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Relationship between Bitcoin dynamics and energy futures quotes as a possible tool of choice for the implementation of startups

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Abstract:

Startups are a new form of implementing various business ideas. This form of business organization allows you to quickly and efficiently find the necessary solutions for a number of different problems and implement business ideas in the shortest possible time. However, this is a risky business that requires significant financial resources. One source of such resources may be the stock market. The cryptocurrency market and the energy market attract particular attention in this matter. Therefore, it is important to know the best times to enter these markets. Moreover, such markets can be potential consumers of startup services. Based on this, analyzing the relationship between Bitcoin dynamics and energy futures quotes is a promising area of research. The paper presents the dynamics of quotes for Bitcoin and energy futures. An analysis of their mutual dynamics is carried out. The results are presented in the form of separate graphs and diagrams. This helps to understand the progress of this study.

Key words: Comparison, Tool, Analysis, Quotes, Bitcoin, Startup, Dynamics, Futures, Securities Market, Source of Funding.

Introduction

The effectiveness of economic development, as well as the stability of the functioning of various business entities, is largely determined by the entrepreneurial spirit of management and its ability to adapt to constantly changing conditions and factors. At the same time, an important point in this issue is interaction with individual representatives of various fields of science and production, the opportunity to use their scientific and rationalization potential. This is due to the fact that such individual representatives are able to quickly respond to modern challenges and offer various options for solving emerging problems.

One of the forms of implementing non-standard problems and offering appropriate solutions is startups. A startup is a kind of structure that needs investment to implement its business idea into a finished unique product [1]-[3]. This type of activity is risky, but potentially promising in offering innovative solutions to emerging problems. A key aspect in the development of this type of activity is external financing. Such financing can be attracted from any sources, among which are the cryptocurrency market and the energy market [4], [5]. The identification of such markets is associated both with their intensive development and the ability to accumulate significant amounts of funds. Moreover, such markets themselves are capable of generating various directions for the development of startups. Then the dynamics of cryptocurrency quotes and energy market futures can be considered as a tool for selecting individual startups.

In order to implement the idea of studying the mutual dynamics of cryptocurrencies and energy market futures as a tool for selecting startups, it is important to know the dynamics of the corresponding quotes for such securities. This can be done based on consideration of statistical data, where it is advisable to use classical and special methods of analysis [6]-[21].

The result of such an analysis will help to understand the most appropriate moments for entering the securities market in order to attract appropriate financial resources. Such an analysis also helps to identify bottlenecks in the functioning of the markets in question and possibly propose their elimination based on startups.

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Thus, the main goal of this study is to study the relationship between the dynamics of quotes for Bitcoin and energy futures with a view to the possible implementation of startups and their financing.

Related work

M. Klačmer Čalopa, J. Horvat and M. Lalić consider in detail various sources of funding for startups [22]. This analysis covers both start-up companies and companies that have been operating for a long time. The study focuses on companies from Croatia. The main purpose of this analysis is to study the transition from traditional financing to its new forms. This will contribute to a better understanding of startup financing strategies.

T. R. Smus analyzes sources of financing for innovative startups [23]. This study is aimed at identifying new and effective sources of financing for innovative projects. The author emphasizes that financial and non-financial support are key factors in the emergence of a competitive and stable business. Here are various startups that were funded by Poland and Ukraine in September 2016. This study allows us to find solutions in providing financing for the creation of innovative projects.

D. Bauer, S. Junge and T. Reif presented a systematic review of startup financing schemes and options [24]. The authors note that the situation with startup financing has changed significantly recently. Startups can choose between different sources and regularly ask for more [24]. This analysis covers 149 literary sources on the topic of startup financing. Startups have been shown to have different financial resources depending on the stage of their life cycle. Therefore, the issue of financing startups is relevant and very important. This study makes a significant theoretical contribution to the startup finance literature.

K. B. Binh, H. Jhang, D. Park and D. Ryu consider the possibility of financing startups through capital markets [25]. In particular, the authors highlight the securities market. This study is carried out using the example of South Korea. The importance of state participation in this issue is emphasized. For these purposes, the government should develop a financial assistance program to provide funds to these companies.

