Values of Cryptocurrencies Affected by COVID-19

Subjects: Business, Finance
Contributor: Kejia Yan

Cryptocurrencies have become a popular economic and financial topic. When a cryptocurrency is defined as a digital currency, it is very different from a fiat currency because cryptocurrencies are not issued by any judicial body. Generally, a cryptocurrency does not have any original intrinsic value; however, it has an extrinsic value that is totally dependent on the expectation that future investors will be willing to pay for it in the cryptocurrency market.

Keywords: cryptocurrencies ; dynamic conditional correlation ; generalized autoregressive conditional heteroscedasticity ; COVID-19 pandemic

1. Introduction

Cryptocurrencies have become a popular economic and financial topic. When a cryptocurrency is defined as a digital currency, it is very different from a fiat currency because cryptocurrencies are not issued by any judicial body (IFRSIC 2019). Generally, a cryptocurrency does not have any original intrinsic value; however, it has an extrinsic value that is totally dependent on the expectation that future investors will be willing to pay for it in the cryptocurrency market. Many researchers believe that cryptocurrencies will become a mainstream financial instrument in future global financial markets in addition to common stocks, commodities, and precious metals or foreign exchange instruments (Soylu et al. 2020).

The risk involved in cryptocurrencies is obvious. Because of their higher volatilities (Caporalea and Zekokh 2019; Siswantoro et al. 2020), cryptocurrencies cannot be accepted as a common standard for measuring the relative worth of goods and services, even though many researchers admit that cryptocurrencies are a medium of exchange. Accordingly, some researchers do not accept that cryptocurrencies are currencies; they prefer to maintain that cryptocurrencies behave more like an investment instrument than a currency (İçellioğlu and Öner 2019).

However, some researchers have suggested that the higher volatilities may be Granger causes of the higher liquidities. Barbara et al. (2019) verified the relationship between the volatility and liquidity of cryptocurrencies by investigating the daily and weekly data of the 12 most popular cryptocurrencies during the period of 2013–2017 and found that the cryptocurrencies with higher volatilities are Granger causes of high liquidities and can attract investors and lead to higher interest from investors.

In terms of changes in the value of cryptocurrencies, this volatility seems to have intensified during the COVID-19 pandemic (Siswantoro et al. 2020). As the year 2022 progresses, the epidemic has slowed down in many countries as vaccines become more widely available. Simultaneously, the dynamic conditional correlation (DCC) changes in cryptocurrencies before and after COVID-19 have become a major point of contention for investors. From a portfolio perspective, if the dynamic conditional correlation among cryptocurrencies increases, then holding multiple cryptocurrencies at the same time will increase the portfolio risk. Conversely, if the dynamic conditional correlation among cryptocurrencies decreases, then there is an opportunity to hedge risk. This fills the research gap by identifying the volatility of cryptocurrencies and the dynamic conditional correlation among different cryptocurrencies since the beginning of the COVID-19 pandemic.

After empirical analysis using sample data from 8 September 2017 to 14 February 2022 and studying the relationship between Bitcoin, Ethereum, and the other eight cryptocurrencies, including Tether, Ripple, Litecoin, Bitcoin Cash, Stellar, Monero, EOS, and NEO, the researchers confirmed that from the pre-COVID-19 period to the COVID-19 period almost all of the 10 cryptocurrencies' return growth rates increased. Moreover, the researched 10 cryptocurrencies' return indices had features of volatility clustering or memory persistence in the long run, and all of the 10 cryptocurrencies' GARCH values decreased from the pre-COVID-19 period to the COVID-19 period. The correlations among the varying GARCH time series of the 10 cryptocurrencies were quite high, and the correlations among the varying GARCH time series of the 10 cryptocurrencies increased from the pre-COVID-19 period to the COVID-19 period. This also found that, except for Tether, the varying correlations between the return indices of Bitcoin, Ethereum, and the other cryptocurrencies were very

strong; the correlations between the return indices of Ethereum and the other cryptocurrencies were higher than for Bitcoin and the others. Except for Tether, the average DCC values between Bitcoin, Ethereum, and the other cryptocurrencies increased; since the COVID-19 pandemic began, the correlations among the 10 cryptocurrencies' return indices, except for Tether's, have become higher than before. Finally, the correlations between the return indices of Tether and the other nine cryptocurrencies were negative, and Tether can be a hedge cryptocurrency for the other cryptocurrencies.

