GE-International Journal of Management Research
ISSN (O): (2321-1709), ISSN (P): (2394-4226)
Vol. 9, Issue 06, June 2021 Impact Factor: 5.779

www.aarf.asia,**Email** : editor@aarf.asia, editoraarf@gmail.com

THE IMPACT OF CRYPTOCURRENCIES ON MONETARY SYSTEMS

MR. YAMEN NATAFJI

MBA. ISTANBUL AYDIN UNIVERSITY, TURKEY

ABSTRACT

This paper examines the Impact of Bitcoin on monetary systems.

We take Bitcoin, as the most popular cryptocurrencies in the market and analyze the asymmetric causal relations of the leading financial assets: (Bitcoin price, dollar index (USDX), EUR/USD exchange, GBP/USD exchange, gold price, oil brent price, FTSE 100 index, S&P 500 index).

Many of statistical analysis Methods were used for investigates the relations between financial assets such as Granger causality test and Multiple linear regression.

This paper is important because it provides compelling evidence to investors, financial markets, and central banks about the relations between exchange rates on bitcoin and financial assets.

The empirical findings show that Bitcoin price have causality relationship with many of leading financial assets.

KEYWORDS: Cryptocurrencies, Bitcoin, Monetary Systems, Granger Causality Test, Multiple Linear Regression.

INTRODUCTION:

A monetary system is a set of mechanisms and entities by which a government can provide money to the economy of a country. Usually, the entities involved in this process are National treasuries, Central banks and the mint.

The national treasury is the entity that is responsible for the financial management and expenditure of a country alongside with the ministry of finance if exists.

The central bank is the institution that manages the country's currency and money supply. It also manages the interest rates and regulates the commercial banking activities within a country.

As for the mint, it is the entity that has an approval for the government to produce and manufacture its coins in order to be used as the official currency. (Said, A. 2019)

As per in Dharmapalan & McMalon (2016), Citizens, worldwide, need access to safe, affordable means by which to manage their financial lives and thrive. Despite innovations in banking and financial technology, the prevalence of and preference for cash transactions remains high. By "cash", we mean physical manifestations of legal tender, paper currency and coin currency.

Approximately 85% of all global consumer transactions are conducted in paper-based currency. In emerging economies, the ratio of cash to other forms of transactions skews higher still, 98% for India and nearly 100% for Indonesia. In developed economies, despite the wide choices of debit, credit and stored-value solutions, cash transactions remain high:

48% in the United Kingdom, 55% in the United States, and 67% in Germany. Heaviest users of cash may be emerging economies, still, in developed economies, despite wide choices of debit, credit and stored-value solutions, cash transactions remain high. (Dharmapalan J. and McMahan C. *2016)*

With the rapid development of technology during the past 10 years and with the evolution of the Internet and the online applications, a need has been raised to digital & online payments. The online credit cards payments and paypal like solutions were not satisfying to all consumer needs. This evolution along with the needs, has led to the development of what is called Bitcoin, which is the first decentralized cryptocurrency that was based on *blockchain* technology. (Said, A. 2019)

The cryptocurrency was developed to facilitate peer-to-peer transactions that operate independently from the central bank. Cryptocurrency is not physical; it can be a coin but it is a digital coin. It also cannot be withdrawn. The owner can only transfer the funds to other parties. The application of cryptocurrency is an interesting issue of money and contributes to the financial market as it is based on a blockchain that is out of the current modern financial system of fiat money.

Meanwhile, fiat money is produced by the central bank of each country, however, cryptocurrency is based on a borderless system as it is not limited to one country or territory. No authority controls the money mechanism of cryptocurrency.

The value of cryptocurrency is based on the blockchain creation to store the data. The calculation is based on the algorithm, which is complicated.

The bigger the blockchain can create the data and system, the higher the fee of miners. This is the mechanism of how the value of cryptocurrency is created. Then, the supply and demand of users can also lead to either the increase or decrease of the value of cryptocurrency. (Kim J., Kim S., Kim S. 2020)

Cryptocurrencies, such as Bitcoin (BTC), Ethereum (ETH), Ripple (XRP) among hundreds of others, provide a form of digital currency created around the idea of non-centralized banker (conventionally governments) and distribution protocol (as is the case with real money issued by central banks).

