebu kriptovaluta s ciljem da prilikom plaćanja smanje troškove transkacija i prevaziđu postojanje posrednika.

Ključne riječi: finansijska tržišta, digitalne valute
JEL klasifikacija: E4, E42, G12, G15

INTRODUCTION

Supporters of the cryptocurrencies use as an argument for their use cite a limited supply of cryptocurrencies. Namely, with conventional currencies, the supply is limited by the amount of money given by the central bank. On the other hand, the demand for cryptocurrencies varies significantly. However, given the monopoly and tax collection by the state, the use of classic currencies is inevitable.

Cryptocurrencies do not have coverage and can not be used for paying taxes. They have a value in exchanging among users of those currencies. Accordingly, they are private and decrepit (proclaimed or fiat) money. Given the difficult prediction for price fluctuation of cryptocurrencies, their price instability is a guarantee that rational market participants will not easily engage in international transactions with cryptocurrencies. In spite of the high instability, the fact that they do not have coverage and can not be used for paying taxes and other shortcomings, cryptocurrencies have a great value in exchanging among users for financing legal but also illegal activities. In reference to the above mentioned, the expert and general public are interested in the possibility of wider use of cryptocurrencies in international business and their impact on the future of financial markets. The aim of the research is to show that blockchain technology, although it would not come to the limelight if Bitcoin did not gain popularity, has a bright perspective. We will show that, as long as the transaction costs are lower than the cost of payment transactions, the rational behavior of legal and natural entities requires that they should encourage the use of cryptocurrencies among themselves in order to reduce the cost of transactions and to overcome the existence of an intermediary when paying. The research was conducted with the description method and analyzing the literature. We will show that cryptocurrencies are not simply a trivial invention limited to a narrow area, but they are a set of technologies that have a significant impact on the future of international trade.

1. PREVIOUS RESEARCH

The biggest advantage of electronic money is the fact that it, like paper money, makes it easier to keep the anonymity of a person paying with such money. Therefore, it is possible to monitor and determine the flow of "bank notes", but not the identity of the person making the payment. A person who receives a digital banknote cannot find the identity of a person who has already used this Cryptonian but can have an insight into a series of change of the owner. The anonymity of the currency and capital owners has brought to the great interest of all those who try to deal with money laundering from criminal activities such as drug, weapons, human trafficking etc. Undoubtedly, this is one of the unlawful possibilities offered by the use of cryptocurrencies. Therefore, the advantages of digital currencies in terms of safety and speed of change of owners and the retention of anonymity can easily

be translated into potential hazards or risks. With dramatic changes in value, the cryptocurrencies attracted speculators. Along with the possibility of faster earnings, they came into the focus of speculators also because it is possible to hide from the supervision of central and commercial banks and other authorities.

The term cryptocurrencies is used for a system that uses cryptography in order to enable the secure transfer of digital currencies and exchange in a decentralized way. After exchanging or transferring digital "coins" it is possible to substitute them for classical currencies at market value (Hayes, 2017). The largest number of cryptocurrency definitions points to a technical character and points to the fact that cryptocurrencies are "defined data using pairs of public and private keys generated around a special algorithm" (Turudić, Milić & Štulina, 2017). White present cryptocurrencies as "*digital assets secured by cryptography, created by private individuals, organizations or firms and it is possible to transfer it quickly and in a simple way*" (White, 2015, 383).

Yermack (2013) compares digital currencies with real currencies and points out that cryptocurrencies have no intrinsic value. He also points out that the fluctuations in the movement of cryptocurrencies expressed in dollars relatively high in dollar and that their price in dollars can be significantly different among different stock exchanges, which can cause problems in attempting to analyze price data. In short, in his opinion the cryptocurrencies are not currency but speculative property (Corbet, Lucey, Peat & Vigne, 2018). The idea that cryptocurrencies have no intrinsic value is also supported by other authors (Cheah & Fry, 2015), but there remains an open discussion of the economic value and future of use of cryptocurrencies and blockchain technology (Demir, Gozgor, Lau & Vigne et al., 2018). At the same time, the authors agree that the blockchain represents the greatest innovation in information science since it represents distributed databases where trust is established through mass collaboration and smart code, and not through a powerful institution that is conducting authentication (Arsov, 2017; Laabs & Đukanović, 2018). The key advantage of blockchain technology lies in the fact that it enables the establishment of secure, reliable and decentralized autonomous systems that are applied in different areas (Yuan & Wan, 2018).

There is relatively little, but new and fast-growing academic literature on cryptocurrencies, with the greatest emphasis on Bitcoin. Most of the investigations carried out make the analogy of cryptocurrencies with "digital gold" (Harwick, 2014).

The roots of cryptocurrencies are in the eighties of the last century, when an algorithm was created that allowed the safe and unchangeable exchange of information between parties interested in the exchange. The next cycle of network money development is reflected in the use of *PayPal* and *e-Gold*. *PayPal* offered a simple P2P trading and payment method, and *e-Gold* has been its completion for a long time. Also, *e-Gold* has been accepting gold deposits from its users by issuing certificates. Despite the fact that both services have stimulated international trade, *PayPal* has survived to this day, and *e-Gold* has been shut down after a series of frauds that have led to the pyramidal Ponzi scheme (Radivojac & Grujić, 2018b, 80).

