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THE CRYPTOCURRENCY MARKET AS REFLECTED BY INDIVIDUAL US INDUSTRY STOCK INDICES AS A FACTOR IN THE DEVELOPMENT OF SMALL AND MEDIUM-SIZED ENTERPRISES

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Abstract: Economic development presupposes a stable connection between various sectors of the economy and individual business entities. Such a connection is possible using stock market instruments. Currently, among the stock market instruments, cryptocurrency and stock indices are distinguished. The dynamics of the corresponding quotes helps to understand the development of the market, the time of favorable entry into the market and much more. Based on this, the work examines the dynamics of individual components of the cryptocurrency market and stock indices. The results obtained are confirmed by graphs and diagrams.

Key words: Cryptocurrency, Stock indices, Stock market, Small and medium enterprises, Comparative analysis, Dynamics

INTRODUCTION

The sustainable and successful development of various economic entities is largely determined by the interconnection of individual sectors of the economy [1], [2]. In modern economic conditions, the stock market with its variety of securities plays a special role. Here we should highlight the cryptocurrency market and industry markets.

The cryptocurrency market makes it possible to attract the necessary resources for the implementation of startups, which are widespread among small and medium-sized enterprises [3]-[5]. This market has its own characteristics and a variety of individual types of instruments. Studying it helps to understand the general dynamics of the stock market and make appropriate investment decisions. Industry segments of the stock market contribute to the detailing of possible connections between business entities and the formation of packages of proposals for investment. For these purposes, various stock indices are used [6]-[8]. The dynamics of stock index quotes allows us to analyze individual market segments, understand the relationship between such components in order to enter the securities market and make appropriate investment decisions.

Mutual analysis of the dynamics of cryptocurrency quotes and stock indices is one of the tools for formulating strategies for the development of small and medium-sized enterprises. Therefore, the topics of such research are important and relevant in both theoretical and practical aspects. To study the dynamics of cryptocurrency quotes and stock indices, you can use both traditional methods of analyzing economic data [9]-[23] and non-standard approaches [24]-[34], which allow you to obtain additional information or use new directions for studying data. In this

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case, an important aspect is the mutual analysis of data dynamics, which requires the use of special methods and approaches.

Thus, the main goal of this work is to study the dynamics of quotes of cryptocurrencies and stock indices. To uncover such a goal, it is necessary to consider a number of related works and identify a data set for their study.

Related work

The subject of this research is constantly in the focus of attention of scientists and practitioners. Let's look at some of these works to help determine further interest.

C. Alexander and M. Dakos conduct a comprehensive and critical analysis of data on the cryptocurrency market [35]. The study presents an analysis of literary sources and markets where different types of cryptocurrency are circulated. The mutual dynamics of various stock indices is also considered. Particular attention is paid to various currency pairs and Bitcoin. This allows us to better understand the impact of cryptocurrency quotes on the sustainability of economic development, including small and medium-sized enterprises.

J. Liang, L. Li, W. Chen and D. Zeng explore the relationship between cryptocurrency, foreign exchange and stocks [36]. First of all, the authors review analytical information that helps to understand cryptocurrency as a financial asset. The paper compares the dynamic characteristics of cryptocurrency with two traditional and widely used financial assets: foreign currency and stocks [36]. For these purposes, the following properties of such data series are studied: volatility, centrality, clustering structure, reliability and risk. As a result, it was shown that the dynamics of cryptocurrency are more similar to the dynamics of stocks [36]. This justifies the topic of our research.

Y. Yue, X. Li, D. Zhang and S. Wang consider the impact of cryptocurrency on the economy [37]. This analysis is carried out on the basis of relevant literature, which examines the economic effects of cryptocurrency. The authors examined 1,850 articles between 2013 and 2020. As a result, it was shown that such studies are focused on: the impact of technology on an economic phenomenon, technological progress in overcoming the negative economic consequences of cryptocurrency, the creation of a new payment system using basic technologies, and assessment of the economic results of cryptocurrency. Based on this, the authors conclude that the macroeconomic effects of cryptocurrency, the mechanism of influence of cryptocurrency and legal digital currency are the basis for future research.

