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CRYPTOCURRENCY MARKET TRANSFORMATION DURING THE PANDEMIC COVID-19

Svitlana Volosovych

D.Sc. in Economics, Professor of the Department of Finance, State University of Trade and Economics, Kyiv, Ukraine;
 ORCID: [0000-0003-3143-7582](https://orcid.org/0000-0003-3143-7582)

Antonina Sholoiko

D.Sc. in Economics, Associate Professor of the Department of Insurance, Banking and Risk-management, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine;
 e-mail: sholoiko@ukr.net
 ORCID: [0000-0003-1239-4281](https://orcid.org/0000-0003-1239-4281)
 (Corresponding author)

Liudmyla Shevchenko

Candidate of Philological Sciences, Associate Professor of the Department of Foreign Languages, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine;
 ORCID: [0000-0002-4543-3876](https://orcid.org/0000-0002-4543-3876)

ABSTRACT

The pandemic and subsequent changes in various spheres of human activity have also transformed consumer behavior, particularly in the cryptocurrency market. The article is aimed at identifying the priority directions of transformations taking place in the cryptocurrency market in the conditions of the Covid-19 pandemic under the influence of certain groups of factors. System and network approaches to understanding the cryptocurrency market have been identified. The cryptocurrency market is considered from a functional and institutional point of view. From a functional point of view, the cryptocurrency market is a set of economic relations in cyberspace regarding cryptocurrency mining, initial coin offering (ICO) and circulation of cryptocurrencies based on the laws of supply and demand. From an institutional point of view, the cryptocurrency market is a set of participants in virtual currency schemes who carry out cryptocurrency transactions. The following signs of cryptocurrency market segmentation are justified such as those depending on the market capitalization of the cryptocurrency; on the nature of the crypto asset's movement; on operations carried out on the market; on the region; on consumers of services. Factors that influence the functioning of the cryptocurrency market are systematized according to the following groups: macroeconomic, price, environmental, geographic, market, behavioral and technological. The influence of gold, oil prices, the daily number of Covid-19 cases and deaths from Covid-19, the MSCI ACWI global stock index, the iShares MSCI All Country Asia ex Japan ETF, the Wilshire 5000 Total Market Index on the Bitcoin exchange rate is revealed. The trends in the cryptocurrency market development in the post-war period are justified, namely the growth of investors' interest in cryptocurrencies against the background of the initial coin offering collapse; growth of payments in cryptocurrencies; strengthening the regulatory landscape on a global and national scale; integration of the cryptocurrency market with traditional finance; attracting non-typical participants to the cryptocurrency business; expansion of participants in the infrastructure of the cryptocurrency market due to the rapid cryptocurrency market development, in particular, due to the production of equipment for its operation.

Keywords: cryptocurrency, Bitcoin, mining, crypto assets, cryptocurrency business

JEL Classification: E49, E51, P44, O31

INTRODUCTION

The Covid-19 pandemic, declared by the World Health Organization, created challenges not only for the health sector, but also affected sales, production, logistics, and unemployment. The pandemic and subsequent changes in various spheres of human activity have also transformed consumer behavior, particularly in financial markets. The uncertainty caused by the COVID-19 pandemic is contributing to the increased volatility and unpredictability of financial markets. Due to the increased access to high-speed Internet, the consumers' propensity for digital financial services and currencies is growing. This gives a powerful impetus to the development of the crypto economy, a component of which is the cryptocurrency market. The pandemic accelerated the digitalization of financial transactions (Mazaraki et al., 2021; Volosovych et al., 2021) and reduced cash circulation. And although the pandemic is currently causing certain problems in the functioning of financial systems, it is likely that in the long term, it may have a positive effect. Both consumers and providers of financial services are beginning to realize the potential of using FinTech tools. At the same time, cryptocurrency is gaining more and

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more popularity in financial transactions. Cryptocurrency, the impetus for which was created by the financial crisis of 2008, received an increase in interest from consumers of payment services during the pandemic crisis. Changes in traditional financial markets push investors to diversify their portfolios at the expense of cryptocurrency. In particular, the fall in the rates of traditional financial assets in the context of the pandemic contributes to the growth of interest in cryptocurrencies among institutional and individual investors due to the need for a reliable asset so as to preserve value and the ability to make payments. The sharp increase in demand for financial services with cryptocurrency creates the basis for various transformations in all segments of the cryptocurrency market.

LITERATURE REVIEW

The growing popularity of cryptocurrencies is causing the expansion of the virtual money market (Volosovych & Baraniuk (2018)). The significant volatility of cryptocurrencies during the pandemic increases the public's interest in carrying out transactions in the cryptocurrency market with the aim of receiving income, despite possible financial losses. Nowadays, the term "cryptocurrency market" appears in many publications. However, its application is often limited to its use in the title of articles without analyzing its essence (Ji et al., 2019; Lahmiria & Bekiros, 2020; Noda, 2020).