The appearance of electronic money was recorded in 1960 in the United States presented by the EFTPOSS system (*Electronic Funds Transfer at Point of Sale System*). This system gave a hint of electronic payments which led European banks to connect to EFT systems. Given the nature of electronic money,

transactions with such money are realized by "*computer systems, using networks, the Internet and digital data storage systems such as credit cards*" (Buterin et al., 2015, p. 146).

As a consequence of the possibilities arising from the use of the Internet electronic money was introduced in the cryptosystem, which allowed significantly lower transaction costs between banks but also other entities in international payments (Duffie, Gârleanu & Pedersen, 2005; Liu, Li, Karame & Asokan, 2018). With the increasing popularity of cryptocurrencies it became clear that the electronic currency was actually transferable between individuals in the cryptosystem without the need to use the conventional banking system (Corbet, Lucey, Peat & Vigne, 2018). The possibility of forgery and problems with the transport of large quantities were almost eliminated by the development of electronic money. On the other hand, new risks appeared that do not exist with paper money. For example, electronic money is not physically transferable. The user of the digital "banknote" needs to give every "banknote", i.e. set of data, identification information. In this way, with each new transaction carried out with the "banknote", the data that are stored in the virtual banknote are increased (DeGennaro, 2011). In this regard, precisely putting hardware in the function of "mining" represents the motive of "miners" to obtain a certain number of cryptocurrencies (Qin, Yuan & Wang, 2018).

According to one of the theories of appearance of money, money appeared when valuable goods began to be used in exchange frequently. Considering that precious metals, especially silver and gold, are the most suitable for keeping, shaping and sharing quickly become money. Until the first decades of the 20th century, money was "only a security that gives the bearer the right to the prescribed amount of gold" (Radivojac & Grujić, 2018, p. 15). On the other hand, the starting point of the post-Keynesian approach represented in the modern theory of money that is based on cartelism is the definition and explanation of the acceptance of the national *fiat* currency by the entities in the economy (Wray, 1998). Namely, the *fiat* currency is money generated and emitted by a state that does not have a real, i.e. actual or internal value. If it is not accepted as a means of exchange, its convertibility to goods and services is non-existent. In this connection, when *fiat* currency does not have concrete coverage in some valuable goods, it is - worthless. The cartelistic approach accepted by advocates of the modern theory of money is that the demand for a *fiat* currency stems from the compulsion of an entity to pay state tax. From here, the advantages and disadvantages of paper money arise. As an advantage, the use of paper money is most commonly referred to as: customer anonymity, simple verification, portability and universal acceptance. On the other hand, disadvantages include the possibility of forgery, the impracticality of the transport of large quantities, the existence of more than one currency, high distribution and production costs.

The secret of growth of the cryptocurrencies value lies in speculation (Radivojac & Grujić, 2018 b, pp. 81-82). Therefore, it can be concluded that the basic motive and reason for creating a cryptocurrencies is the fact that classic money did not satisfy the ideas of certain groups of people from the aspect of the speed of transactions or the way of acquiring wealth. Secondly, certain groups began to lose patience and want to completely avoid the regulation of financial flows and create a parallel, and less regulated, financial system that would meet their demands.

According to the above mentioned, the use of cryptocurrencies in terms of alternatives to

classical money is limited by at least two reasons. First, although the amount of cryptocurrencies is limited, each individual or group can create, agree the name of the "currency" and rules, and use a variety of other cryptocurrencies. At this point, there are already more than 1,500 cryptocurrencies already. Second, despite limited supply, the price of cryptocurrencies depends on supply and demand. Thus, on the one hand, there is a "quasi-limit" of supply, and on the other, a large uncertainty of demand, which indicates significant instability (Radivojac & Grujić a, 2018, p. 16). Given that the supply of cryptocurrencies is almost unlimited and the demand uncertain, long-term value growth is not sustainable. However, in spite of apparent instability, cryptocurrencies are used in numerous transactions, for the financing of both legal and illegal activities. In fact, apart from attracting investors and speculators, cryptocurrencies introduced a revolution in the field of digital currencies and influenced many other areas (Tschorsch & Scheuermann, 2016). Today cryptocurrencies are created by the mining process and are exchanged by trade in currencies, goods or services on the "stock exchanges" foreseen for that.

On the other hand, a number of authors are sceptical about the future of cryptocurrencies. Luther's model shows that individuals "*may not adopt an alternative currency even if they agree that the prevailing currency is inferior when network effects and switching costs are present*" (Luther, 2016, p. 570). The same author with Salter notes that despite the fact that the number of downloads of cryptocurrencies applications is increasing, "*the effect of cryptocurrency use is not expressed in countries that are considered to have difficulties with banking systems*" (Luther & Salter, 2017, p. 51). Some authors go so far and call Bitcoin a new "golden standard" for the twenty-first century (Kewell & Michael Ward, 2017, p. 496).

2. DEVELOPMENT OF CRYPTOCURRENCIES

At the beginning of 2009, the first platform for creation of the so-called "mining" and trade as an *open source* project was presented. *Open source* presents a practice in creating and developing software that promotes access to original source for end-products. The term gained popularity with the emergence of the Internet and the enabling its various production models, communication channels and interactive communities. The open source model allows simultaneous use of different approaches in production, unlike more centralized development models which are typically used by commercial companies. Accordingly, all participants could contribute to creating the mechanism of this cryptocurrency, but most of the changes were made by Nakamoto (or the group that used this identity). During 2010, competition to Bitcoin appeared, specialized stock exchanges for trade in cryptocurrencies were established, but it gets the use in "real transactions". For example, the first transaction that paid something with Bitcoin in the "real world" was made on May 22, 2010, when "*two pizzas worth $ 25 were paid by 10,000 Bitcoins*" (Maftei, 2014, p. 57).

