Cryptocurrencies responses to the Covid-19 waves

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Abstract:

We investigate in this paper the evolution of the dynamic relationship between Covid-19 cases and cryptocurrency markets. Furthermore, we examine their sensitivity to the second wave period.

Using a DCC-garch model, our findings show different sensitivities between cryptocurrency markets to the Covid-19 pandemic. Besides, we emphasize that the sensitivity of transaction volume in the cryptocurrency markets to the number of covid-19 cases is negatively and significantly affected by the second wave of the pandemic. Then, we underline a suspicious perception of the hedging power of the cryptocurrency market in the covid-19 period.

Keywords: cryptocurrency markets, Covid-19, second wave period

JEL classification:

C1

C32

G15

Introduction

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Pandemics are not new and have occurred at different stages in human history (Ferguson et al., 2020). However, their impacts on financial markets are different and sometimes divergent. The market's sensitivity to these crises can provoke unexpected responses and sometimes disclose the precariousness of a market considered a riskless or safe haven.

Covid-19 crises are still one of the most disturbing health crises of this decade. Starting in china, this pandemic spread rapidly to threaten the whole globe, which explains the global interest in studying its impact on economic and financial stability around the world, especially that, Goodell et Goute(2020) highlights that this virus is inflicting unprecedented global destructive economic damage.

Our research focuses on cryptocurrency's market sensitivity to the pandemic framework. This market arouses the researcher's interest in their apparition. This interest arises with the emergence of Covid 19 since the end of 2019.

Moreover, the analysis of the cryptocurrency market's sensitivity in a health crisis is a first since the emergence of this market whose could challenge its performance. This research focus to test the trust criterion on which is based cryptocurrency prices and demand. On this subject, Greco(2001) considers that the value of these currencies is based on trust that will be valuable and acceptable as a medium of exchange in the future. Thus, we seek to test the market's confidence in the high degree of liquidity of these products, their performance, and the fruitful potential of this type of investment.

It is with this objective that we are carrying out an empirical investigation on the response of the cryptocurrency market stakeholders in terms of transaction volume to the emergence of a crisis framework absolutely new for them.

Noting that several researchers explain the changes in transaction volumes and prices of these products by their sensitivity to several factors as market fundamentals (Buchholzet al.(2012)), investors' attractiveness(Sovbetov(2018), Ciaian et al.(2016), Kristoufek(2013),) and financial indicators(Van Wijk 2013).

This study contributes to these researches by analyzing the Covid-19 crisis framework over a period of ten months. Knowing that the investors' behavior changes in crisis frameworks and that their confidence level may well be affected too, this research tries to disclose the sensitivity of the cryptocurrencies market stakeholders to this crisis.

Empirically, our research adopts an econometric approach based on the DCC-Garch model to analyze the dynamic relationship between the Covid-19 and the cryptocurrency market volume of transaction evolution. It presents, to the best of our knowledge, an unprecedented empirical investigation of the pandemic second wave's impact on the dynamic relationship between covid-19 cases and cryptocurrencies transaction volume.

The remainder of the paper is as follows. We start with a state of the art. We pass them to the data and the applied methodology. Finally, we describe the empirical results and conclude.

- ## State of the art

Analyzing the sensitivity of the cryptocurrency market to the crisis framework requires disclosure of the perception of the risk associated with it by financial market participants. In this context, the cryptocurrency hedging power analysis during the Covid-19 period remains a subject of debate and recent research investigation. Some studies on this subject find the expectations about the character of safe-haven related to cryptocurrencies somewhat dubious. Moreover, Conlon and McGee(2020) find cast doubt on the ability of Bitcoin to provide shelter from turbulence in traditional markets.

In the same resonance, Vukovic et al.(2021) Argue that policymakers and investors cannot accept cryptocurrencies (especially Bitcoin) as safe-havens, but only as highly volatile and speculative assets.

Similarly, Dutta et al.(2020) suggest that gold is a haven asset for global crude oil markets. Bitcoin, on the other hand, acts only as a diversifier for crude oil. Thus, the role played by the cryptocurrency market in the covid-19 framework is limited to diversification, thus making it possible to reduce the degree of exposure to risk without offering a hedge against its realization. Samely, Corbet et al.(2020), identified a potential role for cryptocurrencies in investor portfolios as a significant diversification option.

On the contrary, other studies have reviewed the safe-haven properties of cryptocurrencies to measure the hardness of the Covid-19 pandemic. They hold that cryptocurrency markets can be a haven for financial markets in the face of a major crisis such as covid-19(Goodell and Goute(2021), Jeribi and Manzli(2021)).

Goodell and Goute (2020) consider that cryptocurrencies do not provide a diversification benefit during downturns. Demir et al. (2020) show the hedging role of cryptocurrencies against the uncertainty raised by COVID-19.