Particularly, the BTC network is a form of peer-to-peer (P2P) communication system, where each user can transact with all the other market participants directly without the need to be directed via a centralized intermediary. Fundamentally, each user can be generator, sender or

receiver of the cryptocurrency and subsequently the corresponding monetary amount in any of the available currencies.

Other cryptocurrencies have no or much wider limits as to the maximum number of coin units that can be generated. This results in them having a circulation many times larger than that of BTC, but of course their price is much lower as well. Moreover, a cryptocurrency user can generate a unique address based on an alpha arithmetic string through which they can send and receive blocks of coins (usually referred to as tokens), while to securely store their coins they use another digital entity called a wallet, either an on-line or off-line one.

Each transaction conducted using cryptocurrency tokens is recorded on a decentralized ledger named blockchain, which is managed and maintained by a network of dedicated machines called miners.

Initially, this was with computer processing units from normal desktop computers, then with graphics processing units. Eventually, hardware known as an Application Specific Integrated Circuit was designed specifically for mining BTC Miners are typically very powerful specific hardware which guarantee the operability of the crypto network and are rewarded by the network with cryptocurrency tokens which increase the total coin circulation and are also partially indemnified by the transaction fees.

The latter makes BTC the most desired traded cryptocurrency, but does not necessarily apply to others, a primary distinguishing feature of offered coins.

The rapid rise of Bitcoin's popularity and the increase in the number of block chain wallets have attracted a growing interest among economists and have led to many academic articles about Bitcoin. (Luo M., Kontosakos E., Pantelous A., Zhou J. 2019)

The aim of this paper is to examine the causality relationships between the Bitcoin price and commodity markets, exchange rate and global indexes via asymmetric causality test and several statistical analysis Methods.

The rest of this paper is structured as follows: in section 2, the research background is described; in section 3 data specifications are briefly presented; in section 4, the experimental results are provided; and in the final section, conclusions are outlined.

Literature review:

The emergence of Bitcoin in 2009 has received considerable attention surrounding the validity of cryptocurrencies as a viable, and in some jurisdictions, a legal currency alternative. Despite widespread concern that these cryptocurrencies are fostering the environment within which a substantial bubble can occur, it is important to analyze whether these new assets are behaving similarly to major international currencies.

The bitcoin market has increased dramatically over the last five years. As of August 2017, the total market cap had surpassed $55 billion, with daily trading volume regularly exceeding $1 billion. Although initially traded primarily through USD, bitcoin trading via Chinese yuan increased dramatically from 2014 to early 2017.

This increase may be attributed to the surge in bitcoin mines (and mining pools) located throughout China (due to low electricity costs), and the large control they exert on the network. (Corbet S., McHugh G., Meegan A. 2017)

The European Central Bank (ECB) defines Bitcoin, Litecoin and other cryptocurrencies as virtual currency schemes because they have two characteristics: they resemble money and have a dedicated retail payment system.

The ECB has classified virtual currency schemes into two types: centralized or decentralized; Centralized virtual currency is a closed virtual currency scheme, which has almost no link to the real economy such as Second Life's Linden Dollar.

The ECB classifies the majority of virtual currencies as decentralized.

The ECB lists Bitcoin, Litecoin, and other alternative coins (called altcoins) as decentralized virtual currency schemes with bidirectional flow.

This means that users can buy and sell bitcoins according to the current exchange rate. The Bitcoin exchange rate with other currencies is determined by the supply and demand of the currency. The virtual currency scheme allows users to purchase both virtual and real goods and services.

However, the main economic debate surrounding Bitcoin is on whether it is a currency or not".

Fiat currency must have three properties:

(1) Storability.

(2) Serve as a medium of exchange for transactions.

(3) Able to use as a unit of account.