The financial crisis caused by the collapse of mortgage subprime loans in the United States

began with the bankruptcy of the financial service Lehman Brothers on September 15, 2008. The collapse of assets worth $ 600,000,000,000 caused a drop in the industrial average Dow Jones of 4.5 percent, which presents the biggest drop since the September 11, 2001 attack. A few weeks later, on October 31, for the first time, a Bitcoin was mentioned in an article (Nakamoto, 2008) of the author whose true identity was never identified. Members of a closed mailing group dedicated to cryptography were informed about the publication of the article. Despite the fact that the moment for presenting the investment opportunity almost coincided with the shaken confidence in the current financial system, apart from a small number of enthusiasts who follow the cryptography, Bitcoin has not attracted much attention.

According to the algorithm, the speed of Bitcoin generation rate is halved every four years. For illustration purposes, since January 2009, every 10 minutes, 50 new Bitcoins are generated. Thus, in 2013, 25 Bitcoins were created every 10 minutes, and now 12.5 Bitcoins are generated every 10 minutes. Therefore, the number of 21 million Bitcoins will be generated in 2140 with the creation of 0.0006 Bitcoins that year. There is no central server that monitors and controls the system. This job is entrusted to the "miners" and the newly created Bitcoins are just a compensation to put their hardware on disposal to the network. The mining presents a process of checking transactions and as a compensation, new cryptocurrencies are gained. At the beginning, for this job, the average processor in the computer was sufficient. Over time, the process became so complicated that today it requires powerful graphics cards, specialized ASIC hardware and a large amount of electricity. Today, just for the beginning of this process, it takes several thousands of dollars. That's why mining is mainly done by companies with large servers that are used only for "mining". The miners' job is to pack new transactions into blockchains. Therefore, miners actually compete who will be the first to discover a complex cryptographic formula and its solution presents the creation of a new block. When a block is created, the system of that miner who was the first to come to the "solution" informs other systems – miners that the solution was found, and they check the correctness of that solution. In the event that the solution is confirmed as true - the compensation is given in the amount of Bitcoins as it is predicted for 10 minutes of work. Therefore, the number and role of "miners" are important because the strength of their mining machines maintains the system and makes it safe. All this relates to some form of pyramid schemes that are characteristic for underdeveloped banking systems.

In addition to mining, cryptocurrencies can be acquired by exchanging or purchasing certain goods and services. It is possible to acquire the cryptocurrencies by purchasing directly from somebody or through a certain stock exchange cryptocurrencies. Purchase on the stock exchange is like any stock exchange transaction. By reviewing the relation of supply and demand on a particular stock exchange, it is possible to have an insight into the movement of price and trade of a cryptocurrencies, and, accordingly, give an order for purchase or sale at a certain price. As with every stock exchange, when the orders with the same prices and quantities match, the transaction between the two parties is realized.

It is difficult to resist the impression that the generation of cryptocurrencies is called "digging" or "mining" in order to emphasize the effort, time, and energy needed to acquire a certain amount of cryptocurrencies. In this regard, "mining" is an attempt to simulate "quasi coverage" because "mining" is skilfully used as an allusion to digging gold in mines. "Mining" is rationally and economically justified in countries where electricity prices are

low. Under this condition, it is possible to make a profit with "mining" only if powerful computers are constantly working at a low price of electrical energy. Bearing in mind the fact that "mining" is increasingly complex because the "fever" has caught the diggers, the expense of "digging" is approaching the revenues generated by the acquisition of the cryptocurrencies. In addition, "mining" should represent a psychological phenomenon of golden coverage, which is completely overcome in the modern economy. Therefore, cryptocurrencies have no coverage, and the primary goal of "mining" is not to create a new unit of currency but to secure the network. After that, processing of transactions that does not require a lot of resources and amount of cryptocurrencies is defined as a reward for all this. Accordingly, "mining" is just a way to distribute cryptocurrencies and maintain a system where individuals will use cryptocurrencies while expecting it to have market value. In addition, "*market value is anchored by nothing but expectations of market value is the definition of a bubble*" (White, 2015, 393).

Maintaining the stability of cryptocurrencies is accomplished by using cryptocurrencies exchanged for real currencies on a numerous online stock exchanges and by paying certain goods and services to those who receive cryptocurrencies as a counter-service. On these stock exchanges, as in all others, the rates i.e. prices are dependent on the supply and demand relation. Bitcoin is dominant by popularity and value and other known cryptocurrencies are *Litecoin*, *Dash, Ethereum Ripple*, and *Monero*, and all of them exist only in a digital form, i.e. they are not in the form of banknotes or coins.

The smallest unit is called *Satoshi*, after the author (or several of them) of the original document in which it is first mentioned. One Bitcoin can be divided up to the amount of 0.00000001 Bitcoins or one *Satoshi*. The system enables an unlimited number of everyday transactions, but as time passes, Bitcoin will be lost in everyday trading. Therefore, besides having the features of a *fiat* money, Bitcoin also has a tendency towards deflation. It has a great possibility of dividing values according to the original protocol, as with most cryptocurrencies, by the number of available Bitcoins it is final. Vieira (Vieira, 2014) points out that it is a currency without a regulatory central authority, which means that it is controlled by the entire network of Bitcoin users and their software. In this regard, no entity or government institution is able to change the settings of the system, that is, blockchain or to have an impact on payment. In order to recognize the change of rules on the network, it is necessary that the change is recognized by 50% of users plus one simultaneously, whereby any form of fraud or forgery is disabled.