2. Values of Cryptocurrencies Affected by COVID-19

The volatilities of cryptocurrencies exhibit the characteristics of significant time varying and clustering. When large fluctuations in returns tend to be followed by relatively large fluctuations, smaller fluctuations in returns tend to be followed by relatively small fluctuations. This is accompanied by the realization that the bad news has a much bigger impact on the cryptocurrency market volatility than the good news (Palamalai et al. 2020). The characteristics of long memory or persistence in volatility have also been discussed by some researchers. Abakah et al. (2020) analyzed the volatility persistence in 12 main cryptocurrencies, including Bitcoin, Bitshare, Bytecoin, Dash, Ethereum, Litecoin, Monero, Nem, Ripple, Siacoin, Stellar, and Tether, by considering the possibility of structural breaks and found that the volatilities represented in both absolute and squared returns display long memory features, but after accounting for structural breaks, the degree of persistence in the cryptocurrency market is reduced.

Different cryptocurrencies have different volatility clustering structures and different spillover patterns, and the market price bubbles are associated with the volatilities of cryptocurrencies. Bitcoin, Ethereum, and Litecoin are the most relevant cryptocurrencies in general, serving as connection hubs for the linking of many other cryptocurrencies. However, their roles have been challenged lately, potentially owing to the increased usage of other cryptocurrencies over time. Sensoy et al. (2020) examined the high-frequency return and volatility of major cryptocurrencies, including Bitcoin, Bitcoin Cash, Dash, EOS, Ethereum, Ethereum Classic, Iota, Litecoin, OmiseGO, Monero, Ripple, and Zcash, using the 15-min time series from 10 August 2017 to 23 June 2018 and found that volatility clustering structures of the returns are distinct among the different cryptocurrencies. Enoksen et al. (2020) also studied which variables can predict bubbles in the prices of eight major cryptocurrencies by using the data from 27 December 2013 to 25 February 2019 and found that the multiple bubble periods were located in 2017 and early 2018. They mentioned that the cryptocurrencies' higher volatilities, trading volume, and transactions were positively associated with the presence of bubbles across the cryptocurrencies.

In fact, the relationship between cryptocurrencies and COVID-19 is a very topical subject (Iqbal et al. 2021). García-Medina and Hernández C. (2020) investigated the effects of the financial turbulence of 2020 on the cryptocurrency market by considering the hourly price and volume of transactions from December 2019 to April 2020, finding that the volatility clustering increased dramatically in March 2020. Corbet et al. (2020) analyzed the largest cryptocurrencies' time-varying correlations by using daily data from 2019 to 2020 and found that the cryptocurrencies' returns were significantly influenced by the negative sentiment around COVID-19 during 2020, and the trading volumes and returns of cryptocurrencies significantly increased. James et al. (2021) examined the distribution extremities and erratic behaviors of 51 cryptocurrencies using a structural break method to evaluate the impact of COVID-19 on the cryptocurrency market when the time period was divided into the pre-COVID-19 period from 30 June 2018 to 31 December 2019 and the COVID-19 period from 1 January 2020 to 24 June 2020. They found that during the pre-COVID-19 period, the cryptocurrency market exhibited considerable homogeneity with respect to the structural breaks in volatility, whereas during the COVID-19 period the homogeneity of volatility was disrupted by the pandemic and the self-similarity was reduced.

Since COVID-19 began in January 2020, and after the volatility clustering increased dramatically in March 2020 (García-Medina and Hernández C. 2020), the trading volumes and returns of cryptocurrencies have significantly increased (Corbet et al. 2020), with an unexpected shift toward positive average return among the distribution extremities (James et al. 2021), and most cryptocurrencies absorbed the small shocks of COVID-19 by registering positive gains (Iqbal et al. 2021).

