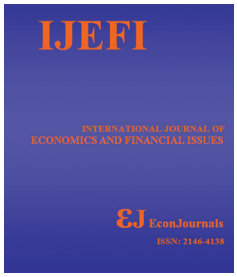

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# The Relationship between Cryptocurrency Prices and Share Prices of Technology Companies in Light of Covid-19

**Rachida Ben Ahmed Daho***

Faculty of Economic Sciences, Management and Commercial Sciences, University of Tlemcen, 13000 Algeria.
*Email: rachidadaho46@gmail.com

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**ABSTRACT**

BitCoin is a new digital currency that turned out to be quite interesting for the financial market. This digital currency has, in diverse manners, exhibited unique qualities in comparison with other financial assets, which certainly means that BitCoin investors may face more concerns and tradeoffs than those who choose more traditional investment opportunities. The present research paper primarily aims to show the importance of the BitCoin currency in the global markets and to highlight its relationship with the share prices of technology companies. It also tries to investigate and identify the most significant fluctuations that this sector witnessed in light of the Covid-19 pandemic, with a statistical analysis of ten technology companies during the period extending from 2015 to 2021. The findings of this study allowed concluding that a strong relationship exists between technology company share prices and BitCoin prices. It was also found that these companies greatly benefited from the Covid-19 pandemic and increased their profit rates, particularly information and communication technology companies.

**Keywords:** BitCoin, Technology Companies, Covid-19, Cryptocurrency, Share Prices
**JEL Classifications:** F3, E4, G1, L1

## 1. INTRODUCTION

It is widely acknowledged that technology plays an important role in most areas of our life. People's daily activities are increasingly dependent on it, particularly in communication processes, information searching or even entertainment. Indeed, technology has greatly contributed to make humans' lives easier and more comfortable. In addition, technology is actually a huge domain that involves a great variety of attractive elements, which was confirmed by most successful technology companies throughout the entire world. It is widely admitted that recently the world has witnessed a dramatic transformation that has significantly helped and encouraged several giant technology companies to lead the global economic scene. Indeed, these companies have achieved significant successes, and have accumulated huge profits. They also increased their market value to levels that exceeded the budgets of some countries.

No one denies the fact that technology companies have become the dominant driving forces of economic growth over the last decade. Indeed, they succeeded in controlling consumer tastes and most financial markets as well. Moreover, over the past decade, the combined stocks of technology companies have exceeded all market values as technology was used in a way that enabled people to communicate, exchange information, shop, work, and socialize as well.

From a broader perspective, companies in the technology sector are involved in the research, as well as in the development and manufacture of technology-based goods and services. These companies develop computer programs; they also design and manufacture computers, mobile devices, and home appliances. Further, they provide products and services related to information technology (IT).

It is worth indicating that life and society are increasingly governed by the rules of globalization. In addition, social media transmits all whispers and statements of executives from the business community and major companies. It should be mentioned that the financial services industry has recently witnessed a real revolution; this was the main reason for the significant attention drawn to digital currencies. However, it turned out that the driving force behind this revolution was not caused by the blockchain applications which received a great deal of media hype; this revolution was actually founded on artificial intelligence, huge data, and the Internet of Things (IoT). Indeed, thousands of real companies are using these technologies for the purpose of disrupting every aspect of financial intermediation. Today, there are dozens of online payment services, such as PayPal, Alibaba, WeChat Pay, Venmo, and so on; they are commonly used by hundreds of millions of people every day.

On the other hand, cryptocurrencies are generally defined as a type of digital cash without a central authority, which means that no single person or institution (such as a central bank) controls them. Indeed, all those on the network can share files which are not stored in one computer only.

Recently, cryptocurrencies have received a great deal of attention from media and investors alike; this could particularly be attributed to their innovative features, transparency, simplicity and growing popularity. In this regard (Katsiampa, 2019) pointed out that the BitCoin (BTC) is the most popular cryptocurrency representing 41% of the estimated value of that cryptocurrency. Nevertheless, not much is known about the behavior of the BitCoin price. As for, (Dwyer, 2014) he found out that the average monthly BitCoin volatility was higher than that of gold or a series of foreign currencies; he also indicated that the lowest monthly BitCoin volatility was lower than the highest monthly volatility of gold and other currencies. Regarding (Brére M, 2015), he suggested that the BitCoin offers remarkable diversification advantages to investors, while (Urquhart, 2016) showed that recently the BitCoin returns have not been following a random path.