In addition to miners, a group of users - *full nodes* have an important role in the system. They are connected to the P2P network and have two functions. The first is the confirmation of all transactions and blocks, i.e. the keeping the transaction history. The Bitcoin system is based on a pair of keys. One is a cash currency unit, and the other is a license to dispose it. A person who tries to pay a particular product or service with cryptocurrency has to send to the recipient only the public key together with the signature for the transaction. Also, the information about it is sent to the nearest full node. It checks the three elements of the correctness of the sender's signature, the correctness of the recipient's address, and the status of the Bitcoin in the sender's wallet, because if the balance in the wallet is not at least equal to the amount in the transaction, the execution of the order will not occur.

Since it has the base of all executed transactions, the full node can quickly determine the status of the Bitcoin at a specific address. After

determining the fulfilment of all conditions, it informs others with whom it is connected to a P2P *(peer-to-peer)* network. Upon receipt of the information they also check the transaction until everyone in the network is informed about the transaction. Although it seems complex, this process takes less than a second. The miners are also connected with the participants, who receive the necessary data from them, which need to be included in the blocks. In this way, the cryptocurrencies change the owner, but the secret code changes also.

The second function stems from the fact that it records all transactions on their hard disk that are updated in real time. In accordance with the described process, on all computers, i.e. nodes the change is recorded. Therefore, the possibility of forging a transaction is eliminated because each change should be confirmed by more than half of the participants at the specific moment in real time. Most of current researches on blockchain technology and cryptocurrencies focus on security and privacy issues (Yli-Huumo, Ko, Choi, Park and Smolander, 2016).

3. RISKS AND LIMITATIONS

Unlike other currencies, cryptocurrencies are not supported by the rule of law, but by technology. The transfer is simple, there are no intermediaries, and a third party can not prevent or correct transactions. Assuming that all legal systems collapse, the cryptocurrencies would continue to exist with the existence of the Internet and people who are ready to use them. Other important characteristics of the cryptocurrencies are: ownership is provided with strong cryptography, transactions are visible but users are anonymous, the person sending the cryptocurrencies, unlike the recipient, must be connected to the Internet, and besides supply and demand, nothing guarantees value to them.

Considering the second most widely accepted cryptocurrency of the "miners" and the stock exchanges, is *Litecoin* it can be considered the second most important cryptocurrency. One of the objectives of this cryptocurrency is to validate transactions faster than the platform used by Bitcoin, as well as to exploit the possibilities of the algorithm to create the so-called "smart contracts" (Christidis, Devetsikiotis, 2016). The total number of this currency available for mining and circulations is four times higher than the number of Bitcoins. Litecoin got media attention when it reached a billion dollar market capitalization at the end of 2013.

The system described above represent a decentralized database that can not be compromised or changed by the attack of a large number of users simultaneously. Therefore, the security of information stored in the system is higher than in a centralized database. Accordingly, with certain corrections, the described blockchain system can be used for storing and processing various types of data. Consequently, this technology can also reform financial markets and find its use in verifying the authenticity of various types of documents: vehicle registration, certification of health booklets, voting at elections, keeping registers or copyrights (Yli-Huumo, Ko, Choi, Park and Smolander, 2016).

The transaction, along with all other changes, is recorded on all computers and servers, and manipulations are almost excluded. These key pairs are stored in the wallet, usually the file name is

wallet.dat that is on the user's disk. Therefore, cryptocurrencies are stored in digital "banknotes". Such wallets are software that records private and public keys. One user can create an unlimited number of Bitcoin addresses. Theoretically, the likelihood of creating identical addresses is negligible. However, in practice there is a possibility of unauthorized access to the order of someone who is not the owner of the "wallet". Since the keys are stored with the user, there is a possibility of theft. A user who loses private and public key data remains without access to his/her cryptocurrencies, which are lost forever. As security, it is necessary to make copies of wallets. It is desirable to additionally protect them or keep them under another code. In this way, a greater degree of protection is achieved and the risk of manipulation is reduced. One of the biggest advantages of the P2P network system is the simple transfer of money on the Internet without the intermediary whereby a third party can not prevent or manage the user's transactions. From this, the key difference between cryptocurrencies and classic currencies arises, and this is the fact that every user in the system has an insight into both their own and others' transactions. Namely, the blockchain allows each transcription to contain the digital signature of the previous participants. In addition, capital can be used freely and without minimal costs in the world market, users are anonymous, but the "track of money" can be checked because each transaction is recorded in the blockchain. Therefore, the cryptocurrencies transactions are monitored, despite the wider public opinion. However, the lack of a regulatory system and anonymity makes Bitcoin suitable for financing criminal activities, from money laundering and financing criminals through drug and weapons trafficking to terrorism. Thus, transactions in virtual currencies are public and can not be traced to large extent. This gives a high degree of anonymity to users of virtual currencies. It is precisely this abuse that can affect the closing of the currency trading platform and disabling access to or use of funds on certain platforms or stock exchanges.

The big changes and the constant increase in prices represented an attractive instrument for both professional investors and full amateurs in investment. At the same time, the very high variability has led professional investors to be cautious about investing in cryptocurrencies on the long run.