Although Bitcoin has the attributes of a currency but due to its volatility and greater demand as an asset than a currency, it calls into question whether it really meets the requirements of a currency. (Miglietti C. and Skulanova Z. 2019; Erdas M., Caglar A. 2018)

The resurgence in US dollars that has been seen throughout 2017 can be attributed to an increased public awareness of bitcoin throughout the United States due, in part, to increased media coverage.

Corbet et al. (2017) investigated the effects of monetary policy decisions made by the FOMC, ECB, BOE and BOJ on bitcoin returns by employing both OLS and GARCH estimation models.

The results indicate that monetary policy decisions based on interest rates taken by the Federal Open Market Committee in the United States significantly impact upon bitcoin returns. After controlling for international effects, they find significant evidence of volatility effects driven by United States, European Union, United Kingdom and Japanese quantitative easing announcements. These results show that, despite its nature and ideals, bitcoin seems to be subject to the same economic factors as traditional fiat currencies and is not entirely unaffected by government policies. This result has implications for investors using bitcoin as a hedging or diversification tool. (Corbet S., McHugh G., Meegan A. 2017)

In another study, Tomić et al. (2020) examined the ability of central banks to conduct monetary policy successfully in conditions of widespread use of cryptocurrencies in payment transactions.

They compared the situation in the cryptocurrency market with the phases of Internet development and the situation on other markets of electronic payment systems. they concluded that cryptocurrencies do not have the capacity to endanger the traditional monetary system at the current level, Bearing in mind the early maturity of this market, In the case of private cryptocurrency usage growth, central banks could partially or completely lose influence over monetary policy. (Tomić N., Todorović V., Čakajac B. 2020)

In their study, Erdas et al. (2018) examined the asymmetric causal relations between Bitcoin price and commodity markets, exchange rate and global indexes,

they studied the relationship between commodity prices and the global indexes which may affect Bitcoin investors' decisions in international markets. they concluded that Bitcoin may exist in association with the commodity market and other global indicators in the future, along with the recognition of the Bitcoin currency by countries, its being accepted as a means of exchange and its increased reliability. (Erdas M., Caglar A. 2018)

By applying Johansen Co-integration and Granger Causality models, Gulec et al. (2018) investigated the association between the selected financial indicators and Bitcoin price. The first period ran from the establishment of variables in March 2012 until May 2018. The results indicated that Bitcoin prices have an increasing trend with a high volatility and that the relationship that exists between interest rates and Bitcoin prices is a variable. (Gulec M., Cevik E. and Bahadır N. 2018)

Data Description:

first, it is important to refer to that we studied the relation between Bitcoin price and more than 30 time series data of financial assets; In this paper we used only eight of the leading financial assets that we find there are significance correlation with Bitcoin price.

The data we employ in this study is based on the historical global weekly price indices, extracted from a financial website (www investing.com); The data has been studied over the past ten years, time interval period extend from (1 June 2011) to (1 June 2021), our data include a total of (522) weekly observations.

The natural logarithm of the data was taken before the analysis. It is aimed to eliminate the scale effect between variables by taking the natural logarithm into account.

We used **(EVIEWS V.12)** software to obtain statistical analysis of data.

Our analysis focuses on the Bitcoin prices (BTC/USD) due to the fact that the highest share in the cryptocurrency markets belongs to Bitcoin currency.

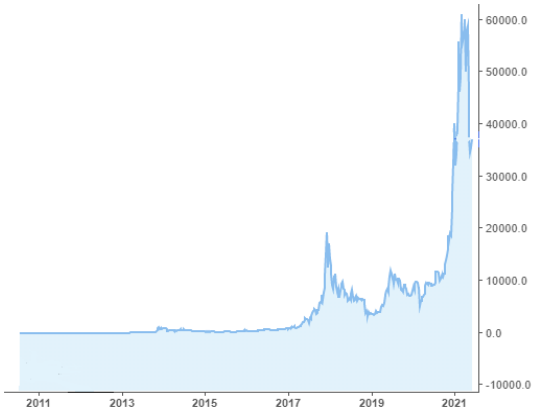
We took eight time series data

1: BTC/USD exchange; 2: dollar index (USDX); 3: EUR/USD exchange; 4: GBP/USD exchange; 5: Gold price; 6: Oil Brent price; 7: FTSE 100 index (London Stock Exchange) ; 8: S&P 500 index;

Figure 1 reflects the eight-time series that described above.