Most companies and educational institutions have lately decided to work remotely from home since the start of the Coronavirus pandemic. Consequently, the share value of Zoom, a video conferencing service platform, has abruptly risen from $90 to $457.69. Indeed, Zoom has greatly benefited from the increasing demand for use in remote meeting services, online work from home and distance education, due to the general business and school closure that accompanied this health crisis.

It is important to mention that Zoom was not the only one successful company. Actually the shares of several major technology companies achieved higher profits. For example, the Apple Inc. share price rose from $ 80 to reach $ 120, which means that it achieved profits that were estimated at 50%. Similarly, the stock price of Microsoft Corporation increased from $180 to $214, which represents more than 20% increase. As for the stock price of Amazon.com Inc., it augmented from 2134 dollars to 3294 dollars, which suggests a 54% rise. With regard to Google Company, it recorded the lowest ratios in comparison with those of similar giant technology companies; indeed, its share rose timidly from 1513 dollars to 1581 dollars, which represents a 4.5% increase. However, the NASDAQ-100 Technology Sector Index (NDXT) witnessed a strong surge due to the stock market crash that occurred in the United States on March 19. This was mainly due to the economic shutdown; the company's index rose by 70%.

It is worth indicating that the share prices of most technology companies dropped sharply after a series of record-breaking trading days. This was fueled in large part by some of the tech superstars such as Facebook, Apple and Amazon.

Furthermore, these same technology companies led to market downturns. Indeed, Apple shares went down by 8%, Microsoft lost more than 6%, and the electric car maker Tesla suddenly became the speculators' favorite, as it lost 9%. It is useful to mention that the market generally stabilized after rising for several months; this usually happens in the month of September with the end of the summer holidays. Then, a pause occurs to take a breath, which is quite normal and healthy for these companies.

The Covid-19 viral pandemic has caused major disruptions in the largest global economies, incurring billions of losses for companies, institutions and individuals. However, it provided profits in hundreds of billions for companies and institutions for which the repeated mandatory business closures around the world constituted a golden opportunity. The largest technology companies were the biggest winners of the financial markets during the year 2020, with financial performances and records that exceeded all expectations. In this regard, it is worth specifying that tech companies, such as Apple, Microsoft, Amazon, Alphabet and Facebook, in addition to Tesla and Nvidia, have accumulated earnings equivalent to a total of $3.4 trillion in market value.

On the other hand, the trend to virtual world innovations in all aspects of daily life doubled the use of electronic devices, particularly the smartphone. For example, the iPhone sales surged in a significant manner. Similarly, this also contributed to the soaring demand for Microsoft Teams products. In addition, the considerable move to online purchases allowed Amazon Corporation to dominate the electronic commerce. In the same way, the dominance and influence of Google and Facebook remarkably increased in the domain of online advertising.

Nevertheless, by the beginning of the year 2021, the bets of investors changed completely especially when the COVID-19 vaccine distribution started, with the return of economic activity and the continuation of government incentives to support the fragile economic recovery. Accordingly, the following problem can be raised:

### 1.1. What is the Relationship between the Share Prices of Technology Companies and the Prices of Cryptocurrencies?

The present study aims to determine the relationship between the stock prices of technology companies and the prices of cryptocurrencies, particularly in the presence of the Corona pandemic, based on the statistical analysis of ten technology

companies; it also investigated the prices of the BitCoin currency during the period extending from 2015 to 2021.

## 2. THEORETICAL FRAMEWORK AND PREVIOUS STUDIES

### 2.1. Digital Currencies

Broadly speaking, the digital currencies are defined as a comprehensive group of virtual currencies and cryptocurrencies that are based on block chain technology; they can only be accessed through computers or mobile phones because they exist only in an electronic form.

If the digital currency is issued in an organized manner by a central bank of a particular country, it is called the Central Bank Digital Currency (CBDC). This currency utilizes an electronic record or a digital code to represent the nonpayment form of the paper currency of the country under consideration. It is worth indicating that the Central Bank Digital Currency (CBDC) is emitted and regulated by the competent monetary authority; it is therefore subjected to the country's financial regulations.

Similarly, to a paper banknote that has a unique serial number, each central bank digital currency unit can also be marked and distinguished to prevent counterfeiting. In this context, countries like China, England and Sweden are considering issuing their own digital currencies.

