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BITCOIN – A CHALLENGE FOR THE FINANCIAL MARKET

Summary
The money is a widely accepted commodity, by means of which it is possible to determine the economic value of purchased goods and services and make payments. Over the centuries, "money" has evolved many times. Their constantly changing character, generates questions on their future aspect. In the reference to the cryptocurrencies questions are focused on their nature and compliance with the definition of money.

Key words: *cryptocurrencies, bitcoin, trading market, electronic money*

JEL Classification: G1, E4

Introduction

Money is a widely accepted commodity by means of which it is possible to determine the economic value of purchased goods and services and make payments. Its appearance was the result of an increase in the scale of production and exchange of goods. Over the centuries, "money" has evolved many times, ranging from commodity money, gold, money, to electronic money based on technological solutions. For this reason, however, there is no generally accepted definition of money.

In the era of dynamic development of new technologies, electronic money represented by electronic impulses or bit strings takes on meaning. However, particular problems arise from interpretation problems regarding "cryptocurrencies", which results, inter alia, from the complexity of these instruments, both in legal and economic terms. Bitcoin, being one of the most recognizable representatives of

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cryptocurrencies, gained its popularity in the era of the global financial crisis in 2007-2011, expressing the form of opposition to the banking system, financial institutions and finally governments for the emergence of a crisis on world markets.

So what is BTC, who is its issuer, what financial institution controls the system of cryptocurrency, what is the changeability of cryptocurrency in time, and finally whether the cryptocurrency is the currency and falls within the definition framework of money, finally what are the limitations of Bitcoin as a means of payment from the perspective of the function of money. The answer to the above mentioned questions are challenges for the modern financial system.

1. Understanding cryptocurrencies

In the 21st century, the dynamic development of cryptocurrencies is observed. Despite their growing popularity, few people can still use them. There is also no uniform definition of cryptocurrencies. Hence, in the literature on the subject one can find a number of terms whose common feature is the concepts of cryptography. These terms indicate that they are distributed accounting systems, based on cryptography, which allow storing information about the holders' account holdings in contractual units[1]. Others state that it is a digital or virtual currency with a limited amount in circulation, using cryptographic solutions to ensure the security of transactions, beyond the control of the central authorities, and thus immune to government intervention or manipulation[2]. Still others define a cryptocurrency as a digital exchange medium that uses cryptography to secure processes related to generating units and conducting transactions[3]. Merriam Webster indicates that it is any form of currency, existing only in digital form, operating outside the central regulatory body, using a decentralized system to register transactions and managing the emission of new units as well as cryptographic solutions to prevent counterfeiting and unfair practices[4].

[1] https://pl.glosbe.com/pl/pl/kryptowaluta

[2] Investopedia, Cryptocurrency, [online:] https://www.investopedia.com/terms/c/cryptocurrency.asp

[3] Whatis.com, Cryptocurrency, [online:] http://whatis.techtarget.com/definition/cryptocurrency

[4] Merriam Webster, Cryptocurrency, [online:] https://www.merriam-webster.com/dictionary/cryptocurrency

Very often one can find the term that is an innovative, distributed accounting system, whose key element is the blockchain, which is an encoded cryptographic structure acting without the involvement of intermediary institutions responsible for the verification of transaction data, responsible for storing accounting entries, payments or transactions system participants[5]. Data of system participants are stored in its distributed nodes called "portfolios" (in the form of a transaction book file[6]), over which only holders responsible for portfolios of private keys have control[7]. Advanced cryptography is responsible for ensuring security policy of the system, related to the lack of possibilities counterfeiting, theft, double issue of units. The adopted cryptocurrency concept has their numerous advantages (although often the advantage for some may be perceived as a disadvantage to others), among others: increased resistance to cyber attacks[8], anonymity, independence, being out of control and supervision of domestic and international financial institutions[9].

Through his anonymous nature, cryptocurrency for many of its owners has become a synonym for freedom, and thus the possibility of using it for activities beyond the borders of the law, including money laundering or tax avoidance. Despite numerous interpretative discrepancies regarding the treatment of cryptocurrencies and national restrictions related to their use, both the number of cryptocurrencies (including Bitcoin, Ethereum, Dash, Monero, Zcash, Navc, Polcoin) and the crypto-currency market capitalization in the world is gradually increasing[10]. This is favored by the dynamic development of new

[5] Blockchain - a kind of decentralized and distributed database operating on the Internet, based on peer-to-peer (P2P) architecture and having no centralized data space.

