Impact of COVID-19 on Cryptocurrency Markets

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Abstract

The pandemic has caused enormous economic costs by affecting banks, governments and financial markets. In this context, the main purpose of this paper is to show that cryptocurrencies have become one of the most traded financial assets in the last decade.

The overall objective pursued in the paper was the major effect on the global economy and financial markets that the COVID-19 Pandemic had and which was the first real global shock since the first cryptocurrency was launched in 2009 until now. Natural disasters and pandemics are a source of contagion in global financial markets and an emerging line of research. Financial contagion can be the result of both financial and non-financial events, but in both cases, assessments require defining a timeframe.

Key words: cryptocurrencies, financial markets, stock exchanges, stock trading
J.E.L. classification: B27, G01, G1, G15

1. Introduction

The transitional environment is constantly evolving, so people are becoming more and more interested in other ways to invest money more easily even from the comfort of their own home. So people are turning to cryptocurrencies for easy investments.

There are only two options in the cryptocurrency market, one of them is to buy cryptocurrencies on the stock market where you own the asset, this can also be considered as a longer term investment because you have to wait for the cryptocurrency price to rise before selling it in order to make a more significant profit. Or the second option would be to buy CFDs on cryptocurrencies, as this is a financial instrument that allows for larger trades, thus providing exposure to a wider financial market.

When trading cryptocurrencies, they are stored in a virtual wallet, unlike CFDs which at the time of trading their position is held by the trading account, which in turn is held by a financial authority.

Among the top advantages for cryptocurrency investors are the simplicity with which customers can reach crypto investment services, and the speed of investing that is just a click away. Investing in cryptocurrency is among the most profitable ways to invest in the world, however the surprise comes from the fact that not bitcoin is the most profitable variant of cryptocurrency, but the cryptocurrencies that will be launched in the future with the help of ICO, are among the most profitable variants. Investing in newly emerging cryptocurrencies can yield returns as high as 425,000%.

Cryptocurrencies are digital currencies that use cryptography, this cryptography is a way of encrypting data for those who do not have passwords so that they cannot access it. The duty of cryptography is to make cryptocurrencies impossible to counterfeit, although their security depends on a few factors. Cryptocurrencies are based on decentralised systems that rely on blockchain technology.

This in turn has a database structure that can be distributed, it was first described by David Chaum a cryptographer, in his 1982 dissertation. Bitcoin is not the first digital currency, nor is it part of the first attempt to implement blockchain technology, nor is it the first use of cryptography with a public key to attempt to keep data secure, but all of this put together has resulted in a single system to what we know as a modern cryptocurrency.

As far as the research objectives are concerned, we can say that they are the following: establishing consumers' view of the crypto market, identifying the credibility of cryptocurrencies among citizens, identifying losses or gains from investing in crypto, the main age groups of people influenced by the crypto market, and the concerns and backgrounds of people influenced by the crypto market.

2. Literature review

At the end of 2019, the world woke up to a new reality. What began as a local event, the local health situation in China, quickly turned into a dangerous pandemic with a mysterious viral disease COVID-19 wreaking havoc across the globe. The damage caused by the virus was (and still is) overwhelming: internationally, international borders were closed; education was halted or severely disrupted; public gatherings were banned or restricted; airlines cancelled flights (some to the point of bankruptcy); and financial markets collapsed. On 11 March 2020, the World Health Organization (WHO) declared the virus a pandemic (Almeida, D. Dionísio, A.; Vieira, I.; Ferreira, P., 2023). Two days later, a national state of emergency was declared. Despite medical breakthroughs in the form of COVD-19 vaccines and (more recently) drugs, the COVD-19 health crisis seemed far from over.

It is therefore essential to understand the consequences of this global disease disruption, which has not only health but also financial implications. The insights that emerge can be used to advance policy making and shape appropriate regulations that can help stabilise financial markets and prevent them from collapsing in times of instability. In particular, the COVID-19 pandemic provides an interesting test case for observing investor behaviour and assessing evidence on how markets respond during a crisis. Naturally, this can be done by analysing empirical data and looking for meaningful data (Akbar, A.A.; Ashar, M.S. & Simonson, J., 2021).

