

Digitalization and management of crypto assets as a source of investment for “green” projects

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Abstract. Cryptocurrencies are digital assets that are used to store and protect savings. The study examined the cryptocurrency market and analyzed the development of investment. A methodology for researching the crypto-asset market is proposed. The main directions for forming a cryptocurrency portfolio (crypto portfolio) have been identified. Methods for forming an optimal “cryptocurrency portfolio” (hedging) have been studied, including risk assessment in the context of income from cryptocurrency and determining the relationship between profitability and volatility. Crypto assets with the “Proof-of-Work” principle (for example, Bitcoin) as a source of investment for environmental events are acceptable when attracting other financial instruments. The prerequisites for developing the cryptocurrency market as a source of investment in “green” projects have been determined.

1 Introduction

Cryptocurrencies have appeared recently and at the beginning of their existence did not inspire confidence among professional investors. Subsequently, there was a rush of demand for Bitcoin, which led to a high rate of growth and increased interest in cryptocurrencies, of which there are currently about 20,000. Cryptocurrencies are becoming a popular investment tool, and cryptocurrency technologies are becoming a competitive alternative to various banking services.

However, unresolved problems remain, including: research of the crypto-asset market; methods for forming an optimal “crypto-portfolio”; risk assessment in terms of income from cryptocurrency; determining the relationship between profitability and volatility; research into the prerequisites of the crypto-asset market as sources of investment in “green” projects.

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2 Theoretical background

Virtual currencies are considered as a speculative medium. The study of methods and algorithms for testing hypotheses of the existence of price bubbles in this market is interesting for investors in order to obtain the expected profit. The studies [4-5] proposed an approach for making decisions for investors to purchase cryptocurrencies, taking into account price bubbles. The international stock market is now offering the opportunity to invest using “cryptocurrencies” through the so-called Blockchain technology [6].

The study [7] is devoted to an unstable market environment. The inclusion of Cumulative Prospect Theory (CPT) cryptocurrencies in diversified portfolios of international equities had a significant positive impact on portfolio risk-return dynamics [8]. However, unresolved problems remain: research of the crypto-asset market; methods for forming an optimal “crypto-portfolio”; risk assessment in terms of income from cryptocurrency; determining the relationship between profitability and volatility; research into the premises of the crypto-asset market and others.

3 Research methodology

The results of the methodology for identifying data on the most popular types of cryptocurrencies are presented in Table 1.

Data on the most popular cryptocurrencies at the beginning of 2023 is provided (Table 1). At the same time, the price per unit of different cryptocurrencies fluctuates within a very wide range, from 1 dollar for 1 dollar on the Binance exchange to 28,000 dollars for 1 bitcoin (May 2023). The market capitalization of cryptocurrencies for March 2023 was \$1,180 billion US (Table 1).

Table 1. The most popular types of cryptocurrencies 2023 [1].

Name	Designation	Market price, February \$	Market capitalization February \$	Market value March, \$	Market capitalization March, \$
Bitcoin	BTC	21 788,00	420 274 300 806	29 268,81	566 661 285 145
Ethereum	ETH	1 515,00	185 400 529 852	1 825,60	225 975 170 378
Tether	USDT	1,00	68 401 008 693	0,99	81 743 942 509
Ripple	XRP	0,37	19 064 006 848	0,46	24 443 538 174
Cardano	ADA	0,38	12 614 472 192	0,39	13 832 293 739
Dogecoin	DOGE	0,08	10 898 077 867	0,08	11 100 461 916
Litecoin	LTC	92,40	6 677 096 875	86,83	6 447 081 344
Binance USD	BUSD	1,00	16 151 343 122	1,00	6 096 033 623
Stellar Lumens	XLM	0,08	2 239 967 605	0,09	2 478 827 980
Bitcoin Cash	BCH	122,90	2 373 224 117	116,04	2 248 614 861
NEO	NEO	8,59	605 944 981	10,39	732 786 612
Others			354 350 152 550		239 123 594 445
Total			1 099 050 125 508		1 180 883 630 726

The increase by February 2023 was 7.44%. The growth in the market value of cryptocurrencies as of May 2023 compared to February was 20.9%. As can be seen from Table 1 and Figure 1, Bitcoin continues to be the most popular cryptocurrency, despite its high unit price. The price of most cryptocurrencies depends mainly on the demand for bitcoins due to the dominant position of Bitcoin among other blockchain projects. For example, Ethereum capitalization is only 19% of the total market volume, and XRP is 1.5%.