W. Yiying and Z. Yeze conduct cryptocurrency price dynamics [38]. Artificial intelligence algorithms are used for these purposes.

At the same time, S. Buyrukoğlu uses deep learning methods to study the dynamics of cryptocurrency quotes [39].

The study [40] carried out a general analysis of the cryptocurrency market and identified trends in its development. Particular attention is also paid to the socio-economic issues of misconduct and the sustainability of cryptocurrency.

In [41], the Hurst method is used to analyze cryptocurrencies. This allows us to obtain new estimates of the dynamics of such quotes.

Thus, the cryptocurrency market plays an important role both in the development of the stock market and in the functioning of various business entities. Bitcoin is usually used as the underlying asset of cryptocurrencies. At the same time, comparison of Bitcoin quotes is possible

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with various stock indices. It should also be noted that various methods and approaches are used for appropriate analysis.

Dynamics of quotes for the data under study

Based on the logic of this work, we will consider the dynamics of Bitcoin and some industry stock indices for the US stock market. In Fig. 1 shows the dynamics of quotes for Bitcoin and Dow Jones Transportation (DJT).
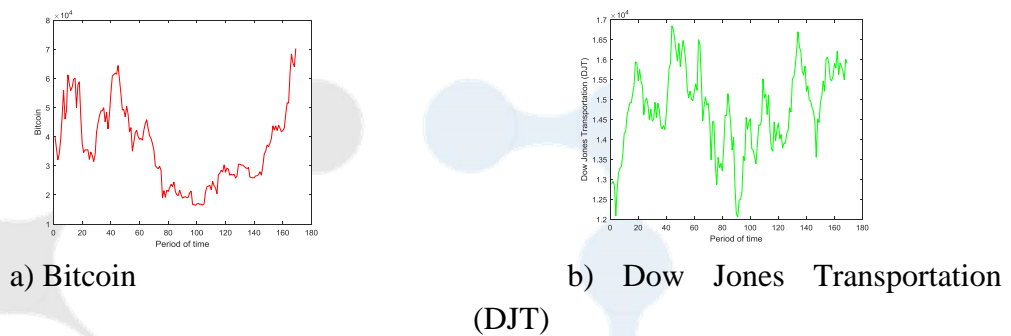

a) Bitcoin   b) Dow Jones Transportation (DJT)

Figure 1: Bitcoin and Dow Jones Transportation (DJT) quotes

In Fig. 2 shows the dynamics of quotes for Dow Jones Consumer Goods (DJUSNC) and Dow Jones Technology (DJUSTC).

a) Dow Jones Consumer Goods   b) Dow Jones Technology

Figure 2: Dow Jones Consumer Goods (DJUSNC) and Dow Jones Technology (DJUSTC) quotes

In Fig. 1 and Fig. 2 presents data for the period 01.03.2021-03.24.2024 in their weekly averaging. All data from investing.com. At the same time, it displays the dynamics of quotes for a number of industry stock indices, where small and medium-sized enterprises may be concentrated.

The dynamics of Bitcoin quotes over the time interval under study has a protracted period of price decline. After this, there was a sharp increase in quotes. This is understandable and typical for the cryptocurrency market. Before the period of declining Bitcoin prices, there is also instability in price dynamics. Here it should be noted both periods of growth of such quotations and periods of their decline. In general, we can talk about significant volatility in Bitcoin quotes in certain periods of time. This makes it difficult to assess their changes in order to predict and develop appropriate strategies over long time intervals.

The presented dynamics of quotes for industry stock indices, as can be seen from the data, differ from each other.