### 2.2. Cryptocurrencies

With regard to cryptocurrencies, they constitute another digital currency form that is not subjected to any supervisory and regulatory standards. It is worth indicating that cryptocurrency mining is done by solving complex accounting equations using highly sophisticated computers. This technique is used to manage and control the creation of new currency units. The cryptocurrency mining process involves the validation of data as well as the addition of transaction records to the public record using the blockchain technology (Arber S, 2012) Since the cryptocurrency is not emitted by any central authority, it is generally considered as immune from government interference or manipulation. In addition, some people view it as an efficient hedge against inflation. Nevertheless, cryptocurrencies have also faced several criticisms, including the ease of using them in illegal activities, their price volatility, as well as the weaknesses in their underlying infrastructure. Some of the most important cryptocurrencies are BitCoin and Ethereum.

### 2.3. Types of Cryptocurrencies

According to (Atik, 2015), some cryptocurrency types are:

#### *2.3.1. BitCoin (BTC)*

BitCoin is the most famous and most expensive among the original cryptocurrencies. It was originally created in 2009 by Satoshi Nakamoto whose real identity has never been established or revealed. Note also that BitCoin is actually so popular that every other cryptocurrency is referred to as an altcoin, i.e. for alternative to BitCoin. Its high price has prompted a large number of investors to switch to altcoins. The major hurdle for investors is that they think that, in the future, altcoins may coexist with or eventually replace BitCoin. It is generally admitted that most altcoins can help to find solutions to some of BitCoin's flaws, especially its limited scalability. So far, it has been observed that the market capitalization of BitCoin has been far and above those of the closest alternative altcoins (Bartos, 2015).

#### *2.3.2. Ethereum (ETH)*

Ethereum is a publicly available computing platform that is based on blockchain technology; it was created in 2015. The main difference between Ethereum and BitCoin lies in the functionality of the network. Instead of being used to track assets for proof of ownership, Ethereum is rather utilized to store data and run decentralized applications. The Ethereum network has its own cryptocurrency, which is called Ether. Indeed, in this case, what is really traded is Ether which is often mistakenly referred to as Ethereum. The basic assumption is that anyone who wants to use the blockchain technology can comment on Ethereum without creating an entirely new application. In this context, several new altcoins were launched, through the Ethereum network. It should be mentioned that some large companies, like EOS, Zilliqa and RChain, are eventually considering launching independent blockchains.

#### *2.3.3. Ripple (XRP)*

Ripple is a money transfer process that operates differently from the BitCoin network. It does not use the blockchain technology and is not limited to transferring its own coins only. Ripple allows transferring any type of currency, including cryptocurrencies, fiat money, gold, and even air miles. It is worth noting that banks were highly interested in Ripple due to its speed of transactions (10,000 times faster than that of Bitcoin). The Ripple protocol has its own cryptocurrencies that can be traded. However, 100,000 cryptocurrencies were issued in the form of company shares instead of mining them.

#### *2.3.4. EOS*

EOS is the cryptocurrency EOS.IO that was actually launched in 2017. EOS.IO is a blockchain protocol that is based on the cryptocurrency EOS. This protocol acts as a smart contract platform and a decentralized operating system that are both aimed at hosting decentralized applications and providing decentralized storage. EOS.IO is primarily intended to solve the scalability problems of legacy cryptocurrencies like BitCoin, in addition to eliminating all kinds of fees for users in the traditional domains of financing. The EOS cryptocurrency, which is actually traded, is used to gain bandwidth and storage on the blockchain for applications that are created/used by the account holder.

#### *2.3.5. BitCoinCash (BCH)*

BitCoin Cash is viewed as a better hard fork than the classical BitCoin (original Bitcoin) as the BitCoinCash (BCH) network may cope with a larger number of transactions per second in comparison with the classical BitCoin network. A hard fork is actually seen as a fundamental change to a network's protocol; it can make antecedently invalid blocks and transactions valid. The main reason for creating a fork was to add scalability. It should

be mentioned that the greatest change consisted in increasing the size of blocks to allow more transactions to be processed per second (Berjerg, 2015).

## 2.4. Behavior of the Share Prices of Technology Companies in Light of the COVID-19 Pandemic

These technology companies are business entities that primarily focus on the development of manufacturing techniques or manufacturing processes. Note that information technology (IT) companies and high tech companies are considered as subsidiaries of technology companies.

### *2.4.1. Apple company*

Its tarted in the seventies of the last century when its three founders developed the first commercially successful line of personal computers, and eventually launched one of the most successful mobile phones ever, the iPhone.

