COVID-19, Cryptocurrency Bubble and Cryptocurrency Market Efficiency in The World

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Abstract

This study examines the effects of the epidemic and the price bubble on the effectiveness of the cryptocurrency market. In this Research, We collect the daily closing price of 5 cryptocurrencies from https://coinmarketcap.com/. The data was taken from 01 September 2017 to 14 December 2021 with a total data or sample of 1231 daily data from each currency or a total of 6155 samples from a total of all tested currencies. The five cryptocurrencies are Litecoin (LTC), Cardano (ADA), Ethereum (ETH), Ripple (XRP), and Bitcoin (BTC). To measure market inefficiency we use magnitude market inefficiency (MIM) and the study by Le Tran and Leirvik (2019) is used to establish the adjusted magnitude of market inefficiency (AMIM). In this study AMIMt is calculated on a daily frequency by using the daily closing price as the basis for calculation.We found that the three periods of the cryptocurrency bubble in the cryptocurrency market occurred in late 2017, early 2018, and July 2020. The cryptocurrency financial bubble had a lesser impact than the announcement of a worldwide pandemic being declared for COVID-19 on March 11, 2020. It is very likely that a bubble will occur during July 2020 related to the declaration that COVID-19 is a pandemic of global scope.

Keywords: Covid-19, Cryptocurrency, Cryptocurrency Bubble, Cryptocurrency Market Efficiency
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Introduction

As an alternative to funding the COVID-19 response agenda, the Covid-19 pandemic has fostered the study of finance and research in the area of finance (Baker et al., 2020). Financial sector analysis pertaining to Covid 19 is still scarce in the study of financial literature and financial technology (Corbet et al., 2020). Money has been transformed gradually following technological developments to date. The cryptocurrency was born as the newest form of money transformation of this century (Sebastiana et al, 2021). Le Tran and Leirvik (2020) discovered that the price of cryptocurrencies on the cryptocurrency market was in a bubble. But it's still unclear how stable the value of cryptocurrencies is. Sasongko et al. (2021) explained that the level of stability of cryptocurrencies still leaves a big question mark with the bubble period and various unexpected things in the cryptocurrency market.

Charfeddine and Maouchi, 2019 explain indications of the development of empirical research related to financial crypto currency and COVID 19. Charfeddine and Maouchi (2019) explain that market efficiency and development of cryptocurrency technology can be studied scientifically including the level of profit from investing in cryptocurrency. However, According

to Bariviera's (2017) research, the market was inefficient in the year before 2014 but has improved since then. Prior to 2017, the majority of cryptocurrencies were inefficient, according to Le Tran and Leirvik (2020). However, during the 2017-2019 period there was an improvement in crypto market efficiency. Wang and Wang (2021) researched the development of cryptocurrencies during the pandemic and found price bubbles and volatility in cryptocurrency prices.

Contrary to the conclusions of Charfeddine and Maouchi (2019), Bariviera (2017), Le Tran and Leirvik (2020), and Apergis Research (2021), the COVID-19 epidemic increases the volatility of cryptocurrency prices, which has a favorable impact just on conditional variance of returns on investments.

Based on previous research, there was a change in market efficiency at a certain period throughout the Covid-19 era, the market for cryptocurrencies had a fairly big price increase. This is the motivation of our research in answering research questions. How stable is the cryptocurrency market considering the Covid-19 pandemic? We using 5 cryptocurrencies as an indicator of price balance in the crypto market.

Data and Research Method

In this Research, We collect the daily closing price of 5 cryptocurrencies from https://coinmarketcap.com/. The data was taken from 01 September 2017 to 14 December 2021 with a total data or sample of 1231 daily data from each currency or a total of 6155 samples from a total of all tested currencies. The five cryptocurrencies are Litecoin (LTC), Cardano (ADA), Ethereum (ETH), Ripple (XRP), and Bitcoin (BTC).

To test market efficiency, we use the return dynamics described by AR(q):

$R_t = \mu + \beta_1 R_{t-1} + \beta_2 R_{t-2} + ...+ \beta_q R_{t-q} + E_t$

$\beta_1,\beta_2,\ldots, \beta_q$ is the coefficient of currency changes with a price of R and μ is the initial price when the calculation starts in this study. In order to satisfy the efficient market hypothesis (EMH) in terms of price stability, the coefficients $\beta_1,\beta_2,\ldots, \beta_q$ = Lim 0 or close to zero but not equal to zero. To test the market we use a vector of standard estimated coefficients designed with = (β_1, β_2, …, q) = L– 1β. To measure market inefficiency we use magnitude market inefficiency (MIM). With the following calculation formula:

$MIM_t = \sum_{j=1}^{q} \beta^s_{jt} / 1 + \sum_{j=1}^{q} \beta^s_{jt}$

MIMt has a value between 0 and 1. Value of MIM_t Efficiency increases with distance from zero, but inefficiency decreases with distance from one. The second phase involves applying research by Le Tran and Leirvik (2019) and using the following calculation formula equation to get the adjusted magnitude of market inefficiency (AMIM):

$AMIM_t = MIM_t – R_{CI} / 1 - R_{CI}$

The market is indicated to be more efficient when the market is getting closer to zero and vice versa. In this study $AMIM_t$ is calculated on a daily frequency by using the daily closing price as the basis for calculation.