The third most famous cryptocurrency, *Ethereum*, is a decentralized platform based on a special blockchain, which launches "smart contracts". As with all cryptocurrencies, this system is based on algorithm that does not have the ability of change, deactivation, fraud, or interaction with a third party. The next known cryptocurrency is *Ripplecoin*. It was created in 2011 on the same algorithm as Bitcoin and it works as a payment mechanism based on PayPal.

The appearance of cryptocurrencies was first treated by the general public as one of the technical innovations, with the label "risky", "unreliable" and "short-term". In this respect, plastic cards had similar history, and today they are generally accepted and regulated. Thanks to the flexibility and adjustment to users' needs, cryptocurrencies are becoming widespread and accepted as payment methods, allowing liquidity and flexibility in payments.

According to the above mentioned, we note that cryptocurrencies serve as measurement units and means of exchange, but do not fully serve as a means of preserving value. So, they have two out of the three money functions. Also, trade in cryptocurrencies has shown that they are very sensitive to different news, announcements and comments, which indicates to the fact that a large number of amateurs got involved in cryptocurrency trade. In relation to the significant inclusion of non-professional investors in trade in cryptocurrencies, the European Central Bank issued a

warning at the beginning of autumn 2012 in which it pointed to the risks of using virtual currency, that is, changeability, the possibility of intruding into digital wallets and the lack of legal protection.

In addition to the classic currency risk, the risks related to trade in any other currency also apply to cryptocurrencies. For example, if a physical entity loses the computer or the phone on which his digital wallet is, and there is no copy or wallet is not under the code, that entity will be left with no virtual money. He/she will also remain free of cryptocurrencies if a product or service was paid in advance and the service was not executed or the product was not delivered. In addition, there are claims in any currency that have been left unpaid because the debtor has declared bankruptcy. So, apart from fraud there is a classic - credit risk. In addition to the aforementioned risks, one should know about the risks associated with money laundering, trafficking in weapons or drugs, hacker attacks, the *dark web* trade, and so on. In line with the above, the European Central Bank issued a warning to point out the possible risks that individuals may be exposed to when handling or trading cryptocurrencies (European Central Bank, 2015). First, if a platform that holds someone's virtual currency or does business with them fails or stops operating, there are no special regulatory protection mechanisms that owners would be provided in case of losses. The warning emphasizes the fact that users often lose significant amounts of money held on these platforms because they are often not subject to some regulation. Namely, there are many cases of the literal termination of the operations of various platforms or stock exchanges. Sometimes it is caused by the bankruptcy of the stock exchange owner and sometimes by a hacker attack. In the event that money disappears from a particular trading platform or it bankrupts, there is no special legal protection in the form of a deposit insurance agency that would provide insurance to the owners of the cryptocurrencies. In addition, loss of a key or password can imply forever lost virtual money because there are not many authorized agencies that keep track of passwords or who issue new passwords.

Acceptance of a virtual currency by companies is not permanently guaranteed and it is based on discretion or contracts that can be terminated at any time without prior notice. Finally, the report emphasizes that the possession of cryptocurrencies may be subject to tax obligations such as value added tax or capital gain tax. In this regard, it is necessary to consider what obligations apply in which country. For example, domestic legislation enables natural and legal entities to own cryptocurrencies and to sell them or change them for money, goods or services. However, the law prohibits the exchange of goods and foreign currencies which are not a convertible mark between the two participants in the territory of Bosnia and Herzegovina. Therefore, it is possible to purchase and sell cryptocurrencies and pay tax on gained capital. In this regard, legal entities may also acquire cryptocurrencies in accordance with an informal exchange agreement. Moreover, the legal entity can be mediator in the "charge" of the cryptocurrencies as long as it charges its services in convertible marks and duly pays taxes for its services and the capital gain tax realized by trade in cryptocurrencies.

The most prominent advocate of the use of private money was the Nobel Prize winner Friedrich von Hayek. Hayek supported denationalized money, i.e. private money. The value of this money would be based on a representative basket of currencies. In this regard, such money would be stable if it were able to buy the same amount of representative goods. Hayek believed that for a private money issuer, it was needed to firmly commit himself to striving to keep the buying power

of the currency unchanged, while at the same time holding a discretionary right to control the supply of money in circulation and changes in the "currency". On the other hand, the performance of cryptocurrencies' issuer is similar to the performance of the painter. Artists "guarantee" to customers of their paintings that the value of their painting will be maintained by not "producing" more than a certain number of paintings or copies of it. Cryptocurrencies' issuer defined the cryptocurrencies supply by an algorithm that they "programmed" to define the supply of cryptocurrencies. Accordingly, there is a complete collision of supply of cryptocurrencies with the principles of the modern state theory which indicates that only the state has a "discretionary right" to issue money. Friedman believed that when presenting the idea of an alternative to the monetary system and the role of the state in it, it is not enough to present only arguments that show only its economic justification. In addition, Fridman proposed the necessity of examining whether the existence of an alternative to the monetary system is "in accordance with the constitution" and whether it would create "*political relations that would disrupt the organization of the state*" (Friedman & Schwarz, 1987, p. 41).

Discussing the risks, it is impossible not to notice the great similarity of the price movement of the Bitcoin with developments in the formation of investment balloons. Namely, it is possible to identify the most important moments i.e. phases of investment balloons: the invisibility phase, the phase of the first major sale, the phase of mania and the phase of "blowing out" (Illustration 1). The illustration shows a clear way of moving the value of Bitcoin which indicates to speculation and creation of balloon. Therefore, it is obvious that the growth of the value of this cryptocurrency does not follow the newly created value at the global level, nor so called "natural" growth rate of the global economy. The mere fact that trust is regulated by the consensus of the network user already indicates to a shaky balloon. Moreover, the fact that, according to the algorithm, the number of newly created cryptocurrencies is halved every four years irresistibly resembles the financial pyramid or the Ponzi scheme.