On average, the discovery of each new COVID-19 case has corresponded with a substantial increase in both the value of cryptocurrencies (measured by their market capitalisation, the price of the cryptocurrency multiplied by the number of tokens circulating in the market) and trading volume. Specifically, for each additional COVID-19 case, each cryptocurrency earned roughly between $32,000 and $59,000, which translates to billions of dollars.

Despite the average cryptocurrency rise, a more refined look shows that investors actually took a U-turn: in the early days of the pandemic, investors rushed to cryptocurrencies, but at some point the trend reversed and investors abandoned cryptocurrencies. This inverted U-shaped relationship (first rise, then fall) seems particularly important from a policy perspective, as it is consistent with various market dysfunctions (Easop,A.B., 2022).

A correlation is observed between cases and cryptocurrency trading (cryptomarket), the effect is much stronger when deaths are taken into account. In other words, each new death led to significant increases in both trade and value of cryptocurrencies much more than the effect of a new case. Specifically, while the deaths may have indicated that the virus is more dangerous than originally anticipated, they could just as easily have been a random consequence, considering whether the infected person was elderly or had a previous medical condition.

Our empirical findings point to an initial crypto-rupture in the early days of the pandemic: on average, the outbreak of the COVID-19 epidemic led to an increase in market capitalization and volume of traded cryptocurrencies. Given that traditional currencies collapsed during this period, a plausible explanation for our findings is that investors withdrew their money from traditional markets and redirected it to cryptocurrencies. However, it is difficult to disentangle the exact factors that have driven this behaviour, as it is consistent with both rational and behavioural explanations. On the rational side, investors may have logically turned to the crypto-market as a substitute based on the information available to them at the time. In particular, recall that the common perception prior to the pandemic was that the cryptomarket was a safe haven, so investors

may have rationally believed that buying cryptocurrencies was a safer option when traditional markets became unstable. However, from a behavioral standpoint, investors may have simply piled in. That is, some investors decided to buy cryptocurrencies, and everyone else followed suit without conducting a meaningful cost-benefit analysis of the investment strategy (McGinty, E.E.; Presskreischer, R.; Han, H. and Barry, C.L., 2020).

However, this avalanche of cryptocurrencies does not necessarily indicate, by itself, any kind of market failure. What does suggest that a failure may have occurred is that at some point the trend reversed and the market collapsed, leading to the inverted U-shaped relationship mentioned above.

To better understand what happened, it is illustrative to compare the trend in the cryptocurrency market with the spread of COVID-19 cases. This reveals that the tipping point of the cryptocurrency market occurred when there were approximately 50,000 cases in total, which is roughly the same time when the number of incoming cases started to slow down. Thus, a plausible explanation would be that investors noticed a slowdown in the velocity of COVID-19 and interpreted this as a positive signal for a return to traditional market trading, causing investors to move away from cryptocurrencies and back to traditional assets. Towards the beginning of March though the trend in the cryptocurrency market did not reverse again and continued to collapse. This suggests that a market failure may be in play (Posetti, J. and Bontcheva, K, 2021).

Another interesting aspect is that the inverted U-shaped relationship appeared in most, if not all chips. This seems inconsistent with rational behaviour, which would usually require distinguishing between the values of different tokens and treating them differently. This further indicates a possible market failure.

The law and economics literature usually divides market failures into four different categories: excessive market power, information asymmetry, externalities and behavioural market failures. The market power problem arises when the quantity of products sold in equilibrium is too small and the price is too high, because sellers with market power have the ability to control the price. In this case, the problem is not a shortage of cryptocurrencies bought (Toussaint, E., 2020). However, one may wonder whether the changes in the market were driven by sellers who had very high power in cryptocurrencies, so their trades affected the market price.

3. Research methodology

In this paper we have chosen as research method the questionnaire. The questionnaire is defined as the data collection tool that depends on the success of the research. When creating this questionnaire, the research purpose, main research objectives were taken into account in the first place and open, closed, mixed, opinion questions, etc. were used. The questionnaire has a series of 15 questions, and in these applied questions, details regarding age segment, background, education level, occupation and knowledge about the cryptocurrency market were found. The quantitative method was used in the research of the chosen questionnaire, using the survey that has the questionnaire as a tool.