Result and Discussion

In understanding the efficiency of the cryptocurrency market, table 1 is presented, below.

Table 1. Assessments of the efficiency of static markets and descriptive statistics

Cryptocurrency	Descriptive Statistic				Market efficiency tests			
	Mean	Max	Min	St.Dev	VR	R/S	GPH	ELW
Bitcoin [BTC]	0.17	20.41	-45.17	4.02	1.03	1.72	0.07	0.05
Ethereum [ETH]	0.09	23.22	-53.06	4.97	1.06	1.69	0.09	0.07
Ripple [XRP]	0.04	60.79	-54.97	6.21	1.18	1.29	0.17	0.10
Cardano [ADA]	0.19	85.89	49.27	7.39	1.13	1.79	0.11	0.13
Litecoin [LTC]	0.07	39.01	-45.05	5.48	1.07	1.49	0.10	0.11

To see the volatility of cryptocurrency prices on the market, we can look at the standard deviation in Table 1. Table 1 shows the lowest volatility (4.02%) in Bitcoin. Ethereum volatility 4.97%, Ripple volatility 6.21%, Cardano in 7.39% and Litecoin in 5.48%. The variance ratio statistic is abbreviated as VR. The three statistics used for the long memory test are R/S, GPH, and ELW. Based on the ratio variance, all cryptocurrencies studied have a ratio variance greater than 1. This shows that all cryptocurrencies studied in this study indicate an over-dispersed negative binomial distribution. R/S is Rescaled range analysis. In this study, Rescaled range analysis is used to investigate the rate of return. In Table 1. This shows that all cryptocurrencies have a rate of return on a time series of more than 1. This means that each crypto currency studied in this study on average can generate profits of more than 1 coin per time series period.

Table 2. Cryptocurrency Market Efficiency

Cryptocurrency	Whole Period		Non Bubble Period		Bubble Period		Pre - Pandemic Period		Pandemic Period	
	%ME	Median	%ME	Median	%ME	Median	%ME	Median	%ME	Median
Bitcoin [BTC]	44.707	0.021	31.591	0.031	47.111	0.001	4.187	0.221	65.917	-0.049
Ethereum [ETH]	44.337	0.021	17.776	0.201	48.936	0.002	7.212	0.232	63.512	-0.071
Ripple [XRP]	49.117	-0.014	10.112	0.149	56.117	-0.031	20.190	0.175	71.114	-0.131
Cardano [ADA]	45.991	0.019	39.619	0.251	51.101	-0.098	19.022	0.218	63.303	-0.018
Litecoin [LTC]	52.889	-0.015	32.999	0.257	55.001	-0.021	6.918	0.169	75.002	-0.112

In table 2, % ME denotes the frequency of efficient trading on the cryptocurrency market over the research period. The median is the average of many series measuring market efficiency. The findings of the AMIM criterion are shown in Table 2 as a percentage and a median market efficiency. We examined the overall period outcomes between the bubble and non-bubble periods, as well as between the time before and after the WHO designated the COVID-19 pandemic a worldwide pandemic.

The five cryptocurrencies under study are effective at more than half of the sample period's points, according to Table 2. Table 2 reveals that on March 11, 2020, the WHO declared COVID-19 to be a health pandemic, which had a significant impact on the efficiency of the

cryptocurrency market. The impact of this announcement has an impact until the end of the study period with a 50% change in inefficiency (median negative). The three periods of the cryptocurrency bubble in the cryptocurrency market occurred in late 2017, early 2018, and July 2020. The cryptocurrency financial bubble had a lesser impact than the announcement of a worldwide pandemic being declared for COVID-19. It is very likely that a bubble will occur during July 2020 related to the declaration that COVID-19 is a pandemic of global scope.

Conclusion

The effectiveness of the bitcoin market is examined in this study in relation to the epidemic and the bubble of price movements. The three periods of the cryptocurrency bubble in the cryptocurrency market occurred in late 2017, early 2018, and July 2020. The cryptocurrency financial bubble had a lesser impact than the announcement of a worldwide pandemic being declared for COVID-19 on March 11, 2020. It is very likely that a bubble will occur during July 2020 related to the declaration that COVID-19 is a pandemic of global scope.

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