[6] Information on recent transactions carried out on the network.

[7] Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System, 2017,* [online] https://bitcoin.org/bitcoin.pdf

[8] wolnosc24.pl,- *„Technologia ważniejsza niż Internet"*, the Ministry of Digitisation, [online] http://wolnosc24.pl/2017/02/18/ministerstwo-cyfryzacji-rozpoczyna-projekt-blockchain-umozliwia-funkcjonowanie-panstwa-nawet-w-czasie-okupacji-technologia-wazniejsza-niz-internet/

[9] Although the first application of blockchain technology was related to cryptocurrency bitcoin, nowadays this technology is used, among others on the Internet of things, decentralized accounting databases (Distributed Ledger Technology).

[10] Statista - The Statistics Portal, *Number of Bitcoins in circulation worldwide from 1st quarter 2011 to 3rd quarter 2017 (in millions),* [online] https://www.statista.com/ statistics/247280/number-of-bitcoins-in-circulation/

technologies, a strong trend leading to the virtualization of money and a departure from its traditional form, and a partial loss of social trust in the current monetary system. Stimulants of such a course of action are also striving to limitation of cash turnover costs, increase in the number of operations performed per unit of time, ensuring transparency of conducted operations.

2. Bitcoin and its understanding

In the literature on the subject, there are a number of definitions for the cryptocurrency called Bitcoin. For some, it is a payment and investment instrument, expressed in the form of an electronic record, operating in virtual space[11]. For others it is a decentralized, selected by the market internet currency, functioning on the basis of cryptography and using P2P[12] network technologies. One can also find the definition that it is a virtual money, composed of a sequence of zeros and ones stored on computer disks[13]. It also occurs as a money equivalent or a specific type of electronic money[14]. Commonly occurring terms of this phenomenon include "Cryptocurrency", "virtual currency" and finally "digital currency". These terms indicate the immaterial form of bitcoin and the scope of its functioning limited only to the Internet. A multitude of terms makes it difficult to understand this phenomenon, especially since some of them synonymously treat cryptocurrency and money. Bitcoin, which is one of nearly 1334 cryptocurrencies[15], is probably the most recognizable representative of its groups. It gained its popularity in the era of the global financial crisis in 2007-2011, expressing the form of opposition to the banking system, financial institutions and, finally, governments for the emergence of a crisis on global markets. Its presence on the currency market is also intensified by the dynamically progressing processes of networking the socio-economic life. The guiding thought of

[11] Piotrowska, A., *Bitcoin a definicja i funkcje pieniądza*, Annales Universitatis Mariae Curie-Skłodowska, Lublin-Polonia, Vol.XLVIII, 3, sectio H., 2014.
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[14] Tavan D., *A brave new bitcoin world*, The Banker, 2013.
[15] Cryptocurrency Market Capitalizations [online:] https://coinmarketcap.com /all/views/all/

its creators, under the pseudonym Satoshi Nakamoto, was to eliminate intermediaries from the process of making financial transaction[16]s. This innovative distributed transaction system allows contact between businesses and private individuals acting as a financial intermediary.

The bitcoin system uses the peer-to-peer network communication model, and uses the users' 'wallets' to store data, generated or purchased coins. There are many applications in virtual space that allow you to store cryptocurrency. Blockchain.info and Quandl.com are one of the more popular solutions. Bitcoin storage can be done either via the "wallet" application located on the user's computer or on external websites that store the portfolios of system users. Once the user registers in the system, his "portfolio" account is created in the distributed network structure and the public key assigned to him is the owner's identifier. This allows the network to verify the number of cryptocurrency units available to the user. The private key, however, remaining only in the possession of the user, is used to make transfers.

The execution of a Bitcoin transaction, consisting in overriding a unit of cryptocurrency to any holder of the bitcoin address (person), consists in adding to the bitcoin the public key (address) of the addressee and signing the transaction with the sender's private key. Then the transaction is advertised in the peer-to-peer network (as mentioned before the transaction uses the peer-to-peer communication model), allowing the remaining group of system users to verify the correctness of the digital signatures applied and the number of coins transferred. A positive verification result allows you to finally accept the transaction. The list of network transactions is public, allowing each participant of the system to view it. It should be emphasized that the address does not convey any information about the owner of bitcoin and is usually anonymous.