G. Elia and F. Quarta explore different sources of funding that should be used for the development of technology startups [26]. At the same time, it is separately noted that such companies are a potential engine for the socio-economic development of regions and territories. At the same time, the ability to access various sources of financing is the basis for the development of technological entrepreneurship. The authors emphasize that this allows you to turn a smart and innovative idea into a successful company. One such source is funds from the stock market. Therefore, it is important to know the features of its functioning in general and individual segments in particular.

H. Jaladati and E. Chitsaz are considering the possibility of using the cryptocurrency market as a source of financing for startups [27]. The need to consider such a source of financing is due to the fact that, as the authors emphasize, startups face major financing problems. Therefore, it is necessary to consider new opportunities to attract financial resources. Based on this, this study examined current methods of entrepreneurial financing through a systematic literature review [27]. Possible problems that arise as a result of using such a source of financing are also considered.

S. Ahluwalia, R. V. Mahto and M. Guerrero explore the possibilities of blockchain technology for use in startup financing [28]. For these purposes, cryptocurrency trading technologies are considered. This is because the impact of blockchain technology on institutional economics is enormous. Therefore, the authors analyze in detail the economics of blockchain technologies from the point of view of transaction costs when financing startups [28]. The authors use various models to carry out the relevant analysis. Information asymmetry is also considered. As a result, the authors provide an explanation of how a financing system based on blockchain technology can lead to more efficient financing of startups [28].

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Thus, we see the importance of confirming that the cryptocurrency market and the energy futures market play an important role in the startup financing process. This makes it advisable to take a more detailed look at such markets, the mutual dynamics of their quotes, and explain the possible conditions for raising funds.

Dynamics of quotes on the cryptocurrency and energy futures markets

Note that the cryptocurrency market is characterized by quotes for various securities. In Fig. 1 and Fig. 2 presents relevant data that reflects the dynamics of prices for securities with the largest capitalization in the cryptocurrency market. In Fig. 3 shows the dynamics of quotes for futures for WTI crude oil and natural gas.

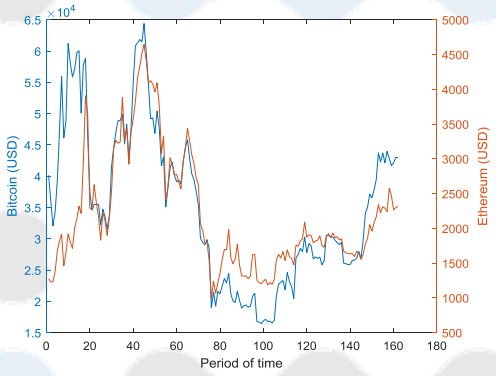

Figure 1: Dynamics of Bitcoin and Ethereum quotes

Let's look at the data in Fig. 1. Here you can see the price dynamics of Bitcoin (left axis, blue color) and Ethereum (right axis, red color). Data are presented on a weekly basis for the period 01.03.21-02.04.24. All data from investing.com.

It should be noted that quotes for Bitcoin and Ethereum have both the same trends and slightly different ones from each other. This is determined by the specifics of trading such cryptocurrencies, as well as the conditions of their initial release. We can see multidirectional trends at the beginning of the period under study. Further, one can observe completely coinciding trends in the quotes of such securities. Although there are also periods when the price trends of these cryptocurrencies do not coincide.

If we talk about the variability of quotes for Bitcoin and Ethereum, then it is insignificant.

The most significant difference between Bitcoin and Ethereum quotes is the unit price of such cryptocurrencies. The price of Bitcoin is significantly higher than the price of Ethereum.

Consequently, investing in Bitcoin allows you to attract larger amounts of money to invest in startups. But accordingly, the risk in this case is higher. Then it is necessary to consider a reasonable combination of choosing a cryptocurrency portfolio for investing in startups and timing of entry into the relevant segments of the stock market. You should also consider the possibility of hedging them through each other. For these purposes, it is advisable to study and evaluate the mutual dynamics of such cryptocurrencies among themselves and in relation to major energy futures. This will facilitate the choice of strategy for working with investment sources for the implementation of various startups.