In this regard, the findings of Rubbaniy et al. (2021) support that long-term investors can invest in the cryptocurrency market to hedge the risks during the Covid-19 pandemic. This market, therefore, presents a hedging power and a refuge from this crisis.

Divided between a diversification role (Dutta et al. 2020, Corbet et al.(2020)) and therefore risk reduction and a hedging-tool (Goodell and Goute(2020), Jeribi and Manzli(2021), Demir et al.(2020), Rubbaniy et al.(2021)) and therefore potentially risk cancellation, previous research has underlined the sensitivity of this market to the health crisis and the importance of its role in this context (Marbouh et al.(2020)).

On this subject, Mnif et al.(2020) and El Montasser et al.(2021) detect that the Covid-19 has a positive impact on the cryptocurrency market efficiency. In another perspective, Lahmiri and Bekiros(2020) find that cryptos showed more instability and more irregularity during the COVID-19 pandemic compared to international stock markets.

- ## Data and applied methodology:

<u>-Sample</u>

As presented in Table 1, our work focuses on a sample collected daily, with 206 observations per data for the period between January 2, 2020, and October 15, 2020.

Insert table 1

To verify the adaptability of the Garch models to our study framework, a preliminary analysis of the variables is first conducted to verify the existence of the Arch effect by applying the heteroscedasticity test to series estimated in first differences All variables were estimated in first difference due to the non-stationarity at level using the Ordinary least squares (OLS). Table 2 allows the rejection of the null hypothesis; thus, an Arch effect is observed. We can use models from the Garch family to estimate.

Insert table 2

-Applied methodology:

First, we begin this empirical investigation by applying the DCC-Egarch model to the first difference variables. This step allows us to analyze the conditional variance of each variable. Moreover, we detect the dynamic conditional correlation between the variable covid-19 cases and each type of cryptocurrency. In the second step, we will estimate the detected dynamic conditional correlations by an Egarch model. Finally, we will examine the impact of the second wave's pandemic period introduction on the estimated variables.

Table 3 presents the results of Unconditional Variances estimation of our variables estimation in first difference with the following DCC-EGarch (1.1) model:

-The average equations:

$$D(X)_t = C * D(X)_{t-1} + \varepsilon x_t \quad (1)$$

$$D(y)_t = C * D(y)_{t-1} + \varepsilon y_t \quad (2)$$

Where X presents the covid-19 Cases.Y presents the volume of transactions in Tether, Bitcoin and Litecoin markets. εx_t and εy_t present the innovations normally distributed.

-The variance equations:

$$ln(\sigma x_t^2) = \omega + \alpha(\phi \varepsilon x_{t-1} + \gamma(|\varepsilon x_{t-1}| - E|\varepsilon x_{t-1}|) + \beta ln\sigma x_{t-1}^2 \quad (3)$$

$$ln(\sigma y_t^2) = \omega + \alpha(\phi \varepsilon y_{t-1} + \gamma(|\varepsilon y_{t-1}| - E|\varepsilon y_{t-1}|) + \beta ln\sigma y_{t-1}^2 \quad (4)$$

Insert table 3

To examine the impact of the second wave's pandemic period introduction on the estimated variables, we propose the following Egarch model:

The average equation:

$$\rho_{(xy)_t} = c * \rho_{(xy)_{t-1}} + \delta K_t^i + \varepsilon_t \quad (5)$$

Where, X presents Covid-19 cases. Where X presents the covid-19 Cases.Y presents the volume of transactions in Tether, Bitcoin and Litecoin markets.

K_t^i is a dummy variable that takes the value 1 in the period of the second wave and 0 otherwise. To detect the date of the beginning of the second wave, we used the bai perron structural rupture test applied to the number of covid cases 19 indicating a structural break on August 18, 2020. This date, therefore, marks the start of the second wave of the pandemic.

The variance equation:

$$ln(\sigma \rho_{(xy)_t}^2) = \omega + \alpha(\phi \varepsilon_{t-1} + \gamma(|\varepsilon_{t-1}| - E|\varepsilon_{t-1}|) + \beta ln\sigma \rho_{(xy)_{t-1}}^2 \quad (6)$$

- ## Empirical results and conclusion:

Table 3 shows that the degree of persistence to shock events is greater for the Tether and Litecoin markets. Hence, the Bitcoin market is finding it easier to recover from a shock. This fact can be explained by Cheach and Fry(2015) whose describe Bitcoin as a cryptocurrency conceived as an alternative to government-backed currencies. This typology of cryptocurrencies is the most famous with an estimated market capitalization of 158 billion dollars. It accounts for around 70% of the total estimated crypto, which can explain the uniqueness of its response to crisis framework.

Similarly, we find that different cryptocurrency markets behave differently to negative information. This result considering cryptocurrencies sensitivity differences fits with a large number of previous studies.

