

INVESTMENTS IN GOLD OR CRYPTOCURRENCIES? SAFE HAVEN DURING THE COVID-19 PANDEMIC

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Purpose: The aim of the article is a comparative analysis of selected cryptocurrencies and gold in the context of the SARS-CoV-2 coronavirus pandemic.

Design/methodology/approach: The study covered the stock exchange of Gold and the four largest cryptocurrencies in terms of market capitalization: Bitcoin, Ethereum, Binance Coin, and Cardano. The data for the analysis for the period 2020-2021 was taken from the internet platform www.coinmarketcap.com, where all cryptocurrencies are published in daily intervals, and from the Investing website www.investing.com for Gold. The analysis of data in the form of time series was carried out, based on the assumption that successive values in the data set represent successive measurements made at equal time intervals.

Findings: Our findings prove that the studied cryptocurrencies proved to be resistant to economic fluctuations related to the pandemic crisis.

Originality/value: We present original scientific research that provides useful information in a practical dimension for investors interested in the cryptocurrency market and safe assets, and anyone interested in the specificity of the problem at hand.

Keywords: investments, cryptocurrency, gold, safe haven, pandemic COVID-19.

Category of the paper: Research paper.

1. Introduction

There is no doubt that the SARS-CoV-2 coronavirus pandemic (short: COVID-19) had a very significant impact on the global economy as well as on the behavior of investors in capital and cryptocurrency markets. In the initial phase of the pandemic, there was a sharp movement of investors related to increasing uncertainty, which was reflected in all financial instruments of stock exchange securities. After initial sharp drops in stock prices, the stock market was gradually recovering from losses. The perception of risk in a pandemic crisis influences the decisions of investors who seek a “safe haven” to protect their capital. Lockdowns between

2020 to 2021 and the slowdown in the world economy contributed to the fact that people were looking for profitable investments, alternatives to traditional investments, such as stocks or bonds.

Until now, the most popular investment security asset was undoubtedly gold. However, currently, the cryptocurrency market is becoming a more and more popular way of profitable investing. In addition, the appearance of the work by Satoshi Nakamoto (2008) on decentralized the electronic payment system based on cryptographic evidence in the network sparked a broadly understood interest in this form of concluding transactions. Due to the numerous advantages, bitcoin is treated as “digital gold”. An important implication of this status is that he is considered a potentially independent – from economic and political turbulence – investment instrument as if it were a substitute for real gold. Over years were established thousands of cryptocurrencies. And their fans and users suggest that bitcoin can be considered as a safe haven like gold.

The aim of this paper is to research how developed the prices of gold and of the largest cryptocurrencies in terms of market capitalization during the pandemic COVID-19 i.e., in the years 2020-2021. Moreover, whether the most popular cryptocurrencies can be considered a safe haven similar to gold.

2. Literature Review

The growing interest in cryptocurrencies and their practical use causes the need for leading continuous research on this phenomenon. Since the appearance of Bitcoin and other cryptocurrencies have been written many theoretical and empirical articles. Cryptocurrencies have become the subject of trade. Interest in the cryptocurrency market is not only limited to technology enthusiasts or investors who value anonymity. Despite lingering skepticism in government circles and financial institutions, investment banks and asset managers conducted their own research into cryptocurrencies in terms of their competitiveness against centralized fiat money. Much of this research was experimental and did not make its way into scientific journals. On the other hand, scientific research focused mainly on the multi-faceted analysis of Bitcoin and its essence from a legal, social and economic point of view. Initially, they focused on the advantages and disadvantages trying to answer the question: Does Bitcoin have a chance to become a transactional unit? Many papers were related to the attitude of governments against to Bitcoin and other cryptocurrencies in different countries (Przyłuska-Schmitt, 2021; Sandner, Blassl, 2020; Brito, Castillo, 2016). They mainly covered the issues of taxation, counteracting money laundering, financing terrorism, consumer protection and fraud (Pieters, Vivanco, 2017; Arnfield, 2015). Others concerned the evaluation of the economic and social functions of bitcoin as money (Heller, 2017).