In Fig. 2 shows the dynamics of quotes for Tether (left scale, blue color) and BNB (right scale, red color). The same period was considered as for the data in Fig. 1.

First of all, it should be noted that the dynamics of the data in Fig. 2 differs from the data dynamics Fig. 1. In Fig. 2 quotes are more variable. This is especially true for Tether quotes.

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Tether quotes also have a significant surge, which occurs on 03.05.23. Tether quotes are more volatile than BNB quotes. At the same time, quotes for Tether are significantly lower than quotes for BNB. At the same time, we can say that quotes for Tether are approximately in the same range (with the exception of 03.05.23). BNB quotes tend to decline over the studied interval. In general, quotes for Tether and BNB are lower than for Bitcoin or Ethereum.

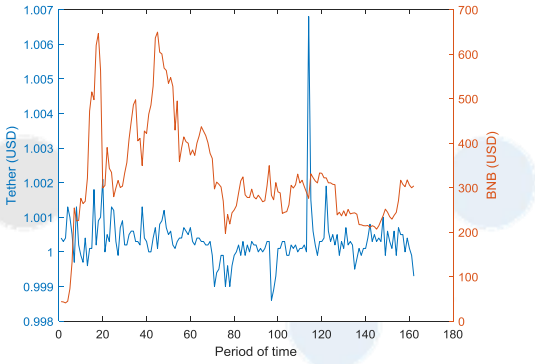

Figure 2: Dynamics of Tether and BNB quotes

In Fig. 3 shows futures for WTI crude oil (left scale, blue) and natural gas (right scale, red). These are the most significant energy futures. The same period was considered as for the data in Fig. 1 and Fig. 2.

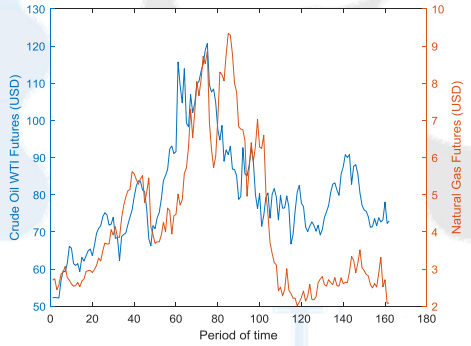

Figure 3: Dynamics of quotations for futures for WTI crude oil and natural gas

We emphasize that quotes for futures for WTI crude oil and natural gas have the same trends. At the same time, quotes for natural gas futures have a certain lag in relation to quotes for futures for WTI crude oil. This is understandable and logical, since gas prices are tied to oil prices.

At the same time, the dynamics of energy futures initially increases, then it decreases significantly and then stabilizes to some extent.

Given the goals of this study, in the next subsection we will consider some examples of analysis of the joint dynamics of the data under consideration.

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Comparative characteristics of the dynamics of cryptocurrencies and energy futures quotes

To consider the characteristics of the mutual dynamics of the presented data, it is advisable to use the wavelet ideology. Among the appropriate methods for such a study, the estimation method based on wavelet coherence should be chosen [29]-[31].

This method allows you to evaluate the mutual dynamics of data over the entire interval of their analysis, taking into account individual time periods. It is also possible to explore the depth of such relationships, which is important for adopting the necessary strategies when choosing a source of funding for startups. It should also be emphasized that this method has found wide application in the analysis of data of this kind and data presented in the form of time series [32]-[38].

In accordance with the chosen research method, we will first consider the reciprocity of the dynamics of Bitcoin and Ethereum. Next, we will analyze the reciprocity in the dynamics between Bitcoin quotes and major energy futures.

In Fig. 4 shows the wavelet coherence estimate between Bitcoin and Ethereum.