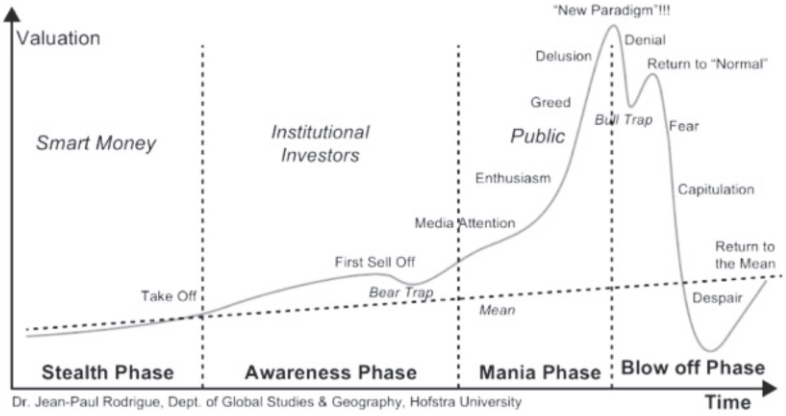

Figure 1. Main Stages in A Bubble

Source: Singh, S., & Bahi, S. (2015). Behavioural Finance. Vikas Publishing House. Available at https://books.google.ba/books?id=9K5DDAAAQBAJ&pg=PA142&lpg=PA142&dq#v=onepage&q&f=false and кретању вриједности биткоина Доступно на https://www.coindesk.com/price/bitcoin

The described decentralization and non-existence of a regulatory agency is proving to be the main cause of high price fluctuations, which is not the case with the movements of classic currency prices (Buterin et al., 2015). Even if this clarification is ignored, it can be concluded that a decentralized system without authority, instead of the most important advantage of cryptocurrencies can be the greatest limitation for maintaining trust in the system.

Since the system is based on complex mathematical algorithms and computational processes, it is clear only to a part of the public with a high degree of computer literacy. In this regard, persons with lesser knowledge on trading on stock exchanges and on computer processes are at high risk for which they can remain without money. Some of the biggest risks for them are loss of data i.e. codes, poor protection that opens the possibility of unauthorized entry into their "wallet" and "unintentional disclosure of key information" (Buterin, et al, 2015, p. 155).

Given the existing and executable protocols, the cryptocurrencies will not disappear because the algorithm is continuously executed and they have a future in money transfer (Buterin et al., 2015) and speculation. Namely, despite the global integration of financial markets, money transfer is expensive and often very slow. Often, the transfer of money abroad takes several days and commissions are high to so that the transfer of smaller amounts is meaningless. For example, as an alternative to the *Western Union* system, cryptocurrencies can be imposed as a preferred way to transfer money. Accordingly, the development of ways to transfer smaller amounts of money can go in that direction.

The money transfer system based on cryptocurrencies in its business "does not rely on banks or payment processors used by modern systems today, and therefore there are no commission or high costs" (Buterin et al., 2015, 156). In case cryptocurrencies are imposed as a cheaper and faster transfer solution, and consequently, their use in trade and in other transactions increases - there may be a "rise in demand and an increase in their price on stock exchanges" (Buterin et al., 2015, p. 156). Such a scenario would be based on sustainable settings.

Financial derivatives are used in order to ensure from the risk of such elimination or risk transfer. Financial derivatives can limit or completely eliminate the effects of currency, credit, and operational risk, liquidity risk and the legal framework. Financial accounting standards define them as:

- Financial instruments, such as contracts for the purchase or sale of assets at a fixed time for a predetermined price (futures),
- A contract on the obligation to replace a certain set of payments (swaps) which the parties possess on the basis of a determined and completed transaction,
- Contracts in which the seller gives the buyer the right, but not the obligation, to buy or sell a particular financial instrument or goods at a predetermined cost of "execution" within a specified period of time or on a predetermined day, for which the buyer pays the premium (option) or
- Instruments with similar characteristics.

Since the cryptocurrencies are secured by the mechanisms already described, they can not be used as a financial derivative. There is a room for risk transfer in credit risk insurance or for theft insurance. Namely, it is possible to make an agreement with a third party that would be willing to pay a certain amount to a person in case the creditor who owes the cryptocurrencies declares bankruptcy. In addition, it is possible to make an agreement with a third party that would be willing to ensure someone's virtual wallet against unwanted hacking attacks.

A fact that does not support the possibility of cryptocurrencies inflation is the fact that the cryptocurrencies are divided almost to zero. Given that the amount of certain cryptocurrency is limited, inflation is not possible which would represent a loss of value due to the emergence of new and same currencies in the short term. Accordingly, cryptocurrencies are not a classic currency, but they represent the asset similar to gold. However, unlike gold, value depends only to the perception of their value by the general public. In this regard, no institution guarantees by the "success" or "failure" of the cryptocurrencies. On the other hand, an alternative can be found by selecting any of the other cryptocurrencies that rest on a similar platform or similar code. Therefore, cryptocurrencies competition is like competition among social networks. In a mass of social networks, Twitter, Facebook and Instagram stand out. They, just like the most famous cryptocurrencies, have many users due to certain characteristics and image. In addition, there is a great possibility of arbitrage in the terms of trade on various stock exchanges or switching to other cryptocurrencies, which suits to professional investors.