Meanwhile, more and more researchers (Selgin 2015; Baeck and Elbeck 2015; Yermacka 2016) admitted that a cryptocurrency resembles a more speculative commodity than money. The issues of cryptocurrency value were dealt with by Peterson (2017) and Van Vliet (2018), who studied Metcalfe's Law on the valuation of Bitcoin based on the size of the users' network. Grinberg (2012) described the influence of macroeconomic factors on the Bitcoin price, and Moore and Christin (2013) explored the phenomenon of the growing interest in Bitcoin in the context of the loss of confidence in money issued by central banks.

Urquhart (2016) was the first to test the performance of Bitcoin as the cryptocurrency with the largest market capitalization in the context of the effectiveness of the cryptocurrency market. It used five different tests to do this and found that Bitcoin returns were indeed inefficient in the market. One step further went Wang Chun Wei (2018), who investigated the liquidity of different cryptocurrencies. He calculated that the unpredictability of return increases in the case of cryptocurrencies with high market liquidity. His results showed a strong relationship between the Hurst exponent and liquidity the cryptocurrencies across the board. He concluded that liquidity plays a significant role in market performance and the return predictability of new cryptocurrencies. In turn, Kristoufek (2020) studied the quantile correlations of Bitcoin and two benchmarks – S&P 500 and VIX - in order to compare them with gold as a traditional safe resource. Whereas Al-Yahyaee (et al. 2020) and Zhang (et al., 2018) studied the efficiency of the cryptocurrency markets and proved that liquidity and volatility affect inefficiency, depending on the market situation.

Various authors undertook research issues in the area of investments in cryptocurrencies and gold. Their research addressed the still pending question whether Bitcoin is a safe haven for investments in extreme market conditions and whether this feature is similar to gold investments and the general commodity index (Shahzad et al., 2019; Mokni et al., 2022). The global crisis related to the COVID-19 pandemic should undoubtedly be considered extreme conditions (Al-Awadhi et al., 2020; Bakry et al., 2021). Uncertainty connected with COVID-19 is priced in in the market for stock options (Bannigidadmath et al., 2021) which tend to be more expensive when governments impose stricter restrictions (Li et al., 2022).

Studies of the new investment areas based on the trade of cryptocurrencies are the subject of numerous research works. The latest literature extensively examines the impact of the COVID-19 outbreak on the performance and stability of global stock markets (e.g., Al-Awadhi et al., 2020, Ali et al., 2020, Ashraf, 2020, Baek et al., 2020, Baig et al., 2021, Haroon and Rizvi, 2020, Liu et al., 2020, Zhang et al., 2020). Recent studies prove that cryptocurrencies can be strong security or a safe haven during the COVID-19 pandemic (Wüstenfeld & Geldner, 2022). However, the above research focuses on short-term analysis.

Our research focuses on the analysis of the full two-year (2020-2021) period of the pandemic crisis, in which we formulate the following research problems:

- How did the prices of gold and the largest cryptocurrencies develop during the COVID-19 pandemic?

- Are there correlations between investing in gold and cryptocurrencies or between the studied cryptocurrencies?
- Can the most popular cryptocurrencies be considered a safe haven similar to gold?

3. Research Hypotheses, Methods, and Data

The prices of investment instruments are the result of investors' behavior in response to changing market conditions. We predict that the cryptocurrencies we study with the highest market capitalization cannot be a safe haven for investments in the conditions of a pandemic crisis. However, they can bring above-average profits.

In connection with above mentioned we present the following research hypotheses:

H1: Prices of gold and cryptocurrencies increase significantly during the crisis because investors seek a safe haven to protect their financial means.

H2: Investments in cryptocurrencies and gold are correlated with each other and continue their upward trend during the pandemic crisis.

H3: Cryptocurrencies with the highest market capitalization due to their volatility cannot be considered a safe haven similar to gold.

The method used in this study is the time series of daily quotes for the four the highest ranked cryptocurrencies in terms of market capitalization: Bitcoin, Ethereum, Binance Coin, and Cardano, listed on CoinMarketCap <https://coinmarketcap.com/> and for the gold prices listed on Investing <https://www.investing.com/>.