3. Bitcoin as the medium of exchange, payment and value meter

Money is a widely accepted commodity by which it is possible to determine the economic value of purchased goods and services and make payments. In the literature there are definitions indicating that it is an asset that stores purchasing power[17]. Other authors emphasize that this

[16] Nakamoto S., Bitcoin: *A Pear-to-Pear Electronic Cash System*, 2008, [online:] https://bitcoin.org/bitcoin.pdf

[17] Piaszczyński W., *Anatomia pieniądzai*, Script, Warszawa, 2004.

must be an asset with high liquidity[18] and predictable value[19]. Still other authors emphasize that it is a means of linking the present with the future[20], or everything that is commonly accepted as a payment for goods, services and repayment of debt[21]. You can also find definitions indicating that money is key an element of the financial system, acting as an integrator of economic entities and closely related to the money and capital market. From the point of view of economic theory, money is a rare commodity and commodity that is traded on financial markets. It is also a legally defined payment instrument associated with a real social product that can be both material and immaterial and used to express, store and convey values[22]. Contemporary money can be defined, among others through its functions and properties. The classic functions of money include: a value measure (means of value), a unit of account (register), legal tender (a means of transferring value), a medium of exchange (rotational), a means of storing values (means of thesaurization[23]). The literature also emphasizes that money is characterized by widespread acceptability, divisibility to smaller units and the difficulty to falsify. Against the background of the above the function will be further analyzed by cryptocurrency in order to assess whether it fulfills the classic functions of money and thus whether Bitcoin, as a representative of cryptocurrencies, can be considered to be money.

The first of the money functions - a measure of the value of goods and services - refers to the price category, which is the value of the goods expressed in cash. Money issuers act as guarantors of its stability through the monetary policy pursued, and the amount of currency held is equivalent to the amount of "owned shares" in all goods produced in

[18] Duwendag D, Ketterer K.H., Kosters W, Pohl R., Simmert D.B., *Teoria pieniądza i polityka pieniężna*, Poltext, Warszawa, 1995.
[19] Piaszczyński W., *Anatomia pieniądzai*, Script, Warszawa 2004.
[20] Keynes J.M., *Ogólna teoria zatrudnienia, procentu i pieniądza*, PWN, Warszawa, 1956.
[21] Mishkin F.S., *Ekonomika pieniądza, bankowości i rynków finansowych*, PWN, Warszawa 2002.
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a given economy[24]. Cryptocurrency is not valued, but only has a rate against traditional currencies, which can be valued many factors influence, among others decisions of politicians or state authorities (as was the case with MT Gox). Thus, the function of the value meter is not fully implemented by bitcoin and differs significantly from traditional money. The function of a payment instrument - one of the functionalities, which is an important value for users of the bitcoin system, is the possibility implementation of anonymous, cheap online transfers, verified immediately, using a global network and a peer-to-peer model. However, it should be remembered that according to the bitcoin assumptions, there is a limited amount of this cryptocurrency in circulation (21 million units). This means that a finite number of bitcoin units can lead (and lead) to an increase in the exchange rate and deflation of prices expressed in bitcoins, Figure 1.

Figure1. Average USD market price

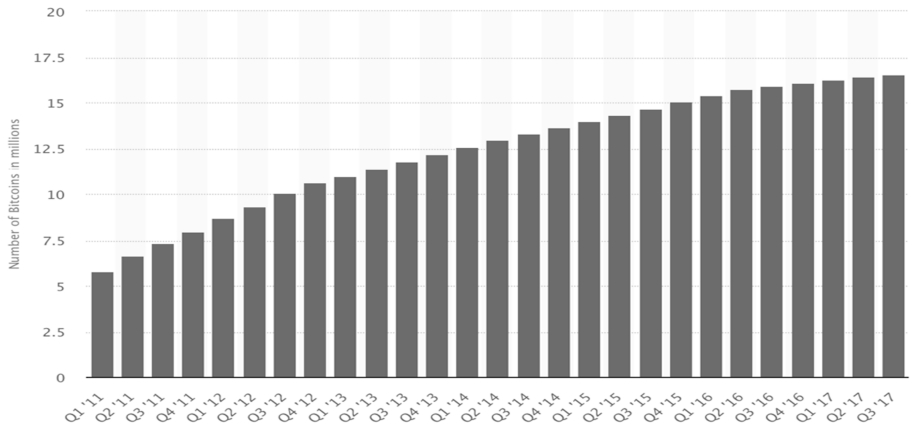
Source: blockchain.info

It can also make bitcoin susceptible to speculative attacks and price fluctuations, which in effect is not beneficial to contractors and their trade transactions. Thus, the function of bitcoin as a means of payment seems to be highly limited. Bitcoin as a value store does not show features that converge with traditional money. In itself, it also has no