In scientific literature and regulatory acts, more attention is focused on the content of cryptocurrency. Regarding the essence of the cryptocurrency market, few researchers have paid attention to this issue. In our opinion, system and network approaches to defining the cryptocurrency market can be distinguished. Within the first approach, Mnif E., Jarbou A., Mouakhar K. (Mnif et al., 2020) understand cryptocurrency markets as complex systems based on speculation, within which investors interact on the basis of certain strategies, and it generates certain biases, conditioning endogenous instability. But here the emphasis is on the secondary cryptocurrency market, without mentioning the primary one. At the same time, attention is focused only on investment activities in the cryptocurrency market. Kuznyetsova A., Sydorchenko, T., Zadvorna, O., Nikonenko, U., Khalina, O. (2021) analyze the use of bitcoin and ethereum cryptocurrencies in the field of e-commerce in Ukraine. T. Zhelyuk and O. Brechko (2016) somewhat expand the system approach, regarding the cryptocurrency market as a system that combines into one whole all the elements that ensure the release (emission) of cryptocurrencies and their circulation according to the laws of supply and demand among the participants of this market. Here it should be taken into account that cryptocurrencies appear on the primary market due to their mining or initial placement of coins (Initial coin offering, ICO). Understanding the cryptocurrency market within the system approach makes it possible to state that it is a component of the financial market, of course, with a specific object, participants and relationships among them. David Vidal-Tomás (2021) equates the cryptocurrency market with the cryptocurrency network. Taking into consideration that cryptocurrency and transactions with it are possible only in cyberspace, this approach follows a certain logic, despite the fact that the market and the network differ somewhat in their structural elements (Podnos, 2016) and functions.

Based on the above, the cryptocurrency market can be considered from a functional and institutional point of view. From a functional point of view, the cryptocurrency market is a set of economic relations in cyberspace regarding cryptocurrency mining, initial coin offering (ICO) and circulation of cryptocurrencies based on the laws of supply and demand. From an institutional point of view, the cryptocurrency market is a set of participants in virtual currency schemes who carry out cryptocurrency transactions. In February 2015, the European Central Bank defined a virtual currency as a digital representation of value not issued by a central bank, credit organization, or electronic money institution, which can in some cases be used as an alternative to money ECB (2015). To characterize the mechanism of transactions with virtual currencies, the European Central Bank used the term "virtual currency scheme(s)", which has two aspects. On the one hand, it shows the value, on the other hand, it demonstrates integral or built-in mechanisms that ensure the transfer of this value ECB (2015).

The COVID-19 pandemic affected all areas of human life, in particular, the cryptocurrency market, where according to the research conducted in 2020-2021, it caused:

- increasing volatility. Thus, Lahmiria S. & Bekiros S. (2020) found that the pandemic has a stronger impact on the cryptocurrency market in this context than on international stock markets, in particular, the stock market;
- the growth of its effectiveness, which is proved by the results of research by Mnif E., Jarbou A., Mouakhar K. (2020). At the same time, Noda A. (2020) notes that the level of efficiency of the Bitcoin market is higher than the level of efficiency of Ethereum and that cryptocurrency markets with greater liquidity have achieved greater development. At the same time, Mnif E, Jarbou A., Mouakhar K. (2020) state that Bitcoin was the most effective before the pandemic; and after the outbreak of COVID-19, Ethereum turned out to be more effective due to the fact, that the spread of the pandemic increases the effectiveness of all cryptocurrencies;

- there is a convergence between cryptocurrencies with clear technological functions and classifications against the background of changes in the market microstructure behavior and the introduction of Bitcoin futures contracts by the Chicago Exchange N., Koutmos D., Payne J. (2021).

AIMS AND OBJECTIVES

The article is aimed at identifying the priority directions of transformations taking place in the cryptocurrency market in the conditions of the Covid-19 pandemic under the influence of certain groups of factors.

Objectives include revealing the influence of gold, oil prices, the daily number of Covid-19 cases and deaths from Covid-19, the MSCI ACWI global stock index, the iShares MSCI All Country Asia ex Japan ETF, the Wilshire 5000 Total Market Index on the Bitcoin exchange rate.

METHODS

To establish the relationship between the daily rate of Bitcoin (Finance, 2021) and the prices of gold (dollar per troy ounce) (Gold, 2021), oil (dollar per barrel) (Eia, 2021), the number of cases of Covid-19 and deaths from Covid-19 (Pkgstore, 2021), MSCI ACWI (Sg, 2021), iShares MSCI All Country Asia ex Japan ETF (Finance, 2021a), iShares Core MSCI Europe ETF (IEUR) (Finance, 2021b), Wilshire 5000 Total Market Index (Finance, 2021c), iShares MSCI China ETF (Finance, 2021d) the Granger test was used. The research period was from January 1, 2020, to September 7, 2021, the time when the pandemic began and reached its peak. The choice of this period was due to the beginning of the pandemic and its greatest spread, which allows to identify or refute cause-and-effect relationships. The Granger test gives the possibility to define the null hypothesis "X is not the cause of Y". The criterion for accepting the hypothesis is the P-value (if P is less than 0.05, then the null hypothesis is rejected). A reverse check is simultaneously carried out. Granger tests were performed for 15 lags. The Granger causality calculation was carried out in the Spyder software environment.