The output data set consists of standardized and harmonized time series covering two full years of daily quotations i.e., the period from 01/01/2020 to 31/12/2021. The time series have been normalized to 100% of the final value. In turn, the harmonization was conditioned by a different number of observations in individual time series. Gold prices do not include public holidays. These observations have been removed from the time series of cryptocurrency prices. Ultimately, three data sets were included in the analysis i.e., the whole time series and two separate subsets, which cover the first half of 2020 and other data dating back to the end of 2021, respectively. The first subset includes the time immediately after the outbreak of the pandemic COVID-19. The second subset includes the longer term, in which the restrictions due to the coronavirus in the dimension and scale of threat were similar.

The empirical analysis is based on the tools of descriptive statistics and on the correlation between the analyzed financial instruments to which three tests were applied. The choice of this simple analytical instrumentation was preceded by careful observation of research data sets and numerous calculations in the SPSS program. The high level of price volatility of individual cryptocurrencies combined with the lack of their periodic repeatability testifies to a high level of predictive unpredictability of these financial instruments.

4. Results and Discussion

The very high level of price differentiation of the analyzed cryptocurrencies in 2020-2021 is due to the multiple increases in their price value. In the case of the Cardano cryptocurrency, the price has increased more than 41 times. At the same time, the price of gold increased by over 19%, wherein the difference in extreme quotations reached 43%.

The coefficient of variation (CV) for gold equal to 6.02% indicates a low level of volatility of its price, unlike the analyzed cryptocurrencies. High and very high volatility in the case of cryptocurrency prices is related to the dynamic development of these financial instruments (Table 1).

Table 1.

Descriptive Statistics (N = 530; 01/01/2020-31/112/2021)

	Bitcoin	Ethereum	Binance Coin	Cardano	Gold
Mean *	29,124.66	1,539.35	198.62	0.79	1,802.47
Std.Dev.	19,628.48	1,437.16	214.73	0.83	108.51
CV	67.39%	93.36%	108.11%	105.03%	6.02%
Max*	67,549.74	4,810.07	676.32	2.96	2,121.70
Min*	5,002.58	110.41	9.37	0.02	1,485.00
Max/Min	13.50	43.57	72.18	123.59	1.43
$X_{(530)} / X_{(1)}$	6.56	28.65	37.81	41.43	1.19

Note: CV=Std.DEV./Mean – Coefficient of Variation. * In USD.

Source: own study.

The graphical presentation (Figure 1) of the normalized time series illustrates the volatility of cryptocurrency prices and their small share in the gold quotations.