Figure 1. Graphical line of time series data.

BTC/USD



dollar index (USDX)

EUR/USD exchange

GBP/USD exchange

Gold price

Oil Brent price

FTSE 100 index

S&P 500 index

Source: Author's Design.

Empirical Analysis and Results:

The Augmented Dickey-Fuller analysis ought to be employed to investigate time series data based on unit roots test. If the results of the Augmented Dickey-Fuller test indicate that any of the variables is non-stationary, the first difference should be taken before applying the Granger causality test, Moreover, if the findings of unit roots test for the first difference show that the data is non-stationary, then the second difference of the variables must be taken into account before conducting the Granger causality test.

Table 1 reports the results of applying the ADF unit root test.

Cross-section	t-stat	p-value
BITCOIN PRICE	0.65217	0.85990
EUR/USD	1.01023	0.92240
FTSE 100 INDEX	0.61639	0.85120
GBP/USD	0.59052	0.84500
GOLD PRICE	1.16510	0.94200
OIL BRENT	0.66714	0.86270
S&P 500 INDEX	0.62091	0.85200
USDX	-0.52238	0.48990

Source: Author's Computation.

The unit roots results illustrated in Table 1 indicate that the p-values for eight time series data are higher than the significant level of 0.05, In conclusion, the results indicate that the null hypothesis are accepted; That said, the data are not stationary.

the first differences were found to be stationary, and all variables become stationary when we took first differenced.

After all the time series data became stationary, causality relationships between Bitcoin prices and commodity markets, exchange rates and global indexes are analyzed via Granger causality test.

Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another.

It is designed to detect the impact of positive and negative shocks separately by eliminating the existence of asymmetric information in financial time series.

Table 2. reports the results of applying **Granger causality test**.

Null Hypothesis:	F-Statistic	Prob.
EUR/USD does not Granger Cause BITCOIN PRICE	0.00128	0.9715
BITCOIN PRICE does not Granger Cause EUR/USD	4.24717	**0.0398***
FTSE 100 INDEX does not Granger Cause BITCOIN PRICE	0.18263	0.6693
BITCOIN PRICE does not Granger Cause FTSE 100 INDEX	6.46550	**0.0113***
GBP/USD does not Granger Cause BITCOIN_PRICE	9.5454	0.9922
BITCOIN_PRICE does not Granger Cause GBP/USD	5.81312	**0.0163***
GOLD PRICE does not Granger Cause BITCOIN PRICE	0.06063	0.8056
BITCOIN_PRICE does not Granger Cause GOLD PRICE	1.05523	0.3048
OIL BRENT PRICE does not Granger Cause BITCOIN PRICE	0.17014	0.6802
BITCOIN PRICE does not Granger Cause OIL BRENT PRICE	3.70875	0.0547
S&P 500_INDEX does not Granger Cause BITCOIN PRICE	4.81417	**0.0287***
BITCOIN_PRICE does not Granger Cause S&P500 INDEX	9.79747	**0.0018***
USDX does not Granger Cause BITCOIN PRICE	0.11415	0.7356
BITCOIN PRICE does not Granger Cause USDX	5.26560	**0.0222***

Source: Author's Computation.

From **table 2.** we find that neither gold price nor oil brent price don't causality relationship with bitcoin price where p-value>0.05, we can conclude there is no correlation between bitcoin price and the price of both gold and oil; Thus, the positive and negative shocks to gold price or oil Brent price do not seem to determine Bitcoin price.

The results of Granger test indicate one-way causality relationship between Bitcoin and each of (USDX, EUR/USD, GBP/USD, FTSE 100 index), Thus, it is possible to make some inferences: a negative or positive trend in Bitcoin prices effects on of (USDX, EUR/USD, GBP/USD, FTSE 100 index) both negatively and positively.

When the other direction of causality is examined, it is seen that the increases and decreases in each of (USDX, EUR/USD, GBP/USD, FTSE 100 index) do not significantly affect Bitcoin prices.