Quotes for Dow Jones Transportation (DJT) (Fig. 1b) have alternating periods of growth and decline. A significant decline in prices for Dow Jones Transportation (DJT) occurs during a period of declining Bitcoin prices. Then we can assume that there is an outflow of resources from this sector, which leads to a corresponding decrease in quotations. For a more detailed analysis of

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this effect, it is advisable to evaluate the mutual dynamics of such data. However, in any case, it is necessary to take into account such dependence when forecasting and planning.

Quotes for Dow Jones Consumer Goods have a general downward trend over the studied time interval (Fig. 2a). Although here we can also note both periods of growth in such quotations and periods of their decline. We also emphasize the significant volatility of the dynamics of quotes under study. It should be noted that the significant decline in Dow Jones Consumer Goods prices somewhat coincides with a period of declining Bitcoin prices. This fact should be taken into account when planning entry into the relevant market segments and forming investment strategies for the development of small and medium-sized enterprises.

The dynamics of the Dow Jones Technology index over the studied interval is generally increasing (Fig. 2b). This is especially evident in the last third of the period under study. The volatility of such dynamics is less than for previous data. But, as with the other data discussed earlier, we note that the lowest values of the Dow Jones Technology Index are observed during a period of declining Bitcoin prices. Thus, this fact in some way unites the considered quotes for industry indices. Also important is the mutual analysis of price dynamics for Bitcoin and individual quotes for indices. This will help to better understand market developments, develop strategies, and predict developments. This is especially important for small and medium-sized enterprises.

In Fig. 3 shows the dynamics of quotes for the S&P 500 Information Technology (SPLRCT) and S&P 500 Utilities (SPLRCU).

a) S&P 500 Information Technology   b) S&P 500 Utilities

Figure 3: S&P 500 Information Technology (SPLRCT) and S&P 500 Utilities (SPLRCU) quotes

It should be noted the characteristic dynamics of quotes for each type of industry indices. This is also observed for the data in Fig. 3.

At the same time, we see that the dynamics of quotes for the S&P 500 Information Technology and Dow Jones Technology indices are identical. This is explained by the fact that these indices reflect the development of identical companies. A distinctive feature is the size of such quotes. Based on the data presented, we can say that the quotes for Dow Jones Technology in their absolute value are higher than for the S&P 500 Information Technology. This is because the Dow Jones Technology Industry Index covers more companies than the S&P 500 Information Technology Index. In other words, the companies included in the S&P 500 Information Technology are part of the companies included in Dow Jones Technology. This fact should also be taken into account when forecasting and developing investment strategies. However, the noted fact reflects the relationship of stock indices in the context of individual segments for the same sectors.

The dynamics of quotes for the S&P 500 Utilities differs from the previously discussed changes. Here, as for quotes for Dow Jones Transportation (DJT), there is also an alternation of

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growth and decline in quotes for this index. An interesting fact is that the maximum values of quotes for the S&P 500 Utilities are observed during the period of minimum prices for Bitcoin. Then we can talk about the lack of connection between Bitcoin and the S&P 500 Utilities index. But such dynamics must be taken into account when forming investment strategies and determining entry into certain segments of the stock market. At the same time, in the first half of the period under study, the values of quotations for the S&P 500 Utilities are growing, then a constant decrease in such values is observed.

Thus, the next stage of the corresponding analysis is to assess the mutual dynamics of the considered data, where attention will be paid to the relationship between Bitcoin prices and individual stock indices.

Comparative assessment of the mutual dynamics of the studied data

To conduct a comparative analysis of the dynamics of Bitcoin prices and quotes in the context of individual stock indices based on the sectoral principle, it is advisable to use methods and approaches of wavelet theory. This is due to the fact that such analysis tools have found wide application for studying the dynamics of economic data, data presented in the form of time series [42]-[46]. Among such methods and approaches, one can highlight wavelet coherence estimates [47]-[49].