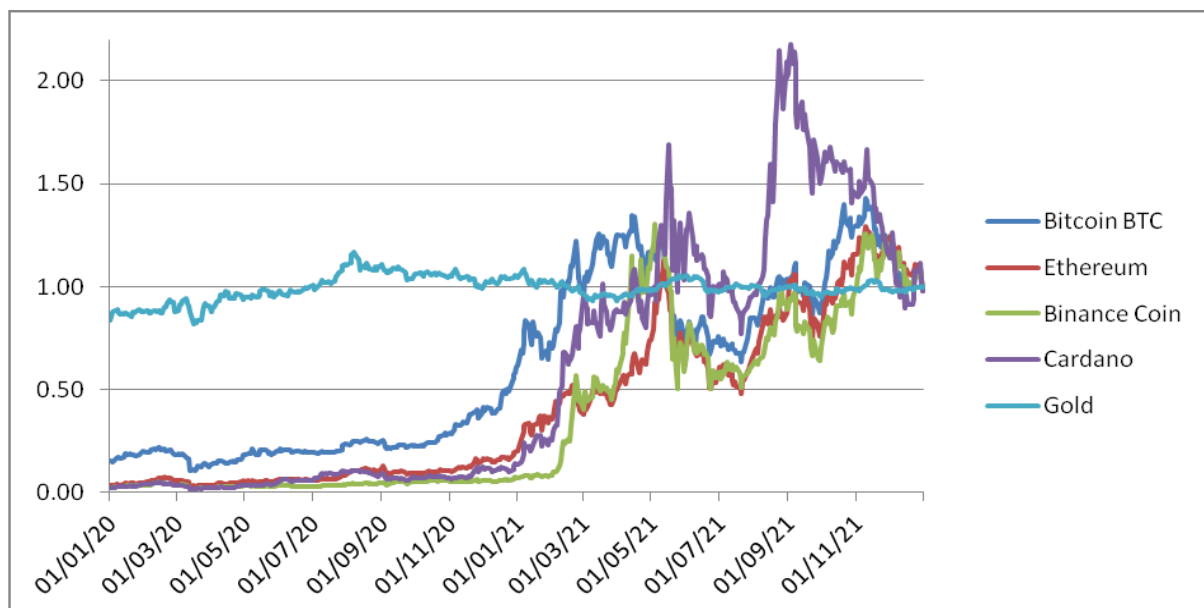


Figure 1. Cryptocurrency and gold prices in the period 01/01/2020 - 31/12/21 (31/12/2021 = 100%). Source: authors' work.

The correlation analysis shows a high level of positive price dependencies of individual cryptocurrencies in the analyzed period. With regard to gold, the obtained values of correlation coefficients do not give an unambiguous answer to the existence of dependences. However, taking into account the low values of these coefficients, the level of dependence should be considered negligible (Table 2).

Table 2.

Estimated correlation coefficients among variables (N=530; 01/01/2020-31/12/21)

Variables	CC	Bitcoin	Ethereum	Binance Coin	Cardano
Ethereum	a.	.905**(.000)			
	b.	.820**(.000)			
	c.	.936**(.000)			
Binance Coin	a.	.892**(.000)	.961**(.000)		
	b.	.802**(.000)	.873**(.000)		
	c.	.940**(.000)	.975**(.000)		
Cardano	a.	.863**(.000)	.926**(.000)	.904**(.000)	
	b.	.746**(.000)	.850**(.000)	.780**(.000)	
	c.	.901**(.000)	.963**(.000)	.928**(.000)	
Gold	a.	.049 (.255)	.061 (.157)	.002 (.957)	.022 (.610)
	b.	.045 (.123)	.127**(.000)	.078**(.007)	.123**(.000)
	c.	.163**(.000)	.242**(.000)	.188**(.000)	.241**(.000)

Note: CC - Correlation Coefficient, a. Pearson Correlation, b. Kendall's tau_b, c. Spearman's rho
 **. Correlation is significant at the 0.01 level (2-tailed).

Source: own study.

4.1. The Outbreak of the COVID-19 Pandemic and the Prices of Cryptocurrencies and Gold

The beginning of 2020 in the context of the COVID-19 pandemic and drastic limitations in social and economic life had a significant impact on investors' reactions and stock market quotations. Ultimately, however, the first half of 2020 in the overall settlement was not characterized by high volatility, both in the case of gold and the analyzed cryptocurrencies.

However, the statistical analysis based on descriptive measures ignores the fact that the relative homogeneity of individual data sets was due to large declines in quotations recorded in March 2020 after previous, systematic increases, and then after systematic increases again and again.

The first half of 2020 in the case of gold brought an increase in prices at a level similar to the previously analyzed two-year period 2020-2021 i.e., up to 19%. In the case of cryptocurrencies, there were also no declines in the end, while in the case of Binance Coin the increase was only 13%, which was less than in the case of gold.

Table 3.*Descriptive Statistics (N = 133; 01/01/2020-30/06/20)*

	Bitcoin	Ethereum	Binance Coin	Cardano	Gold
Mean*	8,472.91	194.25	16.77	0.05	1,675.19
Std.Dev.	1,297.85	42.36	3.26	0.02	84.79
CV	15.32%	21.81%	19.42%	33.78%	5.06%
Max*	10,323.96	282.04	26.46	0.09	1,816.90
Min*	5,002.58	110.41	9.37	0.02	1,485.00
Max/Min	2.06	2.55	2.82	3.72	1.22
$X_{(133)} / X_{(1)}$	1.28	1.76	1.13	2.55	1.19

Note: CV=Std.DEV./Mean - Coefficient of Variation. * In USD.

Source: own study.