4. Findings

The COVID-19 pandemic has adversely affected almost all aspects of human life, various sectors of activity and regions of the world. The flow of human activities has stopped for several months and are now being carefully redefined to align with guidelines and recommendations to avoid the spread of the new coronavirus. Unlike other pandemics the world has witnessed in the past, technological advances in the current era are an asset that can play a key role in protecting humanity. In this paper, we highlight the general challenges that emerged during the COVID-19 pandemic.

The unprecedented transmission of this virus has given rise to a myriad of challenges that are shaking the roots of human civilisation today. Countries that have imposed travel closures and restrictions face the challenge of limiting physical human interaction when socialising is so natural to human beings. Continuing to provide essential services and ensuring a constant supply of medicines and medical equipment is becoming increasingly difficult. Many national and international organisations, as well as individuals, tend to provide financial support to support these

needs, but the major challenges are ensuring adequate distribution and ensuring transparency for organisations and donors. Another major challenge is the infodemics (or "disinfodemics") of false information that exacerbate the pandemic. Technology giants and government regulators are finding it difficult to recognise and combat disinformation. These challenges are being seen by many countries that have been affected by COVID-19 and urgent efforts are needed to address them. Technological advances are one of the strengths of the current era that can help us overcome the challenges posed by COVID-19.

Emerging technologies such as artificial intelligence (AI) and machine learning (ML), the Internet of Things (IoT), blockchain, robotics and unmanned aerial vehicles (UAVs), 3D printing, nanotechnology and synthetic biology, 5G communications, cloud computing and edge computing, and Big Data can be harnessed to develop smart emergency management strategies for the COVID-19 pandemic. In particular, blockchain has been identified by the European Parliament Research Service (EPRS) as one of the ten key technologies to combat COVID-19. Blockchain provides a decentralised computing service architecture that eradicates most of the limitations associated with centralised computing ecosystems.

Blockchain is a collection of compute nodes that are connected in a peer-to-peer (P2P) fashion and that mutually verify transactions executed within the network. In blockchain, each block cryptographically seals a set of transactions and is linked to the previous block to form a hash-based (cryptographic) blockchain.

Nationwide closures and social distancing rules have a huge economic impact on businesses around the world. Governments and financial organisations have a responsibility to help businesses by providing loans and other financial bailouts. However, using traditional paper-based procedures to help large numbers of businesses will be time-consuming and inefficient. Aid agencies are therefore looking for fast, reliable and scalable solutions.

Blockchain with smart contracts can be used to simplify the complicated processes of applying for and approving loan and insurance applications. Using smart contacts as policy agreements can eliminate the processing delays inherent in traditional paper-based policies. In addition, blockchain can eliminate third-party intermediaries. The benefits of such a system include faster processing time, lower costs, reduced operational risks and faster settlement for all parties involved.

Sharing relevant data among health collaborators is of paramount importance when dealing with the COVID-19 pandemic. Global data sharing among the international research community would help formulate strong data sets that can play a fundamental role in COVID-19 research. These data sharing mechanisms must take care to avoid violating national and international data sharing regulations. Patient privacy is the most important concern and is one of the impediments to the implementation of health data sharing and its widespread adoption. National and international bodies apply robust controls, such as HIPAA, that define data access and data control policies. In addition, detailed patient information such as blood oxygen levels, heart rates and medication doses can be collected through integration with medical IoT (MIoT) devices. The decentralised storage offered by blockchain could greatly improve the security and privacy of healthcare data.

In addition, patients and hospitals can have more control over their data thanks to the elimination of costly middlemen in the form of centralised databases. In addition, blockchain could break down traditional medical records silos and make the sharing process between hospitals and doctors across the country and even around the world significantly easier.

In fact, blockchain can enable real-time data sharing. Uploading MIoT data directly into a blockchain-based system can eliminate issues such as data tampering and alterations. The added transparency around data collection, storage and sharing helps build and maintain trust between stakeholders and protects patient confidentiality.