RESULTS

The development of the cryptocurrency market in the conditions of the Covid-19 pandemic varies according to its segments. The segmentation of the cryptocurrency market is not clearly traced in the scientific literature. The Research and Market study carried out in 2020 was based on the segmentation of the cryptocurrency market according to the following criteria: geography, design goals, and market capitalization (GlobeNewswire, 2020). In 2021, the market is segmented on the basis of applications, products and components, technologies, geography Research and Markets (2021). Markets and Markets (2021) offers to analyze the cryptocurrency market according to end-user industries; programs used; cryptocurrency type; cryptocurrency profitability and geographic location of markets.

Table 1 represents the systematization of the mentioned approaches with the authors' clarifications and additions to the existing criteria for the cryptocurrency market segmentation and its types.

Table 1. Segmentation of the cryptocurrency market. (Source: compiled on the basis of [33, 43])	
Segmentation criteria	Market segment
Depending on the market capitalization of the cryptocurrency	<ul style="list-style-type: none"> Bitcoin market (BTC) Ethereum market (ETH) Binance Coin market (BNB) Dogecoin market (DOGE) XRP market Tether Market (USDT) Cardano Market (ADA) Market of other cryptocurrencies
Depending on the nature of the crypto asset's movement	Primary market of cryptocurrencies
	Secondary market of cryptocurrencies
Depending on the operations carried out on the market	<ul style="list-style-type: none"> Mining ICO Exchange cryptocurrency market OTC cryptocurrency market
	<ul style="list-style-type: none"> Mining Payments Trade Investments Transfer
Depending on the region	<ul style="list-style-type: none"> Global cryptocurrency market Regional cryptocurrency market
Depending on the consumers of services	<ul style="list-style-type: none"> The segment of clients-individuals Segment of corporate clients

As can be seen from Figure 1, during July 2016 to June 2021, the global cryptocurrency market grew. This trend is especially clear during the Covid-19 pandemic. Thus, if on July 24, 2019, this indicator was USD 235.5 billion, then on July 29, 2020, it showed USD 274.4 billion and on June 20, 2021, there was an increase up to USD 1.3 trillion (bln) (Coinmarketcap, 2021). At the same time, it is expected that due to the application of blockchain technology and the growth of venture capital investments, the global cryptocurrency market will grow to USD 2.2 trillion (bln) dollars USA in 2026 (Research and markets, 2021). Figure 1 shows that during 2016-2022 the Bitcoin market was the leader in capitalization. The second position is confidently occupied by Ethereum. Other cryptocurrencies from the TOP-5 in 2022, compared to 2021, slightly changed their positions.

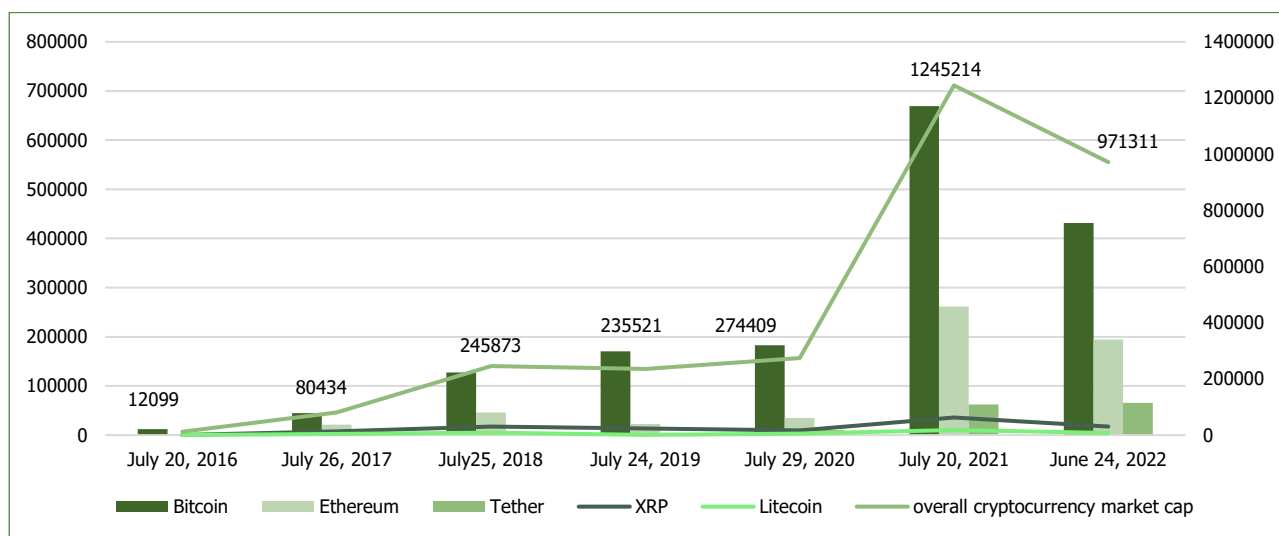


Figure 1. The market capitalization of the global cryptocurrency market and top 5 cryptocurrencies during 2016-2022. (Source: built on the basis of [11])

The development of the cryptocurrency market is influenced by a system of various factors. Ji Q., Bourid E., Roubaude D., Kristoufek L. (2019). emphasize the interdependence of the energy, commodity, and cryptocurrency markets. In our opinion, the factors influencing the cryptocurrency market functioning can be divided into the following groups:

- macroeconomic;
- price;
- ecological;
- geographical;
- market;
- behavioral;
- technological.

