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MODERN CONCEPTS ON THE ECONOMIC ESSENCE OF CRYPTOCURRENCY: BITCOIN CASE STUDY

The development of a new technological mode led to the emergence of a new concept – «cryptocurrency». The purpose of the study is to reveal its economic essence by determining key influence factors. Methods used are description, analysis, modeling, hypothetical and ideographic methods. Relevance of the study is proved by modern growing trends at cryptocurrency markets and appearance of the draft on Federal Law «On digital assets» in Russia.

The author suggested definition of the cryptocurency using asset approach. It was substantiated by analysis of main money functions on the example of Bitcoin (BTC) according to Marx and marginal utility school. Its economic benefits are expressed in the return received through a rise in price. Bitcoin also fits the definition of an investment asset.

Analysis of the BTC exchange rate proved that the cryptocurrency market, like many others, is influenced by news background. Moreover, fifteen other factors were analyzed and regression model was made that passed statistical tests. Only 3 explanatory variables – number of transactions, Google queries for BTC and Wikipedia BTC page views – were significant with coefficient of determination about 95%. Empirical results confirmed that traditional macroeconomic indicators do not influence the rate and no standard market model is suitable for predicting it.

Keywords*: cryptocurrency, cryptocurrency market, Bitcoin, exchange rate, regression.*

The development of a new technological mode, information and communication electronic technologies led to the emergence of a new concept – «cryptocurrency». This phenomenon exists at the junction of two coordinate systems: computer technologies and economics. That is why it is widely studied in the academic literature on computer science and cryptographic field as well as is examined by financial bodies such as the Federal Reserve System and European Central Bank.

The popularity of cryptocurrencies has reached record-breaking scales today. Demand for «digital» money exceeds supply, some countries have already recognized them as an official means of payment or assets, and regulators in many countries, including Russia, show considerable interest in cryptocurrencies. Significant event is appearance of the draft on the Federal Law «On digital assets» in Russia. All these facts definitely raise awareness on cryptocurrency and the problem of its essence becomes particularly acute.

Despite rapid growth of popularity, there is no single and recognized worldwide definition of cryptocurrency that would unequivocally reveal its essence and economic nature. The spread of opinions is wide enough: from financial pyramid synonym to analog of commodity and gold.

In the economic scientific literature there are two basic approaches to determine the meaning of cryptocurrency.

On the one hand, it can be considered as a means of payment and substitute for universally recognized and used currencies, as scientists see a great potential in cryptomarket and blockchain-technology that is actually unique transaction database without centralized management.

R. Satran highlights that having no intrinsic values, alternative currencies turned into billion dollar markets and may be exchanged into products and services all over the world [12]. The study from the European Central Bank suggests that the use of digital currencies like Bitcoin (BTC) is only expected to grow in the near future [13]. Daniel Folkinshteyn calls Bitcoin an oasis of financial remittance [4, p. 2]. Nicholas A. Plassaras regards it as a serious economic phenomenon that is even able to threaten financial stability and international commerce in future [11, p. 3].

From another point of view, the phenomenon of cryptocurrency can act as a means of value storage and investment asset, having speculative feature [5, p. 4].

Paul Krugman, awarded with Nobel Prize in economics in 2008, considers it as an «evil» matter that plays an effective tool in speculators' hands. D. Yermack from Cambridge National Bureau notes that Bitcoin became more than a curiosity and gives a wide outlook why cryptocurrencies fail to conform to the classical properties of a currency [14].

Bitcoin's critics including well known financial authorities like W. Buffett, dismiss cryptocurrencies as a «mirage». He compares them with cheques as method of money transmission. According to him, both have no value.

Analysts from Goldman Sachs warn investors about future dramatic drop of most cryptocurrencies. According to them, rapid rise fueled by enormous investments will follow crash of bubble even bigger that it was during tulip mania or dotcom era.