The widest use of cryptocurrencies is in online payment options. Today, with the payment of credit cards and via PayPal system, the most popular forms of payment on the Internet are actually cryptocurrencies. As a natural continuation of online payments, and regardless of the risks mentioned, the two companies can create their cryptocurrency "wallets" that will be used as legal entities. Namely, legal entities can agree which service will be used so that after the transaction the cryptocurrencies are transferred to the account of the bank, just like the standard currency. The system can be upgraded in the following way. Unlike the current system used by Bitcoin, banks and other financial institutions may be tasked for registering a blockchain variation, and the currency used may be some widely accepted *fiat* currency.

Using precisely blockchain technology, *Wells Fargo* and *the Commonwealth Bank of Australia* were participants in the first cross-border transaction between banks. It was this online transac-

tion that the transfer of cotton from China to the United States was paid (Kaye, 2016). These data confirm that it is not just a trivial invention limited to a narrow area, but a set of technologies that have a significant impact on the future of international trade.

An informal money transfer system that functions beyond formal financial systems for centuries is known as *hawala*. *Hawala* in the Middle East and Asia has for centuries been a developed system for financial transactions. This system has been introduced by Arab traders and caravan owners to ensure themselves from robbery. *Hawala* in Arabic language means transfer, and as an additional meaning, the term "trust" is added to it, which emphasizes how the system works. The essence of this system is the network of intermediaries - *hawaladars*. Namely, *hawaladars* transfer money quickly, in the highest trust, transactions are also performed in the most remote villages without any trace. This system, therefore, is based exclusively on mutual trust. So, *hawala* is the transfer of money without the physical change of the owner i.e. without the physical movement of money. Similarly, the process of blockchain *hawala* transactions takes place outside the control of the state and institutions in charge of control (El Qorchi, Maimbo, Wilson, 2003). On the other hand, the future of digital currencies can be jeopardized as a "consequence of traditional business practices in financial systems" (Hayes, 2017, p. 1309).

Similarly, imagine an example in which a woman born in Argentina is working in Canada. She goes to Western Union branch office every month with some cash to send money order to her mother in Buenos Aires, which costs about 10 percent of the transaction value, and it takes four to seven days for the money to arrive to her mother. Her mother does not know when the money will come. It takes her five hours a week to check if money is in the account. For illustration purposes, today the daughter "can use a blockchain application called Abra" (Larios-Hernández, 2017, 869). She can send $ 300 from her mobile phone. The information goes directly to her mother's mobile device and there is no intermediary. When a mother in Argentina receives a transfer notice, she can choose someone from a "cashier" who is licensed by Abra as they are registered as deliverers. A mother can choose a high rating deliverer (rating is given by other users of the application) to bring her pesos. The whole process "lasts a few minutes and costs only two percent of the transaction value " (Mansky, 2017, p. 514).

4. DISCUSSION

We pointed to the fact that cryptocurrencies allow disposal of money and its direction for various purposes without control or supervision. Accordingly, almost every cryptocurrency owner can use them to pay for what he/she wants and to whom he/she wants and to keep anonymity doing that. In this regard, there are authors who claim that cryptocurrencies are the ideal way for *hawala* money transfer. For example, a citizen of Bosnia and Herzegovina resides in Germany, but his residence visa expired which makes his residence in Germany illegal. Suppose he wants to send money to his mother. Given his status in Germany, he can not use the classic way of transferring money because he could be detected as a foreigner with an unlawful residence. To send

money he can contact the *hawala* agent X and give him the amount of money he wants to send to his mother in BiH. They can arrange a password for receiving money, and the intermediary will charge a certain commission to our citizen for his service. Therefore, some intermediary takes a certain commission and contacts another intermediary in BiH and informs him of the agreed passwords. The intermediary in BiH agrees to pay money to the sender's mother that he already has with him. The intermediary, therefore, gets in contact with the mother of the money sender. After hearing the agreed password from her, he hands her money and receives a certain commission for it. The described method of transaction is considered a basic model involving at least four participants. Along with this basic model, there are variations of models that include different numbers of participants, how to pay commissions, arranging delivery and passwords. However, the most important characteristics of the system is trust. Namely, "without the mutual trust between the participants, no money could be transferred at all" (Bunt, 2008, p. 116). More recently, anonymity and the lack of a written track is just a myth. Namely, since the communication between the intermediary and the user takes place "via telephone and using the Internet, a track still remains" (Bunt, 2008, p. 116). Besides that, an important characteristics of the system is that commission charged by intermediaries are lower than those charged by banks or other financial institutions. According to the above, the future of cryptocurrencies can be exactly as an advanced version of the described process without live intermediaries. Moreover, the son can use the fact that both he and his mother have simultaneous access to the Internet. Through Team Viewer software, which allows remote control using a password, he can have access to his mother's computer, he can transfer his cryptocurrencies into her wallet and change it for real money. The mechanism we have described is just one of the possibilities of sending and transferring money. Namely, the use of cryptocurrencies has become apparent in B2C (business to consumer) area. It is already clear now that significant steps forward will take place in B2B (business to business) business as well as in B2G (business to government) segment in the future, which is evident in the stated and announced cases of reported use of blockchains and cryptocurrencies. Therefore, one of the biggest contributions to the cryptocurrencies is the promotion of operational technology in the form of a blockchain. Blockchain, with automation, robotics, artificial intelligence and the Internet, could generate a new direction in the financial markets in terms of the new industrial revolution. Namely, FANG shares (*Facebook, Amazon, Netflix* and *Google*) already benefit greatly from blockchain technology, as well as some other sectors such as financial and health sectors. On the other hand, there are views that the collapse for investors in cryptocurrencies is inevitable and that they can expect the fate of every speculative balloon (Spitznagel, 2017).