In terms of financial strategies, after analyzing the correlations and the characteristics of hedging among cryptocurrencies, some scholars announced that the correlations between Bitcoin and the other cryptocurrencies are strong, and no hedging abilities exist among cryptocurrencies (Kyriazis et al. 2019). Ciaian et al. (2018) examined the interdependencies between Bitcoin and the other 16 alternative cryptocurrencies in the short run and long run by applying time series analytical mechanisms for the daily data during 2013–2016 and found that the correlations between the prices of Bitcoin and the other 16 alternative cryptocurrencies are indeed significantly strong in both the short run and the long run.

However, it is worth examining whether such an opportunity is arising in the post-COVID-19 pandemic period. To illustrate, the unique characteristics of Tether have been isolated from the other cryptocurrencies, and some researchers have

proven that Tether has different characteristics from the other cryptocurrencies. Tether exhibits unusually docile profiles for extreme behaviors (James et al. 2021). Dilek et al. (2020) studied how the changes in gold and oil prices affected the daily price movements of various cryptocurrencies, including Bitcoin, Ethereum, Tether, Litecon, and EOS, for the period from 1 August 2017 to 3 April 2019 and found that there were no cointegration relationships between the cryptocurrencies and the macroeconomic factors, including gold and oil prices, except for Tether. Huynh et al. (2020) investigated the volatility spillover effects among 14 cryptocurrencies by using the daily dataset covering the period from April 2013 to April 2019, finding that only Tether had average negative return while all the other cryptocurrencies exhibited positive values.

From the above literature review, the researchers found deficits in the research on cryptocurrencies that the researchers needed to pay more attention to in the researchers research.

Firstly, although many researchers have studied the varying volatilities of cryptocurrencies (Palamalai et al. 2020; Abakah et al. 2020; Enoksen et al. 2020) and the impacts of COVID-19 on the cryptocurrencies' volatility (Ardia et al. 2019; García-Medina and Hernández C. 2020; James et al. 2021), the average decreasing features from the pre-COVID-19 period to the COVID-19 period have not been summarized by anyone, and the researchers will discuss this issue. Actually, volatility clustering is a basic in-sample characteristic of cryptocurrencies (Ardia et al. 2019); based on a GARCH(1,1) model, the characteristics of clustering, spillover, asymmetry, and long memory in volatility share the same feature, which is dependent on the coefficient of GARCH. If the researchers do not consider the reasons for the time series' volatility, the researchers can find the characteristics of volatility by investigating the models of GARCH.

Secondly, although the volatility connectedness of cryptocurrencies has been discussed by some researchers (Le et al. 2021), the structure changes between the pre-COVID-19 and COVID-19 periods have not been discussed. Because the sample observations of the previous researchers for the COVID-19 period are not enough, it is necessary to reassess the result.

Thirdly, even though some researchers have discussed the time-varying correlations (Corbet et al. 2020) and returns (Iqbal et al. 2021), seldom have researchers discussed how COVID-19 impacts on the cryptocurrencies' correlation and return together. For cryptocurrencies, higher positive correlations will represent the homogeneity among them, but low or negative correlations will represent the hedging abilities among them. The dynamic conditional correlation (DCC) models are usually used to represent the dynamic relationship for a normality time series. It is necessary to analyze the correlations of the cryptocurrencies dynamically.

Finally, even though some researchers have proven that no hedging abilities exist among the cryptocurrencies (Kyriazis et al. 2019), it is still necessary to discuss the characteristics of Tether (Dilek et al. 2020; Huynh et al. 2020; James et al. 2021). the researchers will discuss if Tether can be a hedge cryptocurrency for the other cryptocurrencies.