Figure 2 shows the specifics of the cryptocurrency market functioning in pandemic conditions. Thus, there is a significant transformation of the macroeconomic environment, reinforced by social distancing and quarantine restrictions, which led to a drop-in world and domestic gross products, production, household incomes, and an increase in inflation. Undoubtedly, this has a powerful impact on all areas of human life as a whole and on the formation of the cryptocurrency market landscape.

The price factors influencing the cryptocurrency market include:

- the price of gold;
- exchange rate of certain national currencies, in particular, the USD;
- electricity price;
- prices for cryptocurrency mining equipment.

Zhu Y., Dickinson D., Li. J. (2017) found that the most significant influence on the Bitcoin rate in the pre-pandemic period was the price of gold and the rate of the USD due to the fact that they have the same trend in the short term and different trends in the long term. The findings of their research showed that the prices of gold and Bitcoin decreased because of

the growth of the US economy and the strengthening of the USD, which causes a decrease in the public interest to invest in gold (Zhu et al., 2017). Electricity and equipment prices are related to cryptocurrency mining costs. The process of producing cryptocurrency coins got its name by analogy with the mining of gold or other minerals. Thus, miners are compared to prospectors when selecting the right combination of numbers for the crypto coin formation. Miners are not cryptocurrency issuers in the legal sense of the word, as they have not been authorized by anyone to create the currency. The energy consumption of this type of activity tends to increase. Thus, in 2018, according to some estimates, about 67 terawatt-hours per year were consumed during Bitcoin mining, as it was approximately done by the population of the Czech Republic with more than 10 million people (Malanov & Lurie, 2019). Already in 2019, this indicator amounted to 73 terawatt-hours, which can be compared with the electricity consumption by the population of Austria with a larger population (Kuzyuk, 2019). Mining requires powerful computers that consume a lot of electricity. As a result, the cost of electricity in the country is an important factor affecting the profitability of this activity. The most profitable is mining in Venezuela, where mining 1 bitcoin costs USD 531 (Zakon, 2018), which is explained by the fact that the state subsidizes electricity generation.

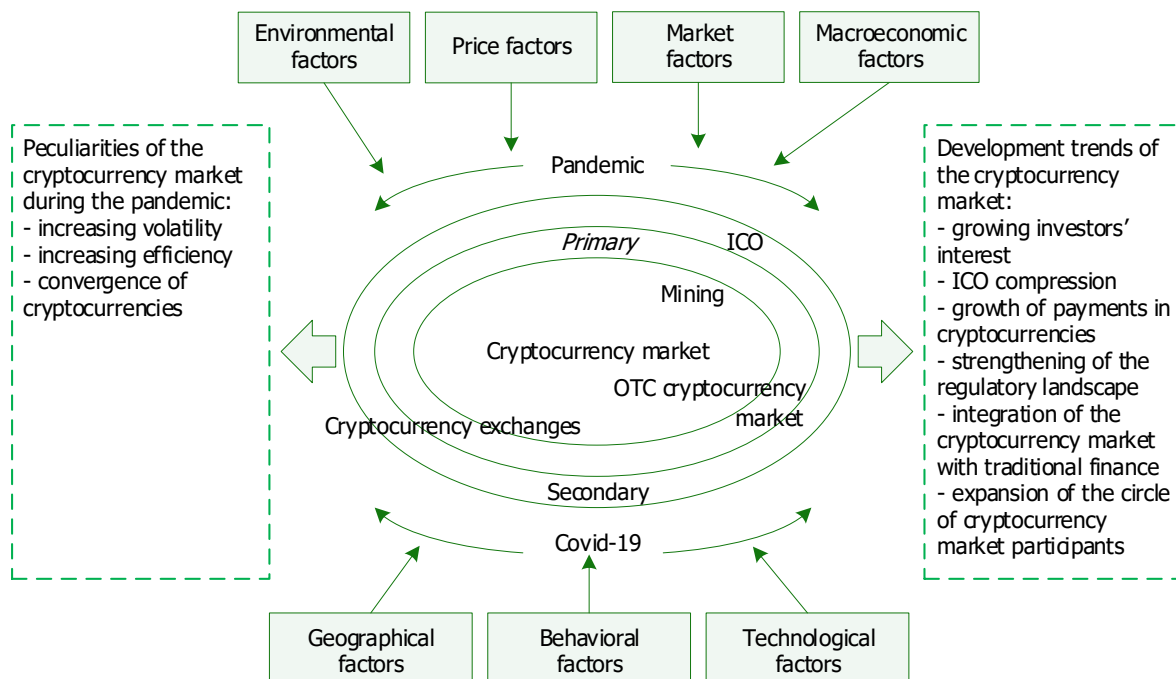


Figure 2. The specifics of the cryptocurrency market functioning in the conditions of the pandemic.