### *2.4.2. Amazon corporation*

Amazon.com is the largest online shopping site worldwide. It started its activities in a garage in the mid-nineties. In 1994, Jeff Bezos left his job as vice-president of D. E. Shaw and Co., a Wall Street business firm, and moved to Seattle, in Washington State, to start his own company. By the time he felt his job, he had already missed the boat with the online boom. Ever since, the company has significantly grown. It first started to sell various innovative and advanced services that are generally used by average people.

### *2.4.3. Facebook Inc.*

This American online social media and social networking service was originally developed at Harvard University.

### *2.4.4. Alphabet corporation*

The founders of Google thought about creating Alphabet Inc. along with a group of other firms in order to take some pressure off Google. Alphabet Inc. and a number of subsidiaries were controlled by Google until they were passed on to the new parent company.

### *2.4.5. Microsoft corporation*

The Microsoft Corporation was actually established in the mid-seventies in the state of New Mexico. The company spent about ten years to complete its initial public offering (IPO), which raised $61 million at that time; this made Bill Gates very wealthy. Over the past few decades, Microsoft has been one of the most reliable and successful technology investments. Indeed, today its software and video game technology is omnipresent around the world.

### *2.4.6. Twitter corporation*

This fast thinking platform is currently very popular and well-known throughout the entire world.

### *2.4.7. Netflix corporation*

Actually, this company started as an innovative project to provide video movies through DVDs. It then started growing slowly to dominate the world of movies and television; it also offers direct streaming services on the Internet. Netflix has deeply changed the way people consume entertainment. Presently, a number of the most famous movies and TV programs are produced and placed on the Netflix platform.

### *2.4.8. PAYPAL Holdings, Inc.*

This Company was launched in 1999 as a platform for transferring money. In 2002, the business was acquired by online marketplace giant eBay as its initial public offering (IPO). It was originally called Co infinity until it merged with Elon Musk's X.com in 2000. Since then, it has grown to become one of the largest online payment platforms in the world. Globally, PayPal is well ranked on many e-commerce sites.

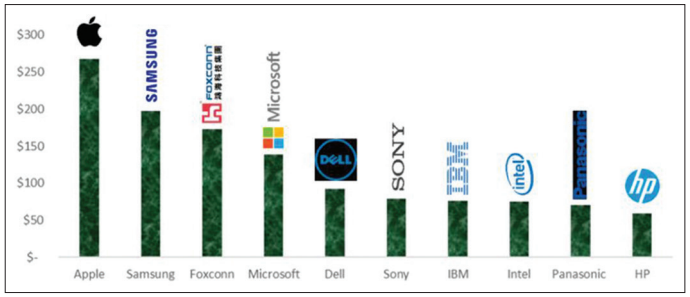
### *2.4.9. TESLA company*

Tesla has been one of the global companies for innovative technology and renewable energy, ever since electric sports cars were invented. Its Model S was the biggest seller throughout the world with regard to plug-in electric cars, for the years 2015 and 2016. Afterwards, its Model Y (an electric compact crossover utility vehicle) was launched in addition to its latest models.

During the Corona virus health crisis, consumption declined significantly, especially in the United States, the largest global economy, while unemployment rates increased. It can therefore be concluded that capital gains do not reflect the real performance of a weak economy. These stock rises are the result of the measures taken by governments through monetary easing, with lower interest rates and deposit ratios to make credit more easily accessible, at zero interest. The measures encouraged investors to invest the available funds in the stock market without risk; this allowed them to get significant returns. Consequently, this led prices to go up (Figure 1).

It was revealed that Apple achieved the largest increase in value; this company jumped by about one trillion dollars in value and its shares increasing by 81 percent to eventually reach the end of 2020 with a market value of about 2.3 trillion dollars.

**Figure 1:** Technology companies




Source: https://companiesmarketcap.com/tech/largest-tech-companies-by-market-cap

As for Microsoft, it gained $480 billion and achieved a market value of about $1.68 trillion. Similarly, Amazon made profits from the growth in its consumer and cloud computing businesses; the company's market value increased by $710 billion to nearly $1.63 trillion by the end of the year 2020.

With regard to Alphabet, the parent company of Google, it added $268 billion to its market value which attained $1.19 trillion by the end of 2020. Concerning Facebook, it added $193 billion to reach a market value of about $778 billion.

As for Tesla, it amazed the markets during the year 2020 as its shares increased nine fold. Indeed, the market value of the electric car maker Tesla increased from $ 76 billion at the beginning of 2020 to $ 669 billion at the end of the same year.