4 Results

The cryptocurrency exchange rate has great volatility, depending on various factors, for example, the actions of cryptocurrency developers, the activity of major players on exchanges, general fluctuations in the cryptocurrency market, as well as world news. Let's look at the investment features of crypto-currency instruments using Bitcoin (BTC) as an example. This choice is due to the fact that the share of this cryptocurrency is 48% of the total capitalization of the crypto-currency market and its rate is a reference point for all other cryptocurrencies (Figure 1).

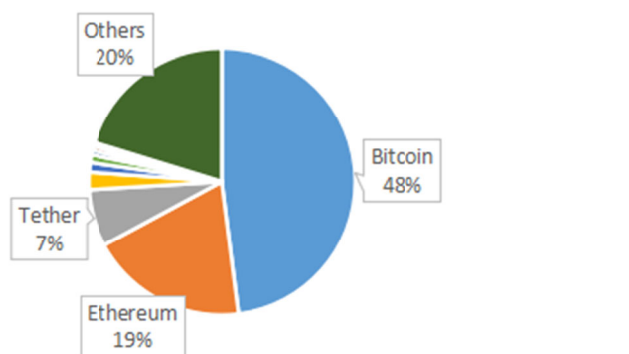


Fig. 1. Cryptocurrency market structure, March 2023 [1].

BTC/USD rate chart from May 2019 to April 2024 (Figure 2) [1].



Fig. 2. BTC/USD exchange rate chart from May 2019 to April 2024 [1].

Cryptocurrencies are a high-risk investment for investors. However, based on the volatility indicator, the potential profitability of various investment instruments was considered using the example of the currency, cryptocurrency, and stock markets [2, 11-12]. The market price of cryptocurrencies for the period 2020-2023 was considered in Table 2.

Table 2. Market price of cryptocurrencies for the period 2020-2023 [1-3].

Name	Designation	Market price, \$											
		07.2020	10.2020	01.2021	04.2021	07.2021	10.2021	01.2022	04.2022	07.2022	10.2022	01.2023	04.2023
Bitcoin	BTC	9.136,72	10.760,57	32.087,38	58.861,03	35.039,55	47.622,00	29.200,00	58.947,00	34.329,00	47.931,29	16.625,08	28.199,31
Ethereum	ETH	226,63	376,54	1.034,14	2.095,91	2.303,55	3.383,50	1.000,00	2.107,00	2.262,00	3.139,16	1.200,96	1.795,71
Ripple	XRP	0,179874	0,243518	0,2274	0,6018	0,63	1,07	0,20	0,93	0,63	0,93	0,34	0,52
Bitcoin Cash	BCH	221,05	258,77	387,76	670,21	501,38	163,60	400,00	1.004,00	501,00	1.007,30	96,96	123,04
Litecoin	LTC	41,39	49,1	137,02	194,67	138,91	164,23	130,00	226,00	138,00	154,98	70,82	93,02
Cardano	ADA	0,124673	0,097194	0,1695	1,17	1,39	2,20	0,20	1,19	1,39	2,10	0,25	0,38
Dogecoin	DOGE	0,003257	0,002551	0,0048	0,0609	0,25	0,22	0,01	0,06	0,24	0,22	0,07	0,08
Stellar	XLM	0,087099	0,076121	0,1379	0,4637	0,25	0,28	0,15	0,34	0,26	0,27	0,07	0,11
NEO	NEO	10,52	20,7	15,9800	63,63	31,91	47,56	13,00	77,00	45,60	33,60	6,40	12,11
Tezos	XTZ	2,42	1,99	2,63	5,64	2,87	6,05	2,50	6,50	2,98	5,03	0,72	1,10
Tether	USDT	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00

The stock market was taken as the most traditional. The fiat currency market was taken as the most liquid and conducting the largest volumes of transactions. The cryptocurrency market was taken as the most modern and quickly changing. It was found that traditional stock instruments remain the most balanced option for most investors. Cryptocurrencies can be suitable for aggressive investing, but they require caution and an understanding of the moral issues associated with them [13-16]. Fiat currencies are suitable for short-term investing [3].

Analysis of Figure 2 and Table 2 allows us to identify several key periods [2]:

1. Rate growth (2020 – early 2021). Bitcoin experienced rapid price growth during this period, accompanied by high volatility and significant price fluctuations, with sharp movements up and down.

2. Price peaks and correction (2021 – 2022). After reaching the price peak at the end of 2021, Bitcoin enters a correction phase. Volatility remains high, but a downward trend is emerging. The price is forming lower highs and lower lows at the end of 2022.

3. Relative stabilization and reduction in volatility (2023). In 2023, Bitcoin volatility decreases noticeably. Price fluctuations become less sharp and a tendency for sideways movement appears.