The graphical presentation (Figure 2) of normalized time series reflects the changes in quotations based on clear returns on investment. The large drops in quotations recorded in mid-February 2020 turned into increases only after a month, and the pace of these changes was not as fast as in the case of the drops.

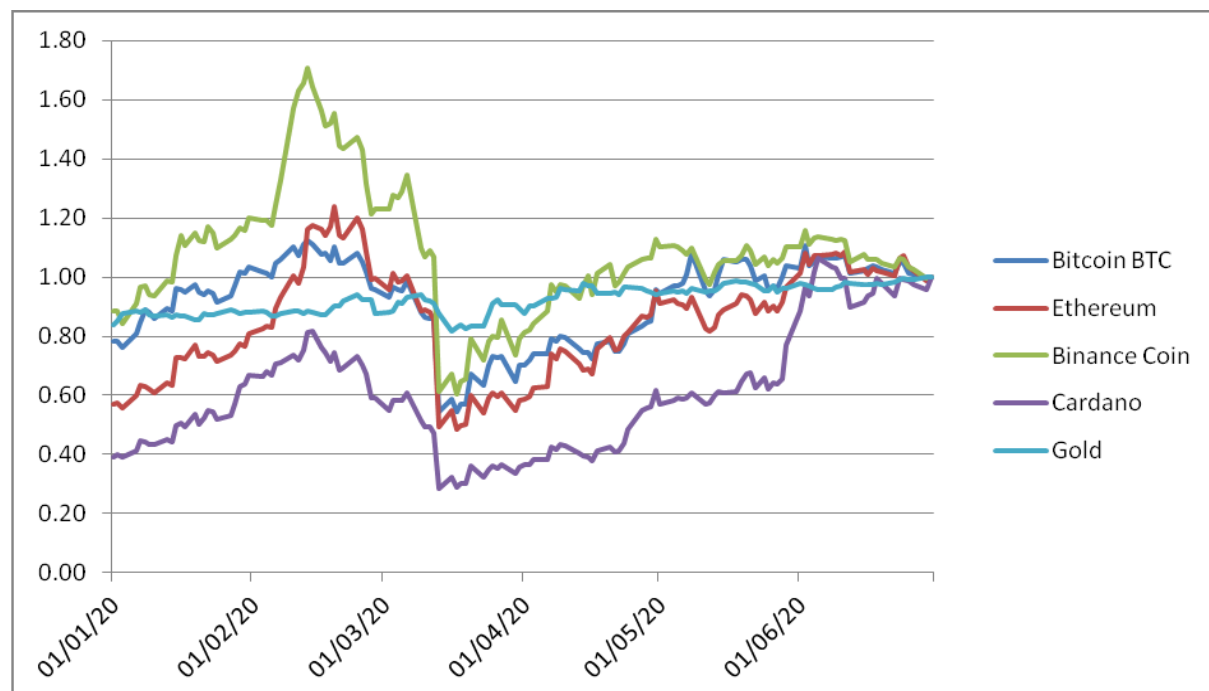


Figure 2. Cryptocurrency and gold prices in the period 01/01/2020 - 30/06/2020 (30/06/2020 = 100%). Source: author's work.

The correlation analysis shows a strong and very strong positive price dependence of the analyzed cryptocurrencies in the first half of 2020. With regard to Gold, there was a positive relationship in the case of three cryptocurrencies: Bitcoin, Ethereum, and Cardano. But the strength of this relationship was moderate. In addition, there was no correlation between Binance Coin and Gold. The corresponding calculations are presented in Table 4.

Table 4.*Estimated correlation coefficients among variables (N = 133; 01/01/2020-30/06/2020)*

Variables	CC	Bitcoin	Ethereum	Binance Coin	Cardano
Ethereum	a.	.854**(.000)			
	b.	.693**(.000)			
	c.	.868**(.000)			
Binance Coin	a.	.790**(.000)	.787**(.000)		
	b.	.607**(.000)	.586**(.000)		
	c.	.773**(.000)	.736**(.000)		
Cardano	a.	.809**(.000)	.831**(.000)	.508**(.000)	
	b.	.745**(.000)	.745**(.000)	.508**(.000)	
	c.	.889**(.000)	.892**(.000)	.648**(.000)	
Gold	a.	.360**(.000)	.495**(.000)	.030 (.732)	.517**(.000)
	b.	.231**(.000)	.352**(.000)	-.021 (.725)	.361**(.000)
	c.	.332**(.000)	.495**(.000)	-.033 (.710)	.484**(.000)

Note: CC - Correlation Coefficient, a. Pearson Correlation, b. Kendall's tau_b, c. Spearman's rho
 **. Correlation is significant at the 0.01 level (2-tailed).