Likewise, the market value of the chip maker NVIDIA more than doubled in 2020 to eventually achieve $323 billion.

Furthermore, as technology companies doubled their business activities to satisfy the increasing demand for electronic services, one should be aware that the return of the economy to normal work after the end of the Coronavirus health crisis may threaten the activities of these companies and make them slowdown, which may therefore push their shares to decline.

## 3. PREVIOUS STUDIES

### 3.1. The First Study

It tried to identify the BitCoin characteristics that make the conversion of this cryptocurrency into a global currency easier. This study also attempted to find indicators of strong BitCoin attractiveness, followed by market forces.

This same study also determined and analyzed the BitCoin features that may render its globalization easy. In addition, it tried to identify the characteristics that may hinder the use of BitCoin as a medium of exchange, a unit of account and a store of value. It then compared BitCoin to standard cryptocurrencies with respect to the main functions of money. Among all the BitCoin features that were analyzed, extreme price fluctuations stood out most clearly in comparison to other standard cryptocurrencies. This study sought to identify the drivers of BitCoin price formation and also to estimate their economic importance; it also applied time series analysis mechanisms to daily data for the period extending from 2009 to 2014. The estimation results suggested that the indicators of BitCoin attractiveness were the strongest drivers of BitCoin price, followed by market forces. On the other hand, it was found that macro financial developments cannot determine BitCoin in the long run. The findings of this study indicated that as long as the BitCoin price is primarily driven by speculative investments, this crypto currency cannot compete with the benchmark currencies (Kancs, 2015).

### 3.2. The Second Study

This study was first to examine the BitCoin price formation by considering both traditional and price determinants, such as the market forces of supply and demand, as well as cryptocurrency specific factors, such as the BitCoin attractiveness to investors and users. It is worth knowing that the conceptual framework is based on Barro's model (1979). Barro derived testable hypotheses from this model. Based on daily data collected during the five-year period (2009-2015), and applying time series analytical mechanisms, authors could show that, in this powerful market, the BitCoin attractiveness to investors and users has a significant impact on the BitCoin cryptocurrency. Obviously, the difference can only be observed over time. The findings do not support those reported by previous studies which stated that macro financial developments can affect the BitCoin price in the long-term (Ciaian, 2016).

### 3.3. The Third Study

Authors in this study investigated the asymmetric causal relationship between BitCoin and gold, Brent oil and the dollar and the S and P 500 indices of weekly data, during the period between 2013 and 2018, using the HATEMI test; the results obtained indicated that there was a causal link between the BitCoin price and the S and P 500 Index.

Furthermore, the study examined the asymmetric causal relationships between BitCoin and gold, Brent oil, US dollar, S and P 500 and BIST 100 indices for weekly data, for the period between November 2013 and July 2018, via the Hatemi-J test (2012). The results suggested the existence of a causal link moving from the BitCoin price to the S and P 500 Index.

It therefore appears that a fluctuating BitCoin price does influence the decisions of investors about the S and P 500 Index, which means that investors in the S and P 500 Index fund generally closely follow the new macro financial developments in the market.

The financial developments were quite active in the S and P 500 stock market. However, the existence of the above mentioned causal relationship does not confirm the correlation between the BitCoin price and other variables. It can therefore be assumed that, in the future, BitCoin may exist jointly with the commodity market and other global indicators. Thus, BitCoin should be recognized and accepted as a medium of exchange, which would increase its credibility (Levent, 2018)

### 3.4. The Fourth Study

Authors in this study focused on the differences and similarities between cryptocurrencies and stock networks (100 currencies and 100 shares); they found out that cryptocurrencies and large capital companies tend to be compatible. This study tried to investigate the similarities and differences between stock networks and cryptocurrencies, based on the results obtained for the recorded returns and time series volatility. Authors created a correlation and charts based on the Fast Fourier Transform and minimum spanning trees from a pool of 100 highly capitalized cryptocurrencies and 100 highly capitalized Nasdaq stocks, over a time window of fixed length. The analysis was based on a comparison between the two economies in terms of network characteristics. These same researchers also examined the distributions of node degrees and edge weights. The results showed that cryptocurrencies and large cap companies tend to fit into central and densely connected nodes.

In contrast, the crypto-economy is more connected to the important nodes, unlike the NASDAQ stock charts, where they noted clusters of nodes with small differences (Mariana Durchervaa, 2019).