Instead of the term «cryptocurrency», European regulators use «virtual currency». They define it as digital representation of value that are issued and controlled by their developers are used and accepted by members of a particular virtual community. In some circumstances virtual currency can be used as an alternative to money. But the European Central Bank highlights that it is not money or currency from a legal perspective. According to the official site, Bitcoin, in particular, is said to be «a speculative asset» and «it is not the ECB's responsibility to ban or regulate Bitcoin or other cryptocurrencies». Taxation of cryptocurrency transactions is carried out in accordance with the national legislation of the EU member states, depending on their nature. The only exception is the value added tax: Bitcoin's purchase and sale for fiat currencies are not subject to it.

In terms of the Russian legal regulation, cryptocurrencies are still beyond the law. The fact is that the very concept of cryptocurrency is not named among the objects of civil rights under Art. 128 of the Civil Code of the Russian Federation.

An attempt to equate the cryptocurrency with money in view of obvious substantial similarity and apply the corresponding legal institution by analogy also turns out to be unsuccessful.

All money is treated as property by the legislator, while cash is related to things and non-cash - to other property. According to Part 1 of Art. 75 of the Civil Code:

- ruble is the unit of currency in the Russian Federation;
- the Bank of Russia has an exclusive right for money issuance;
- foundation and issuance of other money is not allowed.

In accordance with Art. 140, ruble is a legal tender mandatory for acceptance at face value in the territory of the Russian Federation. The procedure and conditions for foreign currency use are defined by the Federal Law No. 173-FZ of December 10, 2003 «On currency regulation and currency control». According to it, foreign currency shall mean:

a) paper currency in the form of bank notes, treasury notes and coins which are in circulation and which are legal means of payment in cash in the territory of the appropriate foreign state (a group of foreign states), as well as the said money being withdrawn or withdrawn from circulation but subject to exchange;

b) funds kept on bank accounts and as bank deposits in monetary units of foreign states and in international monetary units or units of accounts.

Thus, cryptocurrencies cannot be attributed to either Russian or foreign currency, being a kind of monetary surrogate. At the same time, as defined by Art. 27 of the Federal Law No. 86-FZ of July 10, 2002 «On the Central Bank of the Russian Federation (Bank of Russia)», the introduction of other monetary units in the territory of the Russian Federation and the issuance of money surrogates are prohibited. Such uncertainty is worsened by ambiguous information signals from various state bodies and officials.

In February 2018 the Ministry of Finance has published a draft federal law «On digital financial assets». According to it, cryptocurrencies will be treated as property in electronic form. It is emphasized that digital asset is not a legal means of payment in the territory of the Russian Federation. Money or other digital assets can be exchanged only by specialized legal entities that correspond to the large list of criteria introduced by the new law.

Moreover, for individuals there will be a severe restriction of 50 thousand rubles. Cryptocurrency purchased for this amount is no longer a secret for community. It will be tied to an electronic wallet. Now, it is difficult to imagine how the things will be realized in practice. Probably, such systems as «Yandex-money», «QIWI» and others will create a separate wallet for cryptocurrency.

Any mining (activity on earning cryptocurrency by ensuring functioning of cryptocurrency platforms) will be defined as an entrepreneurial activity even on minimal scale. So, mining without an entrepreneur status will be recognized illegal. All miners will be obliged to pay taxes under the current legislation.

The key decision is to remove anonymous transactions completely. Under the new law, cryptocurrency markets must disclose full information about beneficiaries and even about individuals making deposits. Anonymous transactions are recognized as law violation.

Obviously, the new law will not be supported by the cryptocurrency community. Its paragraphs introduce total record and control, so the very idea of anonymous transactions loses its main essence and attractiveness. Supporters of the cryptocurrency always consider its decentralization and independence but with this legal framework all the advantages are offset. Also, the new law will actually eliminate private miners. Every year mining results in less earnings. In terms of taxation, business will be profitable only on industrial scale.

Without diminishing importance of the contributions of the theories and opinions mentioned above, it should be noted that there is a need for a more comprehensive, succinct, universal approach to the definition of the cryptocurrency as a financial category reflecting its real economic nature.