4. Starting from September 2023, the price of Bitcoin has been growing rapidly and tripled in six months. In March 2024, the price of Bitcoin reaches its all-time high.

Cryptocurrencies can be an attractive investment tool. First, they represent a relatively new and rapidly growing market that can provide high returns. Secondly, cryptocurrencies are not associated with traditional markets such as the stock market or real estate market, which can provide diversification of the investment portfolio. Third, cryptocurrencies provide anonymity and security, which can be important for those who want to keep their investments secret and protect them from fraud and theft.

There is a dynamic growth in funding for research and documents devoted to the diversification of the cryptocurrency portfolio [3, 17-20]. The study of the identified data set was carried out using econometric and bibliographic analysis techniques. For the period 2015-2023, 491 documents were identified in the direction of “cryptocurrency portfolio”. A sharp increase in the dynamics of document publication has been observed since 2019 (Figures 3-4).

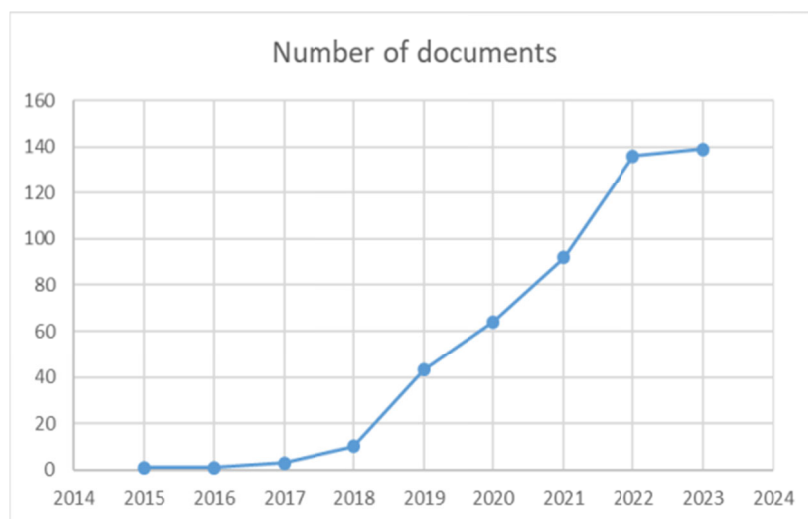


Fig. 3. Dynamics of documents in the direction of “cryptocurrency portfolio”, units of documents [3].

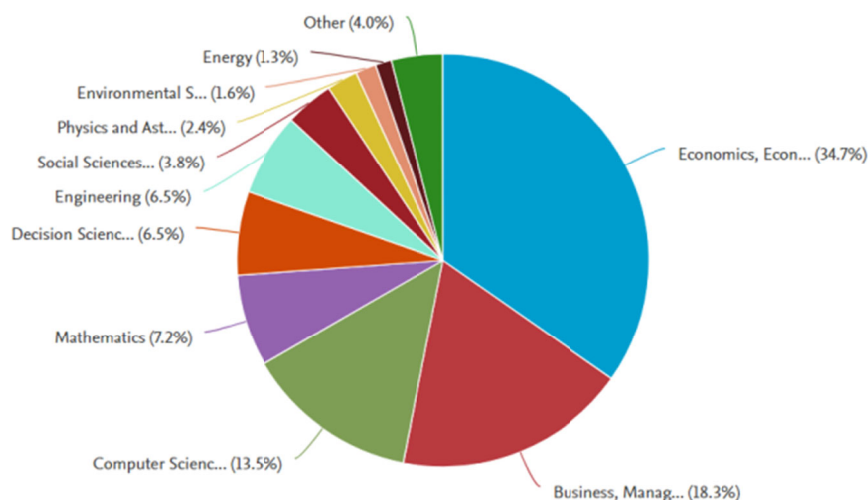


Fig. 4. Distribution of documents in the direction of "cryptocurrency portfolio" by industry, 2015-2023, units [3].

The largest number of documents in the area of “cryptocurrency portfolio” was published in different field (Table 3).

Table 3. Distribution of documents in the direction of "cryptocurrency portfolio", 2015-2023 by industry, units [3].

Industries	Documents, units	Industries	Documents, units
Economics, Econometrics and Finance	303	Environmental Science	14
Business, Management and Accounting	160	Energy	11
Computer Science	118	Psychology	9
Mathematics	63	Multidisciplinary	8
Decision Sciences	57	Arts and Humanities	5
Engineering	57	Materials Science	5
Social Sciences	33	Medicine	5
Physics and Astronomy	21	Chemical Engineering	2

Additionally, the following organizations were identified carrying out research in the direction of “cryptocurrency portfolio” (Table 4). It is proposed to develop portfolio insurance strategies in the cryptocurrency market. Assessing effectiveness against different downside risks in different economic conditions.