Annual commissions for the transfer of money amount to more than 22 trillion dollars. Most of it is done through a service like Western Union. Commissions range from three to 12 percent of the value of the transaction, depending on the amount to be transferred, and it takes few days to get the money on the account. Digital money already allows significantly faster and cheaper transactions, which, along with existing technologies, is considered inevitable in the future. On the other hand, there are many examples of financial damage due to retention of utility due to anonymity. For example, the site "*sci-hub*" (a science hub) allows for free access or without subscription, scientific articles and journals. The founders of the site believe that the spread of science and truth should be available to all researchers. This site is funded by voluntary

donations exactly by cryptocurrencies, because the site is considered illegal.

Given that the supply of cryptocurrencies is almost unlimited and the demand uncertain, the long-term value growth is not sustainable. Even they suddenly lose value, which is a realistic scenario, cryptocurrencies have already offered a contribution to understanding the functioning of money, the benefits of using money, and in payment improvements. Similar to the fact that in the 20th century, the US dollar served as a global currency, often only because most people in the world believed that the US and its financial system would have the greatest chance of survival, cryptocurrencies too only have coverage in trust. The total value of all cryptocurrencies is only a few billion dollars and they exist as a protocol that is constantly executed. Therefore, they will exist in parallel with the existing currencies. Although their representation will be relatively small, they can be used as a billing tool, such as SDRs (special drawing rights) - which were designed as world money. Listed similarities are at the same time the only parallels of cryptocurrencies and transnational currencies, such as Euro or special drawing rights.

5. CONCLUSION

Experts in the field of economics, law, information technology and security deal with the phenomenon of cryptocurrencies. One of the motives that attracted advocates of technology, the Internet and investors in the beginning is the fact that cryptocurrencies are not subject to control by central banks or state agencies, but their value is determined by a lot of computers. Namely, cryptocurrencies are protected from inflation by a function that prevents their quantity to grow above a certain limit. The following characteristics of the cryptocurrencies, identified as an advantage, is the elimination of intermediaries, which makes the transactions cheaper - which has great application in international payments. The following advantage of cryptocurrencies that is emphasized is the fact that they are based on a decentralized system in which there is no regulatory authority. On the other hand, the biggest disadvantage, is precisely the decentralization, the anonymity of the users and the lack of a regulatory agency.

We have identified a large space for further research. First, there is insufficient research in the existing literature on the usability of cryptocurrencies and blockchain technology. We have identified papers that considered usability from the perspective of the user and from the perspective of the software developer. However, apart from the use of cryptocurrencies in financial markets, there is still room for the development and use of blockchain technology in the economy. In this regard, most of the current researches relate to Bitcoin, and rarely are they focused on other cryptocurrencies. Further research should focus on smart contracts and to increase knowledge beyond the cryptocurrencies. Namely, although the blockchain is represented in the cryptocurrencies environment, this idea can also be used in a variety of other situations. A further area for research exists in the fact that there are not enough high-quality publications on the use of cryptocurrencies and blockchains in the financial markets at the magazine level. Currently, most researches are published at conferences, symposiums and workshops.

Transfer of money based on cryptocurrencies does not rely on banks or other intermediaries which are used in modern systems. Therefore, cryptocurrencies can be used as a preferred way to transfer money. Accordingly, there are no high commissions or high costs. Accordingly, if the Securities Commissions and / or other agencies in charge of supervising financial transactions would support the establishment of funds and indexes related to cryptocurrencies, and would approve similar innovations or derivatives - the value of the cryptocurrencies would additionally increase. However, precisely the use of cryptocurrencies in international business points out their shortcomings. First, legal insecurity and the failure to accept cryptocurrencies by the regulator slows down the process of wider acceptance. At the same time, this process is hampered by frequent cases of cybercrime. In this regard, the security of the transactions itself is ensured by blockchain technology. It is precisely blockchain that, as a technology that would not come to attention if Bitcoin has not gained popularity, represents a significant factor in the development of financial markets. By adopting blockchain technology in business and international exchange, the possibility of widespread use of cryptocurrencies is gaining importance because companies would use cryptocurrencies more efficiently kicking out intermediaries. In addition, blockchain technology can be widely applied independently from financial markets such as keeping registers, various records, verifying health booklets, voting at elections, etc. However, the blockchain is only the first recorded attempt to control the sending of electronic money. Creating and maintaining a decentralized network is a complex task that requires much more resources (time, connectivity, and processing) than centralized networks. In accordance with the above, the ultimate range of cryptocurrencies is to simulate modern electronic clearing of a globally informatized society. Therefore, they only provide an interim solution, towards the wider use of decentralized databases and private money. At the moment when a certain problem arises that a currency can not overcome, its position will be taken by another currency, which will contain components that overcome this deficiency. That's exactly how the Internet functions. In case that a particular page or application on the Internet disappears, this would not lead to the disappearance of the Internet, but the second would soon appear instead.

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