[24] Michalik Ł., *Bitcoin – waluta wolnych ludzi czy pomysłowa piramida finansowa*?, Gadżetomania, 2012.

value, it only includes the speculative price of itself. Thus, it is not possible to assign a thesaurization function to us. On the other hand, bitcoin can be assigned the function of a medium of exchange because it is acquired for the purposes of exchange for consumer goods or production goods[25]. It is used in transactions between system users bitcoin for mutual transfer of goods and units of cryptocurrencies. It is also a rare good, which results from the algorithmically limited number of units in circulation up to 21 million items, Figure 2.

Figure 2. Crypto currency supply in the period Q1.2011-Q3.2017. Status on Q3.2017 - 16.6 million units



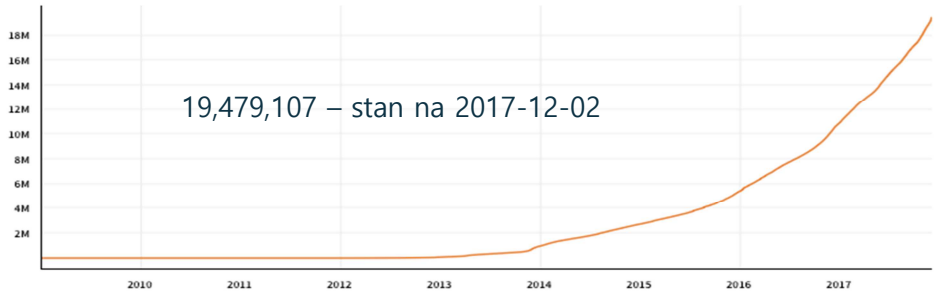
Source: (Statista, 2017)

It can be attributed to the easy transfer feature via an extensive Blockchain network and ATM devices (bitomats that enable buying crypto-valuables), divisions into smaller units through which transactions in the network are carried out and acceptability among Bitcoin system users. It seems controversial to attribute the universality of acceptance, since the number of system users is still relatively small, and goods purchased using bitcoin can also be purchased using other currencies, Figure 3.

[25] Mieses L., *Ludzkie działanie*, transl. Witold Falkowski, the Institute of Ludwig von Mises, Warszawa, 2007.

Assuming that the number of portfolios corresponds to the number of system users, their number based on data published by the Quandl.com portal by as of 12.2017, it reached only 19.5 million.

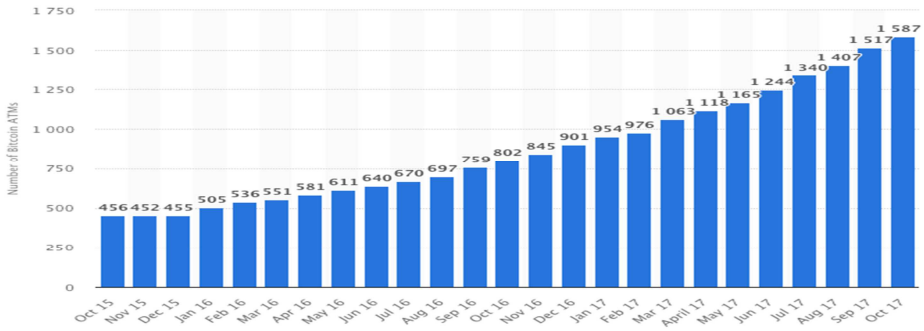
Figure 3. Number of Bitcoin wallet holders.



Source: (Quandl.com).

The amounts describing the number of bitcoin transactions on a daily basis are relatively small - 346,283 transactions (as at 02/12/2017 22:24:42) as well as the number of devices in the world accepting Bitcoin - 1,587 items[26]. However, it should be noted that a dynamic growing trend is observed, Figure 4.