### 3.5. The Fifth Study

In this paper, authors used monthly data, from the period between2011 and 2016, to construct a Vector Error Correction (VEC) model in order to examine the nature of economic factors such as the custom price index, the US dollar index, the Dow.

Jones Industry Average and the Federal Funds Rate; they also examined the effect of gold price on the BitCoin price. Empirical analysis of the results obtained indicated that all these variables had long-term effects on the BitCoin price. It should be noted that the US dollar index has the greatest impact on the BitCoin price, while the gold price has the least effect.

It was therefore concluded that presently BitCoin can be treated as a speculative asset; however, it is far from being a suitable credit currency (Zhu Yechen, 2017)

### 3.6. The Sixth Study

This paper examines the relationship between leading financial assets, Bitcoin, gold and S and P 500 with GARCH - Dynamic Conditional Correlation (DCC), Nonlinear Asymmetric NA-DCC (GC-DCC), and Gaussian copula-based Nonlinear Asymmetric-DCC (GCNA-DCC). In a highly volatile financial situation, like the COVID-19health crisis, there are computational difficulties in applying the traditional DCC method to select suitable cryptocurrencies. To solve this limitation, GC-DCC and GCNA-DCC are applied to examine the time-varying relationship between BitCoin, Gold and the S and P 500. With regard to logging in, it turned out that it is preferable to use the models GC-DCC and GCNA-DCC instead of DCC and NA-DCC in order to determine the relationship between BitCoin, gold and S and P 500. Authors considered that the relationships between time variables are conditioned by the correlation with BitCoin volatility, while the S and P 500 volatility depends on the Gaussian Coppola Marginal Regression (GCMR). The experimental results showed that the S and P 500 and price of gold had a statistical significance to BitCoin with regard to return and volatility history (Kim, 2020).

### 3.7. The Seventh Study

Authors in this work examined the possibility for BitCointo act as a safe haven against negative movements of stock and bond assets in five major economies during the COVID-19 bear market, using the panel Bayesian VAR method that captures potential interaction and heterogeneity across the markets of a country. It turned out that BitCoin in each particular economy contributes to diversifying the benefits and/or mitigating risks within and across borders. However, the role of BitCoin against traditional assets varies across economies. It was also shown that the role of BitCoin in our target segmentation markets has been changed by the COVID-19 outbreak, except for the United States (Yingyinghuang, 2021).

**Table 1: Technology companies, a study sample**

| Technologycompanies | Information about the study sample companies |
|---|---|
| AAPL | Apple is an American multinational company that designs and manufactures consumer electronics and computer software products. |
| CAJ | Canon Inc. is a multinational manufacturer of imaging equipment such as digital video and still cameras, photocopiers and computer printers. |
| IBM | International Business Machines is an American multinational consulting and technology firm headquartered in Armonk, New York, with more than 350 000 employees serving clients in 170 countries. |
| MSFT | Microsoft is a multinational computer technology company with revenue of more than $85 billion in 2016. It was the world's largest software maker by revenue as of 2016. |
| MU | Micron Technology Inc. is an American manufacturer of computer memory chips and data storage devices, including dynamic random access memory, flash memory, and USB flash drives. |
| NOK | Nokia Corporation is a Finnish multinational telecommunications and information technology company headquartered in Espoo, Finland. Its main product is the mobile phone. The company also provides Internet services, including applications, music, digital media, and messaging. Nokia also offers free digital mapping and navigation services through its wholly owned subsidiary. |
| ORCL | Oracle Corporation is one of the largest and most important IT companies in general, and databases in particular. The company has a number of service centers for customers in more than 145 countries |
| SNE | Sony Corporation is a Japanese multinational conglomerate headquartered in Konan, Minato, in the capital city Tokyo of Japan. This company is one of the world's largest manufacturers of consumer and professional electronic products, the largest video game player company, the second largest video game publisher, and the second largest recording company, as well as one of the most comprehensive media companies. |
| TOSYY | Toshiba Corporation is a Japanese multinational corporation headquartered in Minato, Tokyo, in Japan. Its products and services cover many areas such as energy, industrial and social infrastructure systems, elevators and escalators, electronic components, semiconductors, hard disk drives, printers, batteries, lighting systems, logistics, as well as IT solutions such as quantum encryption. |
| TSM | Taiwan Semiroule Manufacturing is a Taiwanese multinational company specializing in the electronics and semiconductor industries. |

### 3.8. The Eighth Study

Authors used commonality tests of high-dimensional stochastic volatility on crypto-assets against a basket of global investor sentiment proxies. They found an incorrect link between cryptocurrencies and global risks, and risk aversion.