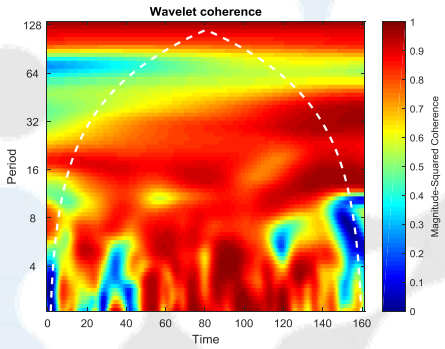
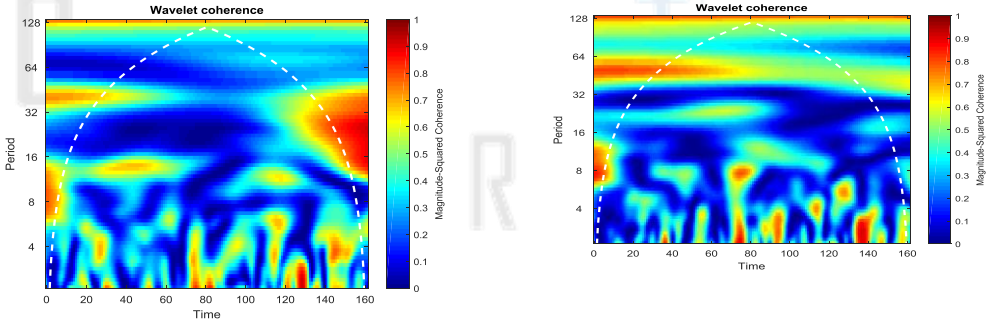


Figure 4: Estimation of wavelet coherence between Bitcoin and Ethereum

In Fig. 5 presents estimates of wavelet coherence between quotes for Bitcoin and futures for WTI crude oil and natural gas, respectively.



a) WTI crude oil b) natural gas

Figure 5: Wavelet coherence estimates between Bitcoin quotes and crude oil and natural gas futures

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Data analysis Fig. 4 confirms the fact of strong mutual influence in quotes between Bitcoin and Ethereum. There is also a significant depth to this relationship. This is observed over almost the entire interval that is being considered. Thus, this allows you to select appropriate strategies when choosing sources of investment for startups and determining time intervals for entering the market. No less relevant, in this aspect, is the ability to predict appropriate actions from the point of view of business development in the form of a specific startup. Mutual hedging for such cryptocurrencies can also be considered. This will reduce the risk of attracting the required amount of investment resources.

Looking at the data in Fig. 5, their similarity should be noted. This is due to the identical dynamics of quotes for the main energy futures. Thus, the data in Fig. 5 confirm the corresponding conclusions of the previous subsection (see Fig. 3). This also needs to be taken into account when developing and implementing a strategy for selecting sources of investment for startups using the cryptocurrency and energy futures markets.

Detailed data analysis Fig. 5 allows us to note the fragmented consistency in the dynamics of quotes for Bitcoin and the main energy futures. This is also important information for implementing appropriate startup investment strategies.

It should also be noted that a separate area for the relevant startups is the development of investment strategies for such business ideas, analysis of the possibilities of entering the stock market in order to attract the necessary resources.

Conclusion

The work examines certain issues of determining sources of financing for investing in startups. For these purposes, a brief but critical review of various literature sources has been carried out. This allowed us to pay attention to the cryptocurrency market and the energy futures market. In order to clarify this issue, the relationship between the dynamics of Bitcoin and quotes for major energy futures is examined in detail. The dynamics of various components of the cryptocurrency market are also considered.

For the purpose of analyzing the mutual dynamics of the corresponding data, wavelet coherence estimates were used. The possibility of constructing strategies when choosing sources of financing for startups using data on quotes of Bitcoin and energy futures is substantiated. Attention is also paid to developing such strategies based on individual startups.

References:

1. Bortolini, R. F., Nogueira Cortimiglia, M., Danilevicz, A. D. M. F., & Ghezzi, A. (2021). Lean Startup: a comprehensive historical review. Management Decision, 59(8), 1765-1783.

2. Skala, A., & Skala, A. (2019). The startup as a result of innovative entrepreneurship. Digital Startups in Transition Economies: Challenges for Management, Entrepreneurship and Education, 1-40.