Source: own study.

4.2. Cryptocurrency and gold prices in the COVID-19 pandemic

The period from July 2020 to December 2021 was characterized by large fluctuations in the prices of individual cryptocurrencies. However, as result led to multiple increases in their prices. The smallest increase exceeding 400% was related to Bitcoin, and the largest reaching 3.300% was recorded by Binance Coin. In the analyzed period of time, gold was characterized by very low volatility (CV = 4.22%) with the difference of extremely classified prices reaching 25%, and in the end reducing its initial quotations up to 1% compared to the quotations in December 31, 2021. The relevant calculations are presented in Table 5.

Table 5.*Descriptive Statistics (N = 397; 01/07/2020-31/12/2021)*

	Bitcoin	Ethereum	Binance Coin	Cardano	Gold
Mean *	36,043.26	1,989.98	259.54	1.04	1,845.11
Std.Dev.	17,968.99	1,395.45	16.25	0.82	77.90
CV	49.85%	70.12%	83.32%	79.16%	4.22%
Max*	67,549.74	4,810.07	676.32	2.96	2,121.70
Min*	9,072.85	226.13	15.41	0.08	1,691.20
Max/Min	7.45	21.27	43.89	38.56	1.25
X ₍₃₉₇₎ / X ₍₁₎	5.16	16.42	33.69	16.36	0.99

Note: CV=Std.DEV./Mean - Coefficient of Variation. * In USD.

Source: own study.

The graphical presentation (Figure 3) of the normalized time series illustrates the marked volatility of researched cryptocurrency prices and the lack of such volatility in the case of Gold.