Geographical risks relate to the concentration of mining and equipment manufacturing in China. The largest manufacturers of Bitmain, Canaan Creative and Ebang cryptocurrency mining equipment are located in this country. This may lead to a crisis in this component of the cryptocurrency market.

Although the concept of the cryptocurrency virtual nature dominates today, its destructive impact on the environment is observed due to the consumption of significant amounts of electricity during mining. Even though the physical damage at the site of the mining farms is minimal, the indirect environmental damage due to the consumption of electricity is not controllable in contrast to economic entities involved in the extraction of minerals or a certain type of production. A 2020 study by researchers at Dublin City University, Trinity College Dublin, and the University of Southampton found that cryptocurrency mining is a factor affecting prices in the electricity and utility markets (Laurent, 2021).

According to some estimates, thermal power plants that produce energy for mining emit about 35 tons of CO₂ into the atmosphere annually, or about 308 tons per Bitcoin transaction (Kuzyuk, 2019). Only 28% of the energy consumed in global cryptocurrency mining is produced from renewable sources (Kuzyuk, 2019). The largest contribution to environmental pollution is made by Chinese miners, whose share in carbon dioxide emissions is 47%. Although China's role in CO₂ emissions into the atmosphere should decrease, given that in 2007 the share of thermal power plants operating on coal was 80%, and by 2040 they are planned to be reduced to 40%, as currently in Germany (Kuzyuk, 2019). Additionally, according to some estimates, Bitcoin mining could increase the Earth's temperature by 2° by 2033 (Hightech, 2018). The negative impact of cryptocurrency mining on the environment is uneven. In countries with a significant share of coal-fired power plants, pollution levels are higher, particularly in China. In Iceland and Norway, where nearly 100% of all energy

production is renewable, cryptocurrency miners take advantage of cheap hydroelectric and geothermal energy to power their machines. Low temperatures in Nordic countries cause cost reductions as a result of the natural cooling of computer servers. In 2020, according to a Cambridge University study, about 39% of the electricity used in Bitcoin mining is generated from renewable sources (Hazlewood, 2018). It should also be noted that specialized equipment is used for mining, in particular, reserve blocks that require annual renewal. As a result, about 11,500 tons of hazardous e-waste are generated annually (Howson, 2021).

Among the market factors which influence the functioning of the cryptocurrency market, such factors as the stock market, the supply of cryptocurrencies, and the effectiveness of operations carried out on the market should be highlighted.

Volatility in financial markets causes the transformation of investments from shares to safer savings, in particular, cash and gold. Although Bianchi D., Guidolin M. & Pedio M. (2020), Kuznyetsova A., Sydorchenko, T., Zadvorna, O., Nikonenko, U., Khalina, O. (2021) insist on the absence of a systematic influence of such factors as the stock market and the gold market, in the conditions of the pandemic, a certain connection is still observed. The results of research by Arias-Oliva M., Pelegrín-Borondo J., Matías-Clavero G. (2019) show a significant influence on the decision to invest in cryptocurrency due to the expected effectiveness of this operation.

A powerful factor influencing the state of the cryptocurrency market is the supply of cryptocurrencies, in particular, Bitcoin. Halving the reward for adding a new block when mining bitcoins, which is determined by the halving procedure embedded in the network protocol, slows down the process of creating new blocks. On May 11, 2020, the third bitcoin halving took place, which reduced the mining reward from 12.5 bitcoins per block to 6.25 bitcoins. After 21 million Bitcoins are created (estimated in 2140), their mining will be stopped. In the context of the pandemic, due to the increasing efficiency of cryptocurrency markets compared to the gold market, and the limited supply of Bitcoin, cryptocurrency becomes a powerful investment tool capable of protecting against the volatility of the stock market and becomes a digital form of value preservation (Harper, 2020).

Yang H. (2019) investigated behavioral anomalies in cryptocurrency markets, noting that due to the lack of regulation in the cryptocurrency market, operations of a speculative nature, which can be characterized as asset pricing anomalies from the standpoint of the behavioral theory, are carried out. Matselyukh N. (2016, p.53) defines price anomalies as persistent deviations of the prices of financial instruments from the predicted ones, the size of which allows for generating excess profits. Based on the classification of price anomalies proposed by Raghuraj P. & Das S. (1970), it can be assumed that their impact on the cryptocurrency market is enhanced by the fact that it is characterized by volatility and significant profitability in pandemic conditions.