These findings come to reinforce the growing wave of support for the acknowledgement of crypto assets as belonging to a separate asset class (Sifat, 2021).

## 4. RESEARCH METHODOLOGY

A set of daily data were collected for the technology companies that belong to the study sample under consideration, for the period between 2015 and 2021. These data are summarized in Table 1 as follows:

Afterwards, a descriptive statistical study was carried out on ten leading international companies in the field of technology, for the period from 2015 to 2021. The results obtained are reported in Table 2:

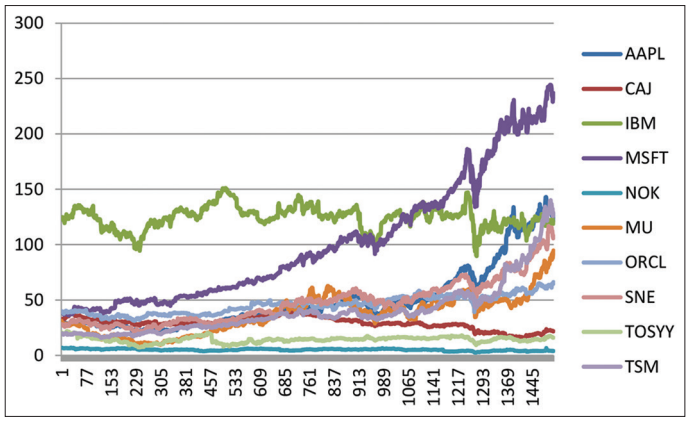
It is easily noted that a probability less than 0.05 means that the model is statistically significant and that the standard deviation (std. dev.) is far from zero, which means that the risk is significant, because there are daily fluctuations in the share prices of the technology companies. This was noticed first in MSFT and then in AAPL.

Moreover, a descriptive statistical study was conducted on BitCoin prices between the years 2015 and 2021; the results are given in Table 3:

One may easily notice that a probability less than 0.05 means that the model is statistically significant and that the standard deviation (std. dev.) is far from zero. The standard deviation value is quite large, which means that the risk is high due to daily fluctuations of the BitCoin prices (Figure 2).

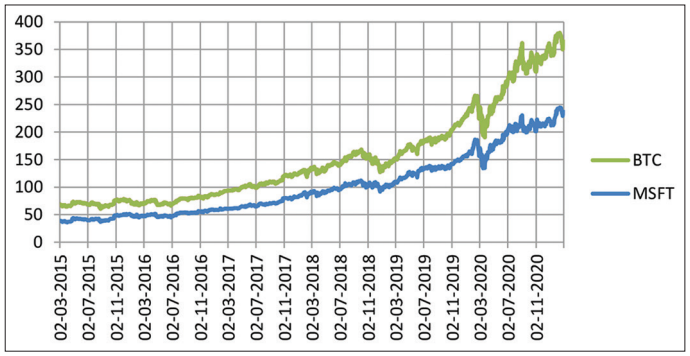
The figure above indicates that the share prices of technology companies were fluctuating, while some others remained stable. As for the two companies AAPL and MSFT, they improved a lot, especially between the years 2019 and 2021. This can certainly be attributed to the Coronavirus pandemic. These technology companies benefited significantly from the Covid-19 health crisis because people became increasingly dependent on their phones and tablets to communicate, work, study and shop during the period of store closure. Technology companies try to end the current year with their largest shares ever in global stock exchanges.