In this connection, considering the Ministry of Finance of Russian Federation and European Central Bank experience in this issue and their characteristics of cryptocurrency, the following definition may be proposed: cryptocurrency is a type of digital financial asset created and accounted for in the ledger by its participants and used and accepted by members of a particular virtual community.

The appearance of the cryptocurrency phenomenon is certainly close to the idea of money denationalization proposed by F. Hayek [6, p. 88]. It is about necessity to transfer the freedom principle to money circulation and, as a consequence, deprivation of government of the monopoly right to emit money. In the process of competition between private institutions, people will choose the most convenient medium for exchange and accumulation.

And now cryptocurrencies are appearing incredibly fast on historical scales. Naturally, in attempts to understand the phenomenon, reveal how it should be treated and what the risk management issues with cryptocurrency are, it is necessary to explain why it does not relate to the concept of money.

As for economic characteristics of money, there is an approach based on K. Marx's theory [9, p. 93]. In his main work «Capital» he revealed five functions of money:

- measure of value;
- means of circulation;
- storage of value;
- means of payment;
- world money – universal means of payment.

A later approach based on views of the marginal utility school reduces the number of functions to three [10, p. 168]. They are: medium of exchange, unit of account and storage of value. Under a medium of exchange they understood use of money for purchases of goods and services, as well as for paying debts (means of payment). As for unit of account, money measures and compares the value of various goods and services. Money as store of value is an asset that is retained after the sale of goods and services and provides purchasing power in the future.

Let us take Bitcoin – the most popular and capitalized cryptocurrency – for example. Notably, cryptocurrencies other than BTC are often called «altcoins». Most of them are traded against Bitcoin making it kind of reserve currency in the digital world.

The first function relates to it rather nominally. Deflation makes difficult to use it as a medium of exchange. The realization that tomorrow the value of money will increase can greatly diminish desire to give them away for something. The use is possible only for those who really trust in Bitcoin and use the network for goods and services payment. Moreover, Bitcoin prices may differ on numerous crypto-exchanges.

It is also inconvenient to use Bitcoin as a unit of account because of limited supply and danger of deflation. If salary is paid in Bitcoin, then, as it will go up in time, the workforce will also go up in price (usually, contracts are signed for a certain period of time and indicate nominal salary). This situation will make producers to save on labor force that could lead to a serious unemployment problem.

As a storage of value, Bitcoin is beyond competition and surpasses usual fiat money by all parameters. And negative inflation even allows getting a certain return without depository placement. But in this case, Bitcoin is characterized by very high volatility – its value can change dramatically in short and long term.

As the world money, Bitcoins are absolutely not suitable - a sharp increase in international commodity turnover should be accompanied by an increase in the money supply. Otherwise, the lack of working capital will impede the economy. Simply put, there should be an opportunity to quickly print the amount of money necessary for the economy. But Bitcoin does not allow this. No one can control issuance. By the way, it was the reason why the gold standard was abolished: when the world economy needed a lot of dollars due to rapid growth of turnover, it was necessary to cancel backing dollars with gold. In a short time, it was simply impossible to get enough gold for this. Besides, cryptocurrency has limited international use because of differences in attitude and legislation all over the world.

Thus, Bitcoin is a specific means of payment that performs some functions of money and has some cash characteristics (irreversibility and partial anonymity) but in the full sense is not the money. Having failed meeting the economic criteria of money, Bitcoin and cryptocurrency in general could be called asset instead. Obtained as a result of mining or ICO, cryptocurrency goes under control of a new owner. It does not generate cash flow but can be converted into cash (maybe with some difficulties). Its economic benefits are expressed in the return received through a rise in price. Bitcoin also fits the definition of an investment asset: tangible or intangible items obtained for producing additional income or held for speculation in anticipation of a future increase in value [8, p. 94].

No doubt, the cryptocurrency market, like many other assets, is influenced by the news background – even being decentralized, it is affected by state policy and economic events. The state can affect Bitcoin by sending negative signals to the financial market. Even the news about intention to impose restrictions on monetary circulation can topple the exchange rate by dozen percent.