References

1. IFRSIC. 2019. Committee's Tentative Agenda Decisions on Holdings of Cryptocurrencies. IFRS Interpretations Committee (IC), Update March 2019. Available online: https://www.ifrs.org/news-and-events/updates/IFRSIC-updates/march-2019/#1 (accessed on 9 September 2020).
2. Soylu, Pinar Kaya, Mustafa Okur, Ozgur Çatıkkaş, and Ayca Altintig. 2020. Long memory in the volatility of selected cryptocurrencies: Bitcoin, Ethereum and Ripple. Journal of Risk and Financial Management 13: 107.
3. Caporale, Guglielmo Maria, and Timur Zekokh. 2019. Modelling volatility of cryptocurrencies using Markov Switching GARCH models. Research in International Business and Finance 48: 143–55.
4. Siswantoro, Dpdik, Rangga Handika, and Aria Farah Mita. 2020. The requirements of cryptocurrency for money, an Islamic view. Heliyon 6: e03235.
5. İçellioğlu, Cansu Şarkaya, and Selma Öner. 2019. An investigation on the volatility of cryptocurrencies by means of heterogeneous panel data Analysis. Procedia Computer Science 158: 913–20.
6. Będowska-Sójka, Barbara, Tomasz Hinc, and Agata Kliber. 2019. Causality between Volatility and Liquidity in Cryptocurrency Market. Working Paper.
7. Palamalai, Srinivasan, K. Krishna Kumar, and Bipasha Maity. 2020. Testing the random walk hypothesis for leading cryptocurrencies. Borsa Istanbul Review 21: 256–68.
8. Abakah, Emmanuel Joel Aikins, Luis Alberiko Gil-Alana, Godfrey Madigu, and Fatima Romero-Rojo. 2020. Volatility persistence in cryptocurrency markets under structural breaks. International Review of Economics and Finance 69: 680–91.

9. Sensoy, Ahmet, Thiago Christiano Silva, Shaen Corbet, and Benjamin Miranda Tabak. 2020. High-Frequency Return and Volatility Spillovers among Cryptocurrencies. Researchgate, June. Available online: https://www.researchgate.net/publication/341820733 (accessed on 30 November 2020).
10. Enoksen, F. A., C. J. Landsnes, K. Lucivjanská, and P. Molnár. 2020. Understanding risk of bubbles in cryptocurrencies. Journal of Economic Behavior and Organization 176: 129–44.
11. Iqbal, Najaf, Zeeshan Fareed, Guangcai Wan, and Farruskh Shahzad. 2021. Asymmetric nexus between COVID-19 outbreak in the world and cryptocurrency market. International Review of Financial Analysis 73: 101613.
12. García-Medina, Andrés, and José B. Hernández C. 2020. Network analysis of multivariate transfer entropy of cryptocurrencies in times of turbulence. Entropy 22: 760.
13. Corbet, Shaen, Yang Hou, Yang Hu, Charles Larkin, and Larkin Oxley. 2020. Any port in a storm: Cryptocurrency safe-havens during the COVID-19 pandemic. Economics Letters 194: 109377.
14. James, Nick, Max Menzies, and Jennifer Chan. 2021. Changes to the extreme and erratic behaviour of cryptocurrencies during COVID-19. Physica A 565: 125581.
15. Kyriazis, Nikolaos A., Kalliopi Daskalou, Marios Arampatzis, Paraslevi Prassa, and Evangelia Papaioannou. 2019. Estimating the volatility of cryptocurrencies during bearish markets byemploying GARCH models. Heliyon 5: e02239.
16. Ciaian, Pavel, Miroslava Rajcaniova, and Artis Kancs. 2018. Virtual relationships: Short- and long-run evidence from BitCoin and altcoin markets. Journal of International Financial Markets, Institutions & Money 52: 173–95.
17. Dilek, Teker, Teker Suat, and Ozyesil Mustafa. 2020. Macroeconomic determinants of cryptocurrency volatility: Time series analysis. Journal of Business & Economic Policy 7: 65–77.
18. Huynh, Toan Luu Duc, Muhammad Ali Nasir, Xuan Vinh Vo, and Thong Trung Nguyen. 2020. Small things matter most: The spillover effects in the cryptocurrency market and gold as a silver bullet. North American Journal of Economics and Finance 54: 101277.
19. Ardia, David, Keven Bluteau, and Maxime Rüede. 2019. Regime changes in Bitcoin GARCH volatility dynamics. Finance Research Letters 29: 266–71.
20. Le, TN-Lan, Emmanuel Joel Aikins Abakah, and Aviral Kumar Tiwari. 2021. Time and frequency domain connectedness and spill-over among fintech, green bonds and cryptocurrencies in the age of the fourth industrial revolution. Technological Forecasting & Social Change 162: 120382.