3. Magalhães, R. P. C. (2019). What is a startup?: a scoping review on how the literature defines startup (Doctoral dissertation).

4. Lyashenko V. Wavelet Analysis Methodology as a Tool for Predicting Cryptocurrency Price Dynamics / V. Lyashenko, O. Sergienko, S. Stepurina // International Journal of Academic Management Science Research (IJAMSR). – 2021. – Vol. 5. – Issue 12. – P. 45-52.

5. Petrukhnov O. V. Development of the Energy Sector in the Display of Key Exchange Indices / O. V. Petrukhnov, A. V. Negliad, V. Lyashenko // International Journal of Academic Management Science Research. – Vol. 7(6). – P. 69-75.

6. Baranova, V., Zeleniy, O., Deineko, Z., & Lyashenko, V. (2019, October). Stochastic Frontier Analysis and Wavelet Ideology in the Study of Emergence of Threats in the

Financial Markets. In 2019 IEEE International Scientific-Practical Conference Problems of Infocommunications, Science and Technology (PIC S&T) (pp. 341-344). IEEE.

7. Kuzemin, A., & Lyashenko V. (2011). Microsituation Concept in GMES Decision Support Systems. In Intelligent Data Processing in Global Monitoring for Environment and Security, 217–238.

8. Lyashenko, V., Deineko, Z., & Ahmad, A. (2015). Properties of Wavelet Coefficients of Self-Similar Time Series. International Journal of Scientific and Engineering Research, 6, 1492-1499.

9. Tvoroshenko, I., Ahmad, M. A., Mustafa, S. K., Lyashenko, V., & Alharbi, A. R. (2020). Modification of models intensive development ontologies by fuzzy logic. International Journal of Emerging Trends in Engineering Research, 8(3), 939-944.

10. Dadkhah, M., Lyashenko, V. V., Deineko, Z. V., Shamshirband, S., & Jazi, M. D. (2019). Methodology of wavelet analysis in research of dynamics of phishing attacks. International Journal of Advanced Intelligence Paradigms, 12(3-4), 220-238.

11. Азаренкова, Г., & Ляшенко, В. (2009). Відношення переваг у порівняльній оцінці діяльності банків. Банківська справа, 5, 65-72.

12. Lyashenko, V. (2014). Efficiency of bank crediting of real sector of economy in the context of separate banking groups: an empirical example from Ukraine. International Journal of Accounting and Economics Studies, 2(2), 74-79.

13. Ляшенко В. В. (2007). Интерпретация и анализ статистических данных, описывающих процессы экономической динамики. Бизнес Информ, 9(2), 108-113.

14. Kuzemin, A., & Lyashenko, V. (2009). Methods of comparative analysis of banks functioning: classic and new approaches. Information Theories & Applications, 16(4), 384-396.

15. Куштим, В. В., & Ляшенко, В. В. (2007). Динаміка розвитку банківського сегмента міжнародного фінансового ринку. Фінанси України, (12), 96-105.

16. Kuzemin, A., & Lyashenko, V. (2006). Fuzzy set theory approach as the basis of analysis of financial flows in the economical security system. International Journal Information Theories & Applications, 13(1), 45-51.

17. Omarov, M., Tikhaya, T., & Lyashenko, V. (2019). Internet marketing metrics visualization methodology for related search queries. International Journal of Advanced Trends in Computer Science and Engineering, 8(5), 2277-2281.

18. Vasiurenko, O., Lyashenko, V., Baranova, V., & Deineko, Z. (2020). Spatial-Temporal Analysis the Dynamics of Changes on the Foreign Exchange Market: an Empirical Estimates from Ukraine. Journal of Asian Multicultural Research for Economy and Management Study, 1(2), 1-6.

19. Dadkhah, M., Lyashenko, V., & Jazi, M. (2015). Methodology of the Chaos Theory in research of phishing attacks. International Journal of Academic Research, 7(1), 169-175.