Table 4. Distribution of documents in the “cryptocurrency portfolio” direction by organization, 2015-2023, units.

Organizations	Units	Organizations	Units	Organizations	Units	Organizations	Units
University of Economics Ho Chi Minh City	15	University of the Witwatersrand, Johannesburg	7	Humboldt-Universität zu Berlin	6	WHU - Otto Beisheim School of Management	5
University of Johannesburg	10	Trinity College Dublin	7	WHU - Otto Beisheim School of Management	6	Bilkent Üniversitesi	5
University of Sfax	9	Dublin City University	6	Bilkent Üniversitesi	6	Hunan University	5
Montpellier Business School	9	University of Thessaly	6	Hunan University	5	Lebanese American University	5
South Ural State University	8	FSEG Sfax - Faculté des Sciences Économiques et de Gestion de Sfax	6	Lebanese American University	5	Universiti Sultan Zainal Abidin	5
Pusan National University	8	Trinity Business School	6	Universiti Sultan Zainal Abidin	5	Henley Business School	5

The impact of investor utility is examined based on expected utility theory and prospects. Portfolio insurance in the cryptocurrency market demonstrates risk reduction and price reduction due to a higher Omega coefficient [9].

Traditional multi-factor asset pricing models are proposed, with a focus on mitigating market risk. An analysis of nearly 2,000 cryptocurrencies shows that there is significant heterogeneity in exposure to market downside risk and that higher exposure to downside risk is associated with higher average returns. This conclusion does not depend on whether we use benchmark cryptocurrency market or stock market [10].

Crypto assets with the “Proof-of-Work” principle (for example, Bitcoin) as a source of investment for environmental activities are acceptable when attracting other financial instruments. In addition, the production of cryptocurrency requires a large amount of energy, which is generated at thermal power plants. This in itself causes great harm to the environment, which contradicts the concept of sustainable development.

Cryptocurrencies are becoming a popular investment tool. The following prerequisites for crypto assets as sources of investment in "green" projects have been identified: cryptocurrency is based on blockchain technologies and therefore provides competitiveness equal to banking services; decentralization (no governing centre); all nodes of the system have equal rights); low transaction costs (minimal costs for maintaining the network through P2P transactions, the user independently setting commissions, or even working without commission); high speed of payments and irreversibility of transactions (blockchain property); confidentiality and reliable data protection (no personal data is transferred during transactions).

However, there is a possibility of criminal use (caused by confidentiality of information), attractiveness for hacker attacks on keys to a crypto pocket (the fact that cryptocurrencies exist in digital form makes them desirable prey for hackers, and a low level of education in information technology increases the risk of vulnerability of access keys to a crypto pocket); loss of a key leads to the loss of all funds in the pocket. The cryptocurrency exchange rate has volatility. It depends on various factors, such as the actions of cryptocurrency developers on exchanges, general cryptocurrency fluctuations, international news, etc.

5 Conclusions

The main directions of research in the field of forming a cryptocurrency portfolio (crypto-portfolio) have been identified: methods for determining the most popular cryptocurrencies; methods for forming an optimal “cryptocurrency portfolio” (hedging), including risk assessment in terms of income from cryptocurrency; determining the relationship between profitability and volatility; a method for determining the most popular cryptocurrencies is proposed; cryptocurrency is a popular investment instrument based on blockchain technologies; low transaction costs; high speed of payments and irreversibility of transactions (blockchain property); confidentiality and reliable data protection.

Crypto assets with the “Proof-of-Work” principle as a source of investment for environmental events are acceptable when attracting other financial instruments. The production of cryptocurrency requires a large amount of energy generated at thermal power plants. This causes great harm to the environment, which contradicts the concept of sustainable development. The volatility of cryptocurrency prices has a significant impact on investing in them. Volatility means a change in the price of an asset, and cryptocurrencies, this can mean substantial price fluctuations over short periods.

High price volatility, cryptocurrency can be a source of high returns since volatility can mean the opportunity to buy cryptocurrency at a lower price and sell it at a higher price. However, high volatility can also lead to significant losses if the price of the cryptocurrency suddenly drops. Cryptocurrencies can be an attractive investment tool. First, they represent a relatively new and rapidly growing market that can provide high returns. Secondly, cryptocurrencies are not associated with traditional markets such as the stock market or real estate market. Third, cryptocurrencies provide anonymity and security, which can be important for those who want to keep their investments secret and protect them from fraud and theft.

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