According to the results, there was two-way causality for Bitcoin prices towards the S&P 500 Index where P-value<0.05; A negative trend in Bitcoin prices affects the S&P 500 stock Index both negatively and positively. It was observed that Bitcoin investors do not have a homogeneous structure. Accordingly, S&P 500 investors can get a different position in the face of diminishing Bitcoin prices. It can also be said that investors in the index quoting the largest companies in the world take into consideration the Bitcoin price movements in their investment decisions.

Conversely, it appears that if a positive shock occurs at Bitcoin prices, the S&P 500 Index tends to be adversely affected. It is considered that the increase in the Bitcoin price is negatively priced by the S&P 500 investors. As a result, it was found that the S&P 500 investors adopt a highly sensitive position towards the Bitcoin prices.

In the last stage of analyzing the data we applied **Multiple linear regression** to predict in Bitcoin price (dependent variable) depend on all of (USDX, EUR/USD, GBP/USD, FTSE 100 index) independent variables.

Table 3. reports the results of applying Multiple linear regression.

Dependent Variable: BITCOIN_PRICE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EUR/USD	34.99372	1.562215	22.40007	**0.0000***
FTSE 100 INDEX	1.233700	0.266129	4.635714	**0.0000***
GBP/USD	-1.300937	0.354650	-3.668230	**0.0003***
S&P 500 INDEX	5.973781	0.126392	47.26380	**0.0000***
USDX	35.83756	1.746352	20.52139	**0.0000***
C	-203.6658	7.182008	-28.35777	**0.0000***

R-squared	0.971955	Mean dependent var	6.540382
Adjusted R-squared	0.971683	S.D. dependent var	2.608707
S.E. of regression	0.438982	Akaike info criterion	1.202712
Sum squared resid	99.43597	Schwarz criterion	1.251651
Log likelihood	-307.9078	Hannan-Quinn criter.	1.221880
F-statistic	3576.604	Durbin-Watson stat	0.272090
Prob(F-statistic)	**0.000000***		

Source: Author's Computation.

According to the results from **table 3.** the regression equation of Bitcoin price:

$$\textbf{Bitcoin price} = -203.66 + 34.99 \times (\text{EUR/USDX}) + 1.23 \times (\text{FTSE } 100) - 1.30 \times (\text{GBP/USD}) + 5.97 \times (\text{S\&P } 500) + 35.83 \times (\text{USDX})$$

P-value<0.05 for all coefficients of equation; Thus, coefficients values are statistically significance, and Coefficient of determination (R-squared): is 0.9719, it is very large value.

P-value<0.05 in Fisher test for examine the significance of the equation which indicate that the equation is statistically significant.

The previous regression model provides us the fact that the price of bitcoin is related in many financial assets, and we may consider the impact of cryptocurrencies on monetary systems.

CONCLUSION//DISCUSSION:

Empirical analysis concluded that Bitcoin price have causality relationship with many of leading financial assets, and we may consider the impact of cryptocurrencies on monetary systems.

All current cryptocurrencies are controlled by private entities, so that the issue of impact on monetary system becomes very important. Autonomous decisions by private entities

concerning the money supply could diminish the ability of central banks to implement monetary policy effectively. The subject of this paper is the influence of alternative cryptocurrency forms on the monetary system. The aim of this paper is to determine the ability of central banks to conduct monetary policy successfully in conditions of widespread use of cryptocurrencies in payment transactions.

If we consider the market maturity and constant increase in the number of participants, it may be concluded that, at some point in the foreseeable future, cryptocurrencies could affect certain aspects of monetary system.

A reduction or complete loss of influence on monetary system would lead to the deepening of economic problems. The basic approach against monetary control loss is to conduct a principled, responsible, and unwavering monetary policy.

Maintaining the neutrality of the central bank and depoliticizing monetary policy are clear institutional assumptions. At the same time, the central bank must be open to new ideas and trends. The growing pressure of accepted private cryptocurrencies will not be solved by ignoring reality and by simply banning their use.

E