20. Mousavi, S. M. H., Victorovich, L. V., Ilanloo, A., & Mirinezhad, S. Y. (2022, November). Fatty Liver Level Recognition Using Particle Swarm optimization (PSO) Image Segmentation and Analysis. In 2022 12th International Conference on Computer and Knowledge Engineering (ICCKE) (pp. 237-245). IEEE.

21. Lyashenko, V., Zeleniy, O., Mustafa, S. K., & Ahmad, M. A. (2019). An advanced methodology for visualization of changes in the properties of a dye. International Journal of Engineering and Advanced Technology, 9(1), 711-7114.

22. Klačmer Čalopa, M., Horvat, J., & Lalić, M. (2014). Analysis of financing sources for start-up companies. Management: journal of contemporary management issues, 19(2), 19-44.

23. Smus, T. R. (2017). Sources of support anD funding innovative start-ups. International solutions. Kwartalnik Naukowy Uczelni Vistula, (2 (52), 127-142.

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889,
2023-5.384 ResearchBib IF: 8.848 / 2024

VOLUME-4, ISSUE-2

24. Bauer, D., Junge, S., & Reif, T. (2023). May the resources be with you: a systematic review and framework of startup funding options. Management Review Quarterly, 1-32.

25. Binh, K. B., Jhang, H., Park, D., & Ryu, D. (2020). Capital markets for small-and medium-sized enterprises and startups in Korea. The Journal of Asian Finance, Economics and Business, 7(12), 195-210.

26. Elia, G., & Quarta, F. (2020). Financing the development of technology startups. Innovative Entrepreneurship in Action: From High-Tech to Digital Entrepreneurship, 93-114.

27. Jaladati, H., & Chitsaz, E. (2022). An Overview of Cryptocurrency-based Crowdfunding for Startups. Available at SSRN 4099802.

28. Ahluwalia, S., Mahto, R. V., & Guerrero, M. (2020). Blockchain technology and startup financing: A transaction cost economics perspective. Technological Forecasting and Social Change, 151, 119854.

29. Torrence, C., & Webster, P. J. (1999). Interdecadal changes in the ENSO–monsoon system. Journal of climate, 12(8), 2679-2690.

30. Heil, C.E., & Walnut, D.F. (1989). Continuous and discrete wavelet transforms. SIAM review, 31(4), 628- 666.

31. Kingsbury, N. (1999). Image processing with complex wavelets. Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences, 357(1760), 2543-2560.

32. Vasiurenko, O., & Lyashenko, V. (2020). Wavelet coherence as a tool for retrospective analysis of bank activities. Economy and Forecasting, (2), 43-60.

33. Baranova, V., Orlenko, O., Vitiuk, A., Yakimenko-Tereschenko, N., & Lyashenko, V. (2020). Information system for decision support in the field of tourism based on the use of spatio-temporal data analysis. International Journal of Advanced Trends in Computer Science and Engineering, 9(4), 6356-6361.

34. Dadkhah, M., Lyashenko, V., & Jazi, M. (2015). Methodology of the Chaos Theory in research of phishing attacks. International Journal of Academic Research, 7(1), 169-175.

35. Vyacheslav, L., Omer, I. A. M., & Asaad, M. A. B. (2020). COVID-19 wavelet coherence data for some Gulf countries. GSC Biological and Pharmaceutical Sciences, 11(2), 166-174.

36. Orhan, A., Kirikkaleli, D., & Ayhan, F. (2019). Analysis of wavelet coherence: service sector index and economic growth in an emerging market. Sustainability, 11(23), 6684.

37. Kirikkaleli, D., & Gokmenoglu, K. K. (2020). Sovereign credit risk and economic risk in Turkey: empirical evidence from a wavelet coherence approach. Borsa Istanbul Review, 20(2), 144-152.

38. Wang, Y., Wei, M., Bashir, U., & Zhou, C. (2022). Geopolitical risk, economic policy uncertainty and global oil price volatility—an empirical study based on quantile causality nonparametric test and wavelet coherence. Energy Strategy Reviews, 41, 100851.