Technological factors affecting the cryptocurrency market should include technology changes; conditions that facilitate operations on the financial market, and technical capabilities of national energy systems.

Unlike physical goods, changes in technology affect the prices of cryptocurrencies. In July-August 2017, the price of Bitcoin was negatively affected by controversy about changing the basic technology to improve transaction times. After the changes were completed, the price of Bitcoin rose from USD 2,700 up to USD 4000 in just two weeks. Conversely, reports on hacking often lead to lower prices (Mazer, 2021). The results of the research conducted by Arias-Oliva M., Pelegrín-Borondo J., Matías-Clavero G. (2019) testify to the significant influence of conditions that facilitate the implementation of transactions in the financial market on the decision-making process regarding transactions with cryptocurrency. The technical capabilities of national power systems to support mining will not be able to provide the miners' need for electricity under certain conditions. The growth of cryptocurrency mining may, according to various estimates, lead to an energy crisis. Thus, in June 2019, Iran blocked cryptocurrency mining due to problems in the energy market.

The application of the Granger test made it possible to establish that the course of Bitcoin in the conditions of the Covid-19 pandemic during January 2020-September 2021 largely depends on the prices of gold, oil, the daily number of patients with Covid-19 and deaths from Covid-19, the index world shares MSCI ACWI, iShares MSCI All Country Asia ex Japan ETF, Wilshire 5000 Total Market Index. At the same time, the Bitcoin exchange rate influenced the price of gold (Table 2).

Table 2. Results of the pairwise Granger test for all variables for 1.01.2020-7.09.2021 (rows are Y-variables, and columns are X-variables). (Source: calculated on the basis of [14; 15; 16; 17; 18])

	Rate BTC/USD	gold price, \$/o.z.	crude oil WTI, \$/br.	daily worldwide new covid cases	daily worldwide new covid deaths	MSCI ACWI	iShares MSCI All Country Asia ex Japan ETF	iShares Core MSCI Europe ETF	Wilshire 5000 Total Market Index (US stock market)	iShares MSCI China ETF (MCHI)
Course BTC/USD	1	0.523	0.6381	0.2101	0.0653	0.103	0.0278	0.0938	0.1	0.0276
Gold price, USD/o.z.	0.7382	1	0.2894	0.2746	0.1144	0.013	0.121	0.0005	0.0322	0.1462
Crude oil WTI, USD/br.	0.0002	0.0049	1	0.0263	0.0005	0	0	0	0	0.0078
Daily world- wide new covid cases	0	0	0	1	0	0	0	0	0	0
Daily world- wide new covid deaths	0	0	0	0	1	0	0	0	0	0
MSCI ACWI	0.1308	0.0122	0.0047	0.0979	0.0275	1	0.022	0	0.028	0.3996
iShares MSCI All Country Asia ex Japan ETF	0.463	0.026	0.0244	0.0131	0.0012	0	1	0.0005	0	0.0551
iShares Core MSCI Europe ETF	0.0174	0.0571	0.0895	0.0342	0.01	0	0.1414	1	0.0001	0.3245
Wilshire 5000 Total Market Index	0.2361	0.0052	0.0071	0.1204	0.026	0.1034	0.0805	0.0011	1	0.482
iShares MSCI China ETF (MCHI)	0.0916	0.008	0.2043	0.025	0.0059	0.0008	0.0063	0.0025	0.0003	1

Of course, the specifics of the cryptocurrency market development during the pandemic will to some extent shape its post-covid landscape with the continuation of certain trends. Among the development trends of the cryptocurrency market, in our opinion, it is worth highlighting:

- growing investors' interest in cryptocurrencies due to the ICO collapse;
- growth of payments in cryptocurrencies;
- strengthening of the regulatory landscape on a global and national scale;
- integration of the cryptocurrency market with traditional finance;
- expansion of participants and infrastructure of the cryptocurrency market, due to the rapid cryptocurrency market development, in particular, the production of equipment for its operation.

DISCUSSION

Despite the instability and high level of risk of cryptocurrency transactions, investors continue to invest in crypto assets during the pandemic. Research in behavioral finance suggests that people tend to convert all liquid assets into cash to be prepared for a future crisis (Muhn, 2020). After reaching a market value of USD 1 trillion, Bitcoin has gained popularity among the largest Wall Street banks and Fortune 500 companies (Browne, 2021). In May 2021 the oldest American bank Bank of New York Mellon Corp. declared its readiness to carry out transactions with cryptocurrencies in the interests of its clients (Mind, 2021). Due to the weak correlation of cryptocurrency with traditional and alternative asset classes in the conditions of the pandemic, it becomes an ideal diversifier of the investment portfolio. A study conducted by the Frankfurt School of Finance and Management and the German company Iconic Holding, which carries out cryptocurrency operations, proves that having 1-5% of cryptocurrency in an investment portfolio will not only bring additional profits but also significantly increase the Sharpe ratio and profitability (Muhn, 2020).