These estimates make it possible to compare the mutual dynamics of data over the entire studied interval, as well as in the context of individual periods in the interval of this comparison. We can also consider the depth of connections between two data dynamics. In particular, the depth of the studied connections allows us to talk about the possibility of developing investment strategies and planning to enter the stock market.

In Fig. 4 presents estimates of wavelet coherence between Bitcoin and Dow Jones Transportation (DJT), Dow Jones Consumer Goods (DJUSNC) respectively.
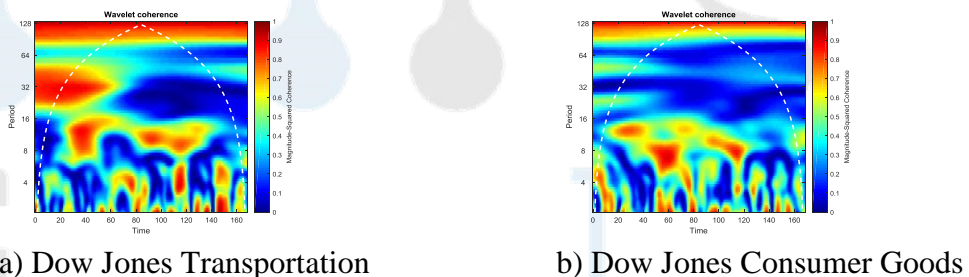

a) Dow Jones Transportation   b) Dow Jones Consumer Goods

Figure 4: Assessing the relationship between Bitcoin and Dow Jones Transportation (DJT), Dow Jones Consumer Goods (DJUSNC) respectively

In Fig. 5 presents estimates of wavelet coherence between Bitcoin and Dow Jones Technology (DJUSTC), S&P 500 Utilities (SPLRCU) respectively.
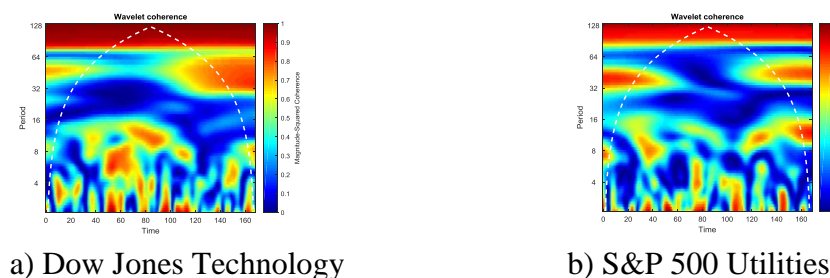

a) Dow Jones Technology   b) S&P 500 Utilities

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Figure 5: Assessing the relationship between Bitcoin and Dow Jones Technology (DJUSTC), S&P 500 Utilities (SPLRCU) respectively

Data Fig. 4 and Fig. 5 display the presence of fragmentary estimates of the relationship between the data under study. Nevertheless, such assessments still differ from each other. Thus, for the connections between Bitcoin and Dow Jones Transportation (DJT), Dow Jones Consumer Goods (DJUSNC), Dow Jones Technology, the depth of fragmentation is greatest during the period of lower Bitcoin prices. This confirms previous findings and allows for better planning and development of investment strategies, especially for small and medium-sized enterprises.

The fragmented relationship between Bitcoin and the S&P 500 Utilities has less depth, which is also consistent with previous conclusions. Here we can also note the more sparse fragmentation of the connection of such data.

Nevertheless, the presented results suggest the advisability of comparing the cryptocurrency market and industry stock indices as a factor in the development of enterprises.

CONCLUSION

The paper examines the issues of analyzing price dynamics for cryptocurrencies and various stock indices. For this purpose, a brief analysis of relevant studies has been carried out. In the course of this analysis, we determined that for our study we would look at the dynamics of Bitcoin prices and quotes for individual industry stock indices that are most interconnected with small and medium-sized enterprises.

To study the mutual dynamics of the data under study, we use wavelet coherence estimates. This allows one to understand the future planning methodology when developing investment strategies and market timing.

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