The unprecedented global spread of COVID-19 has led many countries to close all immigration checkpoints, be they airports, seaports, bus stations, rail or river stations. Sooner or later, these restrictions will either be relaxed or lifted completely. It is thus clear that both immigration and emigration will be critical both now and in the near future. In this context, various impediments are expected, including the need for travellers to share medical history, travel history and real-time location, in line with government policies. In addition, this data will need to be shared at the time of immigration checks when crossing international borders. Data sharing platforms can be created between countries, powered by blockchain, to manage immigration and emigration processes in a

smarter way. Various integral features of blockchain systems with strict smart contracts, such as immutability, access control, auditability and provenance, are vital for such applications. These important features can pave the way for a secure, decentralized and collaborative immigration ecosystem.

In the near future, we may see countries establishing consortium-style blockchain-based immigration systems that connect all immigration checkpoints. Such systems will have well-defined interoperability with similar systems in other countries.

The world is witnessing serious supply chain disruptions due to the ongoing pandemic. Industrial production activities are at a standstill, either because shutdowns have been imposed or because factories are not equipped or designed to follow the new paradigm of social distancing and working with minimal physical contact. In addition, import and export bans have affected the global supply chain. At present, it is difficult to analyse the exact level of disruption that COVID-19 has caused in the global supply chain, however, it has led to serious supply and demand crises. Depending on the type of commodity, there is either high demand or high supply. Panic buying has led to an increase in demand for household commodities. Similarly, medical and pharmaceutical supply chains are finding it difficult to keep the whole chain intact and meet high demand.

Blockchain technology can play a key role in building a more resilient supply chain. Blockchain can anonymously unite all stakeholders, establishing a secure environment. Immutable log records support auditability, provenance and transparency, while well-designed smart contracts provide a high level of access restrictions and automation. For this particular use case, we are likely to see a combination of public and consortium blockchain systems.

For now, the only way to beat the COVID-19 pandemic is to cultivate habits such as social distancing, minimal touching, wearing masks, and self-management of symptoms such as fever, coughing, and shortness of breath. However, adopting these behaviours seems challenging, especially as they do not align with the natural behaviours of human beings. This mismatch implies that some level of continuous, automated surveillance is required for alerts to save countless lives. Furthermore, the current situation requires non-contact (robotic) delivery of essential supplies (food, medicine, etc.) to people in isolation, especially in areas with very high transmission rates, where sending a person for home delivery may be impossible. UAVs (Unmanned Aerial Vehicles) and blockchain-powered robots are very suitable technologies to support this use case. Increasing use of UAVs has already been observed, with many countries using them for public announcements, surveillance, symptom testing (such as temperature) and non-contact delivery. Although UAVs have the unique ability to manoeuvre with precision and perform tasks without human intervention, they are prone to security attacks. Such attacks can alter the intended function or allow data theft.

Blockchain, together with smart contracts designed in line with government or healthcare policies, can enable UAVs to operate securely, provide restricted access to captured data, integrate digital payment systems, etc.

Many countries have closed their schools and universities for an extended period. However, the current situation should not stop the process of teaching education, which is indispensable for individual development and ultimately leads to the growth of a nation. Online education has become the most viable way forward, but online education systems are not well established and face many challenges. These include the lack of secure learning tracking, the threat of data theft (for students and instructors), poor collaboration between platforms, and the difficulty of verifying the authenticity of student credentials (diplomas, transcripts, and other certificates). Blockchain-based online education platforms can offer a wide range of opportunities to mitigate these issues.

For example, such systems allow secure cross-platform sharing of online content and encourage automatic standardisation between educational institutions. Smart contracts and tokens can be used to set up a fair payment system based on accurate content usage. Decentralised blockchain-based storage enhances the security of student data while ensuring that it remains available to authorised users. Finally, blockchain enables the fast, efficient and secure issuance and sharing of verifiable educational credentials. Once an institute's issuing authority uploads a credential to a blockchain-based system, the entitled student gains full control of the credential. Students can then provide access to subsequent viewing to recruiters, teachers or universities as they wish.