The growing interest of investors, in particular, institutional investors, in cryptocurrencies in the context of the pandemic influenced their rate increase. According to forecasts of JPMorgan, against the background of bitcoin's competition with gold as a potential protection of investments against inflation in the conditions of the pandemic, the bitcoin rate may rise to USD 146,000 (Browne, 2021). The information about Tesla's USD 1.5 billion investment in Bitcoin (Biers, 2021) raised its rate to a record. At the same time, with the sale of 10% of bitcoins in the amount of USD 272 million at the end of March 2021, Tesla earned a profit of USD 101 million, which affected the growth of the company's quarterly profit by 27 times, which in turn determined the growth of its exchange rate (Prime, 2021). In early June 2021, the value of Bitcoin decreased by 3% after a short message by Elon Musk on Twitter, containing the word Bitcoin, its image and a broken heart (Ixbt, 2021), which once again confirms the influence of behavioral factors on the cryptocurrency market. There are suggestions that the enthusiasm of cryptocurrency investors may have some social impact. Thus, 94% of German investors who have invested 50-75% of their net assets in Bitcoin report a deterioration in personal relationships due to their investment (Lulay, 2021).

In the post-COVID period, the trend of interest in cryptocurrency payments should continue. Although approximately 60% of Bitcoin is owned by individuals or companies that have never sold more than 25% of their Bitcoin, and only 19% of Bitcoin is used for trading (Bambrough, 2020), cryptocurrency payment services have begun to expand significantly during the pandemic. Thus, PayPal stated that it allowed its users to make payments in Bitcoin as well as other cryptocurrencies such as Ethereum and Litecoin (Sotinel, 2020). At the same time, Tesla announced its readiness to accept cryptocurrency from buyers of its electric cars (Biers, 2021). In May 2021, American collection car auction company Mecum Auction began accepting payments in Bitcoin, Bitcoin Cash, Ethereum, Dogecoin and stablecoins USD Coin (USDC), Dai (DAI), Gemini Dollar (GUSD), Paxos Standard (PAX) and Binance USD (BUSD) via BitPay (Thepaypers, 2021a). In July 2021, Hong Kong-based The Pavilions Hotels and Resorts, which partners with global cryptocurrency payment gateway Coindirect, enabled its customers to pay for hotel reservations using Bitcoin, Ethereum and 40 other virtual currencies 24/7 (The Paypers, 2021b).

The Consumer Adoption Report 2021 "Cryptocurrencies in Retail" compiled by CryptoRefills Labs Big Dream Ventures BV states that 63% of cryptocurrency buyers use it to make payments (of which 35% do so weekly and 40% monthly), while 72.4% of users believe in the further spread of crypto payments in the future (Cabuk & Silenzi, 2021).

The Covid-19 pandemic will accelerate the integration of the cryptocurrency market with traditional finance. In June 2021, the Spanish bank Banco Bilbao Vizcaya Argentaria (SABBVA.MC) said it was starting to provide Bitcoin trading and storage services to private banking clients in Switzerland, where it operates through a franchise. SABBVA.MC limits these services exclusively to Switzerland, motivating it by the appropriate level of regulation of cryptocurrency transactions in this country due to the significant demand for such services. From July 2021, the American pension fund ForUsAll, which manages assets in the amount of more than USD 1.7 billion for more than 70,000 employees of small and medium-sized businesses, in cooperation with the cryptocurrency platform Coinbase, created the opportunity to invest up to 5% of employee retirement funds in Bitcoin and Ethereum within the Alt 401 (k) pension plan. The fee will be 0.5% for transactions and crypto assets management (Khatri, 2021).

The expansion of payments in cryptocurrency, increased investors' interest and the inclusion of cryptocurrency operations by banks in their services to some extent have caused the transformation of the global and national regulatory landscape. The Basel Committee on Banking Supervision noted that the growth of cryptocurrency risks, despite their limitations for banks, may result in increased risks of fraud, cyber-attacks, money laundering and terrorist financing. To prevent global financial instability, in June 2021 it proposed a two-pronged approach to capital requirements for crypto assets held by banks, which caused Bitcoin to rise by 1.5% (Jones & Wilson, 2021).

El Salvador has become the first country in the world to accept Bitcoin as a legal means of payment amid warnings from many central banks about the risks of cryptocurrency transactions (Bbc, 2021). Meanwhile, in May 2021 the National Internet Finance Association of China, the China Banking Association and the China Payment Clearing Association in a joint statement banned financial institutions and payment companies from providing services related to cryptocurrency transactions and warned investors against speculative cryptocurrency trading (Aljazeera, 2021). Argentina's tax authority has ordered cryptocurrency exchanges to submit data on their customers' transactions in monthly reports. Exchanges must identify the owners of cryptocurrency accounts and report on open accounts and the movement of funds to them on a monthly basis (The Paypers, 2021c). Due to the strengthening of global and national regulation of the cryptocurrency market, its participants are adapting their strategies of behavior on the market. Their associations are being created to protect the interests of crypto investors, and former employees of financial regulators are being hired. Thus, the cryptocurrency exchange Coinbase, together with the investment companies Fidelity Investments, Paradigm and the financial

provider Square, created the “Crypto Council for Innovation” association. The policy of lobbying the interests of cryptocurrency exchanges is now actively pursued by cryptocurrency market players in India (Asokan, 2021).