At this subject, Demir et al.(2020) show that the sensitivity between the cryptocurrency market and covid 19 is different depending on the typology of the cryptocurrency. Furthermore, Conlon et McGee.(2020) determine some differences between cryptocurrencies in risk hedging, during the initial bear market period associated with the COVID-19 crisis.

Table 4 indicates a negative relationship between the different cryptocurrency markets and the number of covid-19 cases around the world. Then, Bitcoin, Tether, and Litecoin volume of transaction co-move inversely to cases number of covid-19 with. This result fits with Conlon and McGee(2020) whose find cast doubt on the ability of Bitcoin to provide shelter from turbulence in traditional markets.

Then we conclude at this level that the attractiveness of cryptocurrencies was negatively affected in the Covid-19 crisis framework affecting crypto fundamentals and transaction volumes.

Insert table 4

We can also discern that this co-movement is the least sensitive to its past evolution. Moreover, dynamic cross-correlations between covid-19 cases and cryptocurrency markets are sensitive to the second wave of the pandemic introduction. Nevertheless, this effect differs between different cryptocurrency markets. This result confirms the significant relationship between cryptocurrencies fundamentals and the fluctuation of market risk level previously approved by Sovbetov(2018).

As a conclusion, we detect the sensitivity of cryptocurrency transaction volumes to changes in the number of Covid-19 cases across the world over the entire period. The underlined effect is negative. Our result fits with those of Lahmiri and Bekiros(2020) whose detect that investing in digital assets during big crises as the COVID-19 pandemic, could be considered riskier as opposed to equities.

The dynamic relationship between Covid-19 and cryptocurrencies intensifies with the appearance of negative information and the new pandemic wave emergence. However, the sensitivity detected differs between different cryptocurrency markets. Thus, we point out that bitcoin behaves in a different way to the other tested markets. Thus, it has lower impact persistence and, therefore, better global hedging power. This fact is explained by Ciaian et al.(2016) whose consider that macro-financial developments aren't driving Bitcoin price. They consider that Bitcoin market fundamentals and Bitcoin's attractiveness for investors have a significant impact on its price.

The introduction of the second wave to our analysis allows us to underline a suspicious perception of the capacity of the cryptocurrency market to hedge whose is reflected by the volume of transactions at these markets.

Thus, Bitcoin and Tether's sensitivity to Covid-19 cases decreases significantly during the second wave period. In contrast, the case number-Litecoin correlation is linked positively to the second period of the pandemic wave.

The findings of this study could benefit the investors in the cryptocurrency market to direct their investments towards the least sensitive typology in the current health crisis framework.

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Tables

Table 1 :Data presentation and stationarity results

Source : author calculation

	Tether	Bitcoin	Litecoin	COVID-19 Cases
Definition :	Volume of daily transactions	Volume of daily transactions	Volume of daily transactions	Number of cases
Data source	www.coinmarketcap.com	www.coinmarketcap.com	www.coinmarketcap.com	www.ourworldindata.org
Mean	4.25E+10	3.31E+10	3.29E+09	131700.6
Median	4.24E+10	3.25E+10	3.04E+09	100294.0
Skewness	0.548930	0.524705	0.489888	0.339601
Kurtosis	3.853535	2.936569	2.378600	1.746729
ADF results	Not stationary	Stationary	Not stationary	Not stationary
Result in first difference	Stationary	Stationary	Stationary	Stationary

Table 2: The heteroscedasticity test results :

Source : Author calculation

	F-stat
Tether	7.842175***
Bitcoin	9.798113***
Litecoin	13.01140***
Covid-19 cases	4.783895**

Note: rejection of null hypothesis (No Arch effect) at 1%, 5% and 10%

Table 3: The results of the estimation of the unconditional variances

Source: Author calculation

	ω	α	γ	β	C
D(Covid-19 Cases)	-0.5250	0.9813***	-0.0368	0.9349***	811.7254***
D(Tether)	43.0634	0.2189	0.2120	0.5520**	8.31E+08
D(Bitcoin)	17.6089	0.7785***	0.0064	0.5991**	7.65E08
D(Litecoin)	11.3374	0.1449	0.4096**	0.7162*	62561950

Table 4: The results of model EGarch (1.1) on dynamic cross-correlations:

Source: author calculation

	$\rho_{(\text{Covid}-19\ \text{cases},\text{Tether})}$	$\rho_{(\text{Covid}-19\ \text{cases},\text{Bitcoin})}$	$\rho_{(\text{Covid}-19\ \text{cases},\text{Litecoin})}$
ω	-0.1731***	-5.7423***	-2.08303***
α	-0.1462***	1.5063***	0.8193***
γ	-0.1527***	0.7792***	-0.3***
β	0.9604***	0.2535***	0.6591***
C	-0.046***	-0.0505***	-0.05***
δ	-0.0025***	-0.0083***	0.0038