Figure 4. The number of Bitcoin ATM devices in the world in the years 2015-2017



Source: the data based on the basis[27]

[26] The number of ATMs located only in Poland is 23,528 (according to website nbp.pl dated 02.2017).

[27] Statista - The Statistics Portal, Number of Bitcoins in circulation worldwide from 1st quarter 2011 to 3rd quarter 2017 (in millions), [online] https://www.statista.com/statistics/247280/number-of-bitcoins-in-circulation/

The treatment of Bitcoin as a standard investment value seems also doubtful. In the case of acquisition of standard investment securities, the investor maintains certain guarantees in the event of a decrease in their price (eg the possibility of waiting until the maturity of the debt in the case of bonds). Investments in bitcoins are called a particular type of gambling and are similar to investments in short-term contracts without a lower price limit.

It follows from the above that cryptocurrency is not fulfilling all functions of traditional money and should not be considered as such. It should also not be considered as electronic money, despite showing large similarities to this means of payment.

According to art. 2 point 2 of Directive 2009/110 / EC of the European Parliament and of the Council of 16 September 2009 on the taking-up and pursuit of electronic money institutions and supervision over their activities, electronic money means monetary value stored electronically, including magnetically, constituting the right to a claim against an issuer that is issued in exchange for cash in order to perform payment transactions as defined in art. 4 point 5 of Directive 2007/64 / EC and accepted by natural or legal persons other than the issuer of electronic money. Referring to the Polish market[28], the legislator in Article 2 (21a) of the Act on Payment Services precisely defined the concept of electronic money, indicating that it is "monetary value stored electronically, including magnetically, issued, with the obligation to buy it, in order to make transactions payment, accepted by entities other than the electronic money publisher[29]. The previously mentioned directive also indicates a closed catalog of entities authorized to issue electronic money: credit institutions (Article 4 (1) of Directive 2006/48 / EC), electronic money institutions, post office giro institutions (if they are entitled to issue electronic money in accordance with national law), national central banks and the European Central Bank if their role does not constitute them as monetary authorities or other public bodies, Member States or their bodies, if they do not act as public bodies. In the case of the Polish market, issuing electronic money requires obtaining the permission of the financial supervisory authority - the Supervisory Commission. It should also be added that in EU legislation, including

[28] The reference to the Polish market results from the research conducted by the author on this market regarding the development of cryptocurrencies.
[29] Jorna of laws 2016, items 1572, 1997, from 2017 item 1089.

Polish legislation, electronic money incorporates the right to a claim against the issuer for a specific monetary amount[30].

Unlike in the case of electronic money and traditional fiat currency, there is bitcoin issue process, which does not have one particular issuer. It remains outside the direct control of central financial institutions and without adequate economic support. Units of this cryptocurrency are created by the system automatically, in a manner planned in advance by the system's creators, based on the emission assumptions inscribed in the source code of cryptocurrencies. As a result of these activities, the number of bitcoins in circulation is a function of the nominal value of transactions performed and the said rigid limitation of the number of units in circulation[31]. It should be noted that standard currencies are manually controlled, allowing them to maintain their relative stability in the face of the changing market situation. Bitcoin, when automatically controlled, seems to be less resistant to market shocks. The response to market shocks also seems to be strongly limited and reduced only to further popularizing the system or, last but not least, to modify the bitcoin code. Bitcoin is not, unlike electronic money, issued for legal tender money. Therefore, it does not meet the provisions of the directive 2009/110/UE as well as the provisions of the Polish law on means of payment defining money.

Conclusions

The dynamically growing interest in cryptocurrencies results from many reasons, including transaction anonymity, relatively low risk of losing funds, speed of transaction execution, lack of or small commissions on transactions performed, independence from governments and banking systems. Reasons for this state of affairs are also seen in the loss of confidence in the current monetary system. The considerations made in the article clearly indicate that despite the growing popularity of cryptocurrencies and the often encountered equating them to money-especially electronic money-they do not fulfill the definition of both

[30] Directive of the European Parliament and of the Council 2009/110 / EC of September 16, 2009 on the taking up and pursuit of electronic money institutions and prudential supervision over their activities.

[31] The Bitcoin emission control mechanism assumes that their number in circulation can’t exceed 21 million units.

electronic money and money in general. It is not excluded that Bitcoin may become in the future money operating in modern economies, but due to the lack of its use value (it is empty money) or dependence on complementary capital goods, it is relatively unlikely that it will obtain a money title.

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