In addition, the state can regulate the sphere where cryptocurrency is in contact with fiat money, namely, crypto-exchanges, investment funds and other financial institutions that provide services in the cryptocurrency market. States can also prohibit legal entities from accepting Bitcoin as payment for goods and services, and citizens – from paying with Bitcoins. For example, in 2013 the People's Bank of China banned Bitcoin transactions for financial institutions that led to a natural fall by more than $300. The state can even introduce criminal liability for operations with cryptocurrencies and their mining. It can go the other way - to create its own, alternative to Bitcoin, cryptocurrency. In this case, it is not a ban but a competition in money markets. Even being local and spread to single countries, these events influence the exchange rate worldwide.

What else can affect the price of cryptocurrency? As Bitcoin is completely decentralized, macroeconomic fundamentals may not affect its exchange rate. But on the other hand, like any other asset, BTC price is formed due to the interaction of supply and demand. Demand can be expressed through the number of transactions made with the help of Bitcoin – money approach – or the number of trades aimed at buying cryptocurrency – asset approach. Supply is assumed to be the number of Bitcoins in circulation [1, p. 75].

Concerning absence of long-term «buy-and-hold» strategy speculative behavior of investors can also influence the price. If there are players on the market ready to buy cryptocurrency, the exchange rate will constantly grow. But if a sharp rise is observed, it implies activity of market «pumpers» – the largest market participants owning significant assets that are able to quickly buy up currency and thereby raise the price to maximum [2, p. 24]. On the other hand, the price depends on popularity, as well as good news and advertising as it was proved before. The more people know about the features of a particular asset, the more they want to invest money in it. For this purpose, in this paper, we investigate the impact of Google search queries and the number of views of the Bitcoin webpage on Wikipedia [3, p. 1800].

Cryptocurrency is not isolated from other economic phenomena which influence can not be completely excluded [7, p. 1319]. Such indicators can be exchange rates of fiat currencies, stock indices, for example, S&P 500 and Euro Stoxx 50, prices for oil, gas and gold. In addition, indicators of economic and financial development can be added. In this paper, world monthly consumption of steel is chosen. A more common and widespread annual GDP indicator can not be applied to relatively young phenomenon of cryptocurrency market that appeared only in 2009 while steel consumption has also been considered an indicator of industrial development.

Thus, an empirical model was composed and hypothesis about the effect of the 15 factors (X1–X15) on the BTC exchange rate (Y) was suggested using monthly data set. These factors are: world crude steel production, Mt; crude steel production in China, Mt; US dollar exchange rate, Euro; EUR exchange rate, SDR; crude oil price, USD per barrel; natural gas price, USD per Million Metric British Thermal Unit; gold monthly price, USD per Troy Ounce; S&P 500; Euro Stoxx 50; Bitcoin trading volume, million BTC; number of trades per minute; number of transactions, million; Google queries for BTC; Wikipedia BTC page views; total Bitcoins (given by order).

Results of correlation analysis is presented below (figure 1).

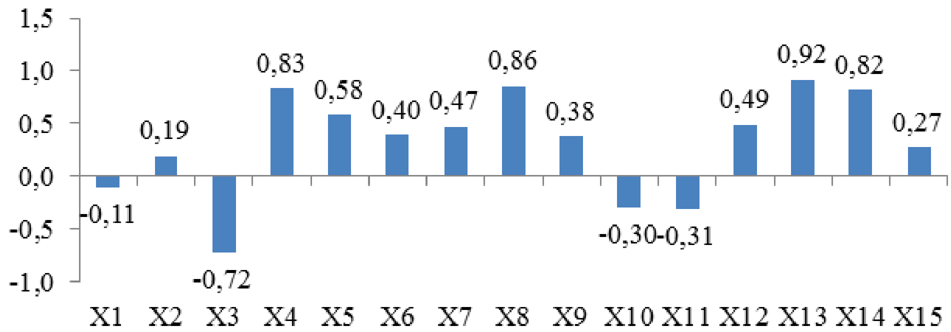

Figure 1. Correlation coefficient (against Y) for external explanatory variables

The choice of external explanatory variables was based on their importance concerning the issue. The series used for the study were taken from the regular reports of World Steel and Index Mundi, stock exchanges, the official site of Blockchain technology and resources devoted to the historical data of Bitcoin. The monthly indicators from 2015 to 2018 were analyzed.