Demand for commodities such as disinfectants, face masks, tests, PPE and disinfectants has risen sharply with COVID-19. To meet demand, many companies have to outsource production to third parties because they do not have sufficient production capacity. This gives rise to serious concerns as these third parties may not meet quality standards or comply with hygiene compliance guidelines. Most importantly, COVID-19 medicines and vaccines will become important commodities in the near future. Many small factories and micromanufacturing units will need to operate simultaneously and collaboratively to meet global demand. Given the exponential growth in COVID-19 cases, establishing traditional time-consuming paper-based collaborations may not be feasible. Thus, an integrated, robust and collaborative compliance monitoring framework is needed to facilitate and govern the manufacturing process. Blockchain-based IoT systems can be used to validate manufacturing integrity. With IoT, quality measurements can be obtained at different stages of production: raw material collection, manufacturing, storage, transportation, etc. Blockchain nodes can be deployed in factories to connect with their main production line. In this way, IoT systems embedded in blockchain enable secure recording of production data in an immutable and decentralised manner. Furthermore, smart contracts can hold the logic needed to perform audits to monitor non-conformance rates. Future COVID-19 vaccines and drugs could be manufactured globally using cloud-controlled, blockchain-enabled manufacturing ecosystems. Smart contracts could be used to manage royalties and other intellectual property rights in such decentralised manufacturing environments.

E-government, or digital government, refers to the substantial use of information and communications technology (ICT) to support the delivery of public and government services to a country's citizens. These services include essential public utilities (water, gas, electricity, sanitation, etc.), payroll, tax collection, marriage and divorce services, land registration, elections, visa processing and so on. The e-government concept proposes digitising all or parts of these services. The use of blockchain for e-government can ensure security by strengthening the integrity, immutability, confidentiality and consistency of data between organisations. In addition, its use improves efficiency by reducing processing delays and operational costs. Key features of blockchain, such as notarisation, shared database and workflow automation, are useful when implementing various operational features in e-government systems. Such systems can automatically detect the spot for possible errors and counterfeit attempts.

Agriculture and food distribution are essential to human life and must continue to function smoothly. However, strict disease control measures such as travel bans, export restrictions, closure of informal labour sectors, closure of local markets, etc. have led to numerous challenges for farmers, suppliers, producers, distributors, retailers and consumers. Farmers find it difficult to sell their produce at a good price because producers are not able to operate their facilities at full capacity. Distributors find it difficult to cross state and country borders because of the time it takes to obtain official permits. In addition, because of COVID-19, humanitarian service organizations such as WFP are facing a severe financial crisis as well as difficulties in keeping the food distribution cycle intact. In this context, blockchain can provide pragmatic solutions with agility. Automation based on smart contracts can replace paper-based, long-standing agreements with a trusted digital marketplace, where buying and selling can be fast without compromising ownership. Because blockchain allows two parties to transact directly, producers can purchase raw materials directly from farmers. This would help farmers get better prices for their produce and reduce the overall price of food. Using blockchain technology, international or national humanitarian organisations can remotely and securely help people in need buy free or subsidised food from local vendors. What's more, more donors may tend to donate to good causes, as blockchain-based systems offer transparency as well as anonymity.

5. Conclusions

In conclusion, we can say that the exposed analysis of the cryptocurrency market at COVID-19 reveals interesting patterns consistent with various types of market failures, including information asymmetry in combination with market power, and externality issues, especially those related to systemic risk. In particular, we observe an avalanche of cryptocurrencies at the very beginning of the crisis, implying a positive effect and a positive correlation between COVID-19 cases and the

cryptocurrency market, but also a reversal trend at some point, generating an inverted U-shaped relationship between the overall evolution of the virus and the cryptocurrency market.

Pointing to alternative explanations, we outline how market intervention can correct each type of market failure, including disclosure rules, trading halts, or other types of intervention. At the same time, we have highlighted the difficulties of such interventions at both institutional and practical levels, given the technological challenges.

Focusing on the early days of the pandemic allows us to see how the initial shock affected investor behaviour. While we leave exploration of the later days of the pandemic for future research, some recent evidence further supports our finding that COVID-19 and the cryptocurrency market are closely linked. Namely, the emergence of the Omicron variant appears to be partly responsible for a crash in the cryptocurrency market, according to press reports. Whether this is true under careful investigation remains an open question, and the current fallout reflects the passage of time and various government policies adopted later in the pandemic. Precisely for this reason, our focus on the early period of the pandemic provides a clearer result that can help with a better understanding of the ways in which cryptocurrencies function during a crisis.

While we consider a specific event, how cryptocurrencies reacted to the COVID-19 outbreak, the fact that people switch from traditional markets to cryptocurrencies is possible during any type of financial instability, not just during a pandemic.

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