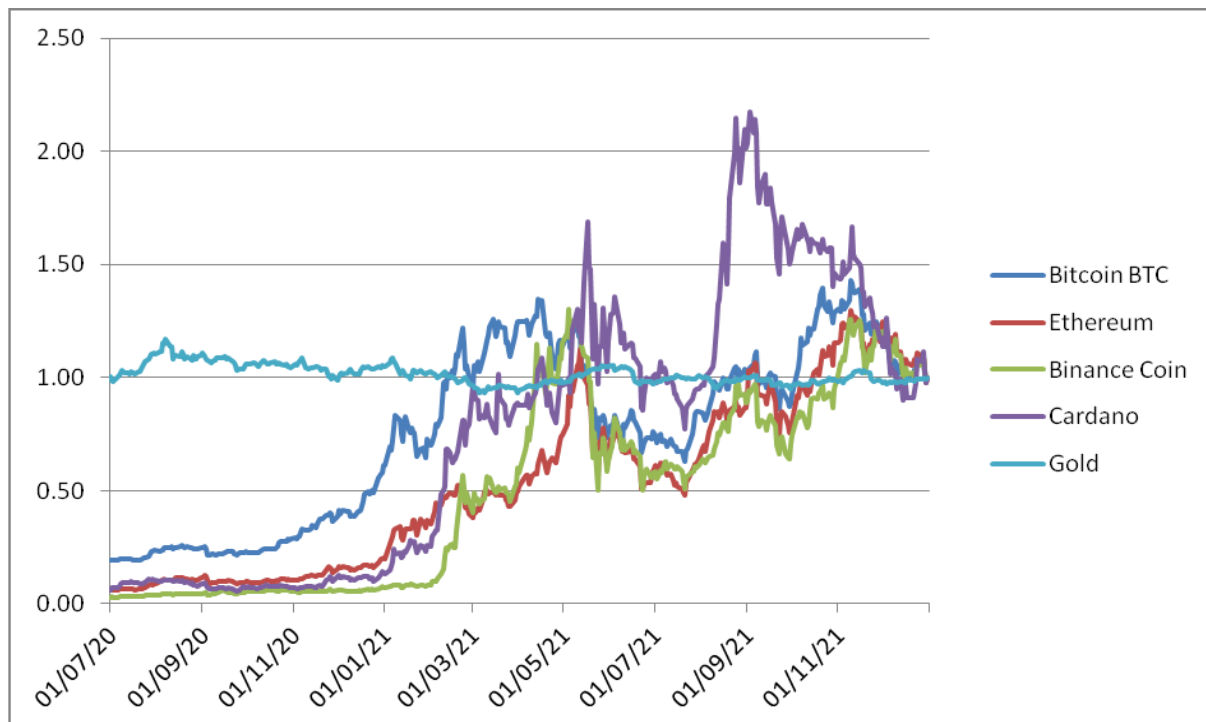


Figure 3. Notowania cen kryptowalut i złota w okresie 01/07/2020-31/12/2021 (31/12/2021=100%). Source: author's work.

The correlation analysis indicates a strong and very strong positive price dependence of all researched cryptocurrencies in the period from the second half of 2020 to the end of 2021. Comparing the cryptocurrencies with gold the dependence turned out to be negative and the strength of the relationship, in this case, was moderate, bordering on strong (Table 6).

Table 6.

Estimated correlation coefficients among variables (N = 397; 01/07/2020-31/12/2021)

Variables	CC	Bitcoin	Ethereum	Binance Coin	Cardano
Ethereum	a.	.863**(.000)			
	b.	.726**(.000)			
	c.	.857**(.000)			
Binance Coin	a.	.858**(.000)	.949**(.000)		
	b.	.719**(.000)	.848**(.000)		
	c.	.876**(.000)	.960**(.000)		
Cardano	a.	.808**(.000)	.898**(.000)	.871**(.000)	
	b.	.598**(.000)	.770**(.000)	.694**(.000)	
	c.	.783**(.000)	.921**(.000)	.869**(.000)	
Gold	a.	-.751**(.000)	-.594**(.000)	-.612**(.000)	-.621**(.000)
	b.	-.520**(.000)	-.399**(.000)	-.421**(.000)	-.417**(.000)
	c.	-.729**(.000)	-.604**(.000)	-.621**(.000)	-.614**(.000)

Note: CC - Correlation Coefficient, a. Pearson Correlation, b. Kendall's tau_b, c. Spearman's rho
 **. Correlation is significant at the 0.01 level (2-tailed).

Source: own study.

5. Conclusion

Significant increases in cryptocurrency prices in the past two years have become a fact proved by multiply changes in price quotations. The turmoil on the traditional stock exchanges in the first half of 2020 was of a temporary nature. Both in the case of gold and the analyzed cryptocurrencies, the balance of changes turned out to be positive. However, while the changes in the price of gold and cryptocurrencies in the first half of 2020 can be described as statistically convergent, the subsequent quotations reaching the end of 2021 were not of such a nature. Correlation analysis showed a clear negative dependence. Cryptocurrency prices have been steadily rising, ignoring systematic fluctuations in exchange rates, and the price of gold has changed slightly over time, eventually decreasing up to less than 1%.

The high level of volatility of prices included in the analysis of cryptocurrencies, combined with the lack of their periodic repeatability, proves a high level of unpredictability of this type of financial instrument, which requires leading further, systematic empirical research based on traditional statistical tools and enriched with new theoretical models.

The COVID-19 pandemic was the first global economic and financial phenomenon that has taken place during the existence of Bitcoin and other cryptocurrencies and their actual usage. During the pandemic, people gained more knowledge about cryptocurrencies by looking for alternative sources of investment. Nevertheless, whereas investments in gold continued their horizontal trend during the whole pandemic time, the cryptocurrencies with lower prices made it possible to achieve significantly higher profits.

To conclude, cryptocurrencies with the highest market capitalization have become undoubtedly high-yield investments, but due to their high volatility, they cannot be considered as a safe investment haven similar to gold.

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