**Figure 2:** Daily evolution of share prices of technology companies between 2015 and 2021




Source: https://companiesmarketcap.com/tech/largest-tech-companies-by-market-cap

**Figure 3:** Relationship between BitCoinprices and MSFT stock prices for the period 2019-2021



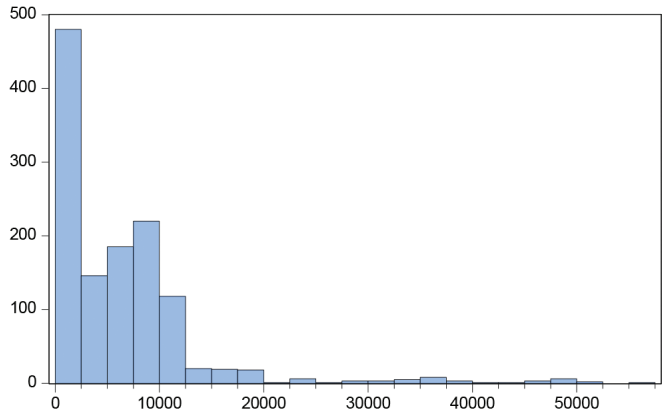

Source: https://companiesmarketcap.com/tech/largest-tech-companies-by-market-cap

**Table 2: The results of the statistical study of technology companies**

| | AAPL | CAJ | IBM | MSFT | MU | NOK | ORCL | SNE | TOSYY | TSM |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 49.39964 | 29.13795 | 124.4487 | 101.3938 | 36.46372 | 5.078129 | 45.68107 | 47.42901 | 14.34147 | 39.66760 |
| Median | 41.10159 | 29.10000 | 125.3432 | 88.68765 | 38.81000 | 5.168797 | 46.02914 | 46.66000 | 14.58000 | 35.03032 |
| Maximum | 142.9464 | 40.22000 | 151.1206 | 244.4270 | 94.76000 | 7.011393 | 66.17000 | 116.7100 | 22.12500 | 140.0500 |
| Minimum | 21.13440 | 15.50000 | 89.78803 | 35.96342 | 9.560000 | 2.420000 | 31.29022 | 20.26000 | 7.250000 | 15.71337 |
| SD | 28.76557 | 5.395250 | 10.07738 | 56.29195 | 16.88597 | 0.845122 | 7.942058 | 19.70689 | 2.628362 | 23.15979 |
| Skewness | 1.561354 | −0.531325 | −0.267385 | 0.851150 | 0.370724 | −0.387977 | 0.231841 | 1.015063 | −0.218643 | 2.061897 |
| Kurtosis | 4.606157 | 2.995813 | 3.530612 | 2.609601 | 2.930987 | 2.550712 | 2.153751 | 3.825640 | 3.264266 | 7.595712 |
| Jarque−Bera | 776.3423 | 71.09513 | 35.73058 | 192.0377 | 34.91082 | 50.61632 | 58.62289 | 302.3948 | 16.43560 | 2400.364 |
| Probability | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000270 | 0.000000 |
| Sum | 74642.85 | 44027.44 | 188041.9 | 153206.1 | 55096.68 | 7673.053 | 69024.10 | 71665.24 | 21669.96 | 59937.74 |
| Sum Sq. D | 1249462. | 43954.17 | 153345.8 | 4784864. | 430555.1 | 1078.490 | 95245.19 | 586426.1 | 10431.51 | 809927.5 |
| Observations | 1511 | 1511 | 1511 | 1511 | 1511 | 1511 | 1511 | 1511 | 1511 | 1511 |

Source: Prepared by the researcher based on EViews 9 data

**Table 3: A statistical study onBitCoinprices**




Source: https://finance.yahoo.com/quote/BTC-USD?p=BTC-US

It is worth indicating that smartphone and social media companies account for nearly 40% of the S and P 500 Index. Moreover, Apple became the first US Company to reach $2 trillion in market capitalization, hence accounting for more than 7% of that the S and P 500 Index alone (Figure 3).

The continuous growth of BitCoin, which reached record levels and achieved strong gains, gave investors a quick and imaginary wealth that was not expected. The data depicted in the figure suggest that there is a close relationship between the BitCoin price and the share prices of large technology companies, including MSFT. In these companies, BitCoin trading is very similar to the shares of this big company. In addition, the fluctuations in prices present the same degree of risk as those of large companies because they all benefited from the Coronavirus pandemic. They all achieved significant profits during the period from 2019 to the beginning of 2021. Note that this success is expected to continue rising until the end of the current year.

## 5. CONCLUSION

Taking into consideration the economic conditions that the global financial system is presently witnessing, and having regard to the radical metamorphosis of the system due to the Coronavirus spread which pushed the World Health Organization (WHO) to raise this health crisis from an epidemic to a pandemic, it can be asserted that the start of the economic collapse may soon be observed.

This would certainly engender global economic changes. It is worth reminding that the world is well aware that the global trade war has already started. Indeed, global trade conflicts have become a reality today, particularly between the United States of America and China, which caused the prices of digital currencies, such as BitCoin, to rise. This was surely due to the fact that most investors, who feared the unstable values of the US dollar or the Yuan, went to search for a safer haven currency. This pushed them to switch to encrypted digital currencies in general, and particularly to the BitCoin cryptocurrency.

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