As a result of the regression analysis, the determination coefficient R^2 was 94.7%; in other words, fluctuations of the selected variables lead to a change in the Bitcoin price in 95% of cases.

A regression was constructed with the following form:

$$Y = 369.9 * X12 + 363.7 * X13 - 0.0055X14 - 1366.7,$$
$$R^2 = 94.5, F = 203.9$$

The graph with predicted BTC value is given below (figure 2).

Empirical results confirm that market forces of supply and demand have an impact on the BTC price as well as speculation of investors (number of transactions, Google queries for BTC, Wikipedia BTC page views). But traditional macroeconomic indicators do not influence the rate. Actually, no standard market model is suitable for predicting the exchange rate of Bitcoin. It makes the cryptocurrency potential but very risky tool for diversification.

All in all, cryptocurrency and Bitcoin in particular seem to be an example of niche assets that is used by a narrow group of people because of legal limitations. With enormous capitalization that could be compared with large investment banks it differs from traditional

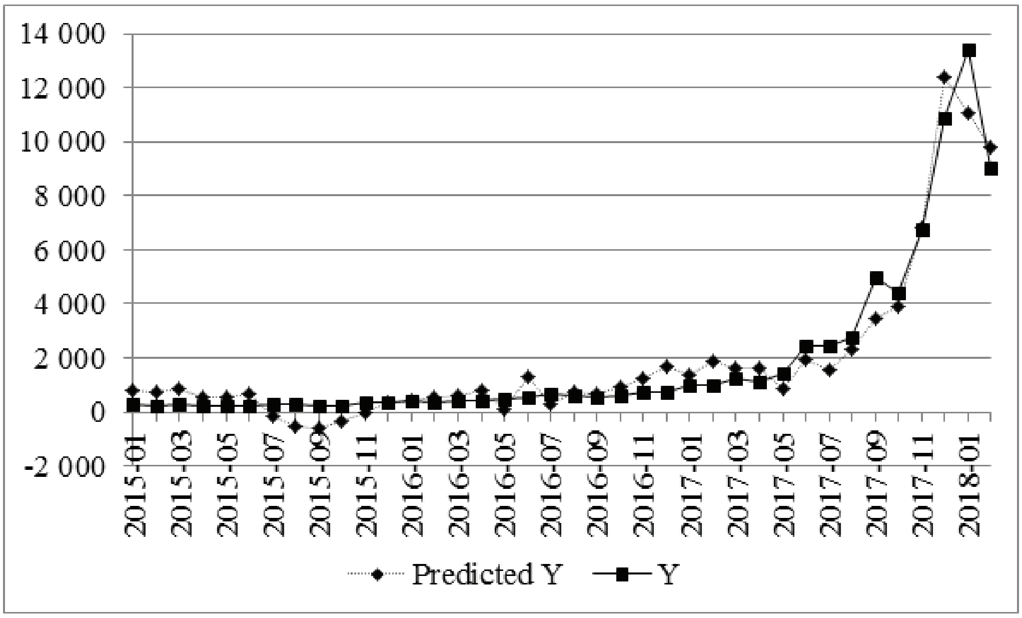

Figure 2. Predicted Y-values

assets: its value depends only on people's expectation. Investors extrapolate past price trends into the future, giving little thought why exactly this trend should continue. For Bitcoin a possible way to mature is to be brought into the centre of regulated space. A negative event, such as a price crash leading to public protests, could trigger a regulatory crackdown on Bitcoin. Perhaps, with its wider adoption volatility will fall.

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