The rapid development of the cryptocurrency market also led to the expansion of its infrastructure, in particular, the production of equipment for its operation. According to some data, the global market for cryptocurrency mining equipment will grow by USD 2.8 billion by 2024 (Rahul, 2021).

The pandemic contributed to the attraction of non-typical participants to the cryptocurrency business. Thus, in particular, in Vietnam, Internet cafe owners, due to the suspension of their activities as a result of quarantine restrictions, began to use computer equipment for mining cryptocurrencies (THG, 2021).

CONCLUSIONS

This study reveals the priority directions of cryptocurrency market transformations against the background of the Covid-19 pandemic under the influence of various factors. In order to identify structural changes in the cryptocurrency market in the conditions of the Covid-19 pandemic, its segmentation was carried out depending on the market capitalization of the cryptocurrency; the nature of the crypto asset’s movement; operations carried out on the market; on the region; on consumers of services. At the same time, it was facilitated by the cryptocurrency market analysis in the functional and institutional aspects.

To illustrate the transformational processes taking place in the cryptocurrency market due to the increased volatility and unpredictability of financial markets, such groups of factors influencing its development as macroeconomic, price, environmental, geographic, market, behavioral and technological were identified.

This analysis proved the dependence of the exchange rate of Bitcoin, as the largest cryptocurrency by capitalization, in the conditions of the Covid-19 pandemic during January 2020-September 2021, on the prices of gold, oil, the number of daily detected cases of Covid-19 and deaths from Covid-19, the index of world shares MSCI ACWI, iShares MSCI All Country Asia ex Japan ETF, Wilshire 5000 Total Market Index. At the same time, the Bitcoin rate affected the price of gold. The results are proved on the basis of Granger test calculations.

The revealed specificity of the cryptocurrency market development during the pandemic made it possible to formulate the following trends of the cryptocurrency market development in the post-COVID period, in particular, the growth of investors' interest in cryptocurrencies due to the ICO collapse; growth of payments in cryptocurrencies; strengthening the regulatory landscape on a global and national scale; integration of the cryptocurrency market with traditional finance; attracting non-typical participants to the cryptocurrency business; expansion of participants and infrastructure of the cryptocurrency market, due to the rapid cryptocurrency market development, in particular, the production of equipment for its operation.

In conclusion, the cryptocurrency market in pandemic conditions creates both challenges (environmental, regulatory, consumer protection) for society and opportunities for further development of financial services as well as integration of the cryptocurrency market with the traditional financial system.

Further efforts should establish new measures to limit the impact of cryptocurrency risks on the functioning of financial systems.

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Волосович С., Шолойко А., Шевченко Л.

ТРАНСФОРМАЦІЯ КРИПТОВАЛЮТНОГО РИНКУ В УМОВАХ ПАНДЕМІЇ COVID-19

Пандемія та викликані нею зміни в різних сферах життєдіяльності людини трансформували й поведінку споживачів, зокрема й на криптовалютному ринку. Метою є виявлення пріоритетних напрямів перетворень, що відбуваються на криптовалютному ринку в умовах пандемії Covid-19 під впливом певних груп чинників. Виявлено системний та мережеві підходи до розуміння криптовалютного ринку. Запропоновано розглядати криптовалютний ринок із функціональної та інституційної точок зору. Обґрунтовано ознаки сегментації криптовалютного ринку: залежно від ринкової капіталізації криптовалюти; від характеру руху криптоактивів; від операцій, що здійснюються на ринку; від регіону; від споживачів послуг. Систематизовано чинники впливу на функціонування криптовалютного ринку на основі виокремлення таких їх груп: макроекономічні, цінові, екологічні, географічні, ринкові, поведінкові, технологічні. Виявлено вплив на курс Bitcoin-цін на золото, нафту, щоденної кількості захворілих на Covid-19 та померлих від Covid-19, індексу світових акцій MSCI ACWI, iShares MSCI All Country Asia ex Japan ETF, Wilshire 5000 Total Market Index. Обґрунтовано такі тенденції розвитку криптовалютного ринку в постковідний період, як зростання зацікавленості інвесторів криптовалютами на тлі згорання первинного розміщення монет; зростання платежів у криптовалютах; посилення регуляторного ландшафту в глобальному та національному масштабі; інтеграція криптовалютного ринку з традиційними фінансами; залучення до криптовалютного бізнесу нетипових учасників; розширення учасників інфраструктури криптовалютного ринку, зумовленого бурхливим розвитком криптовалютного ринку, зокрема виробництва обладнання для його функціонування.

Ключові слова: криптовалюта, біткоїн, майнінг, криптоактиви, криптовалютний бізнес

JEL Класифікація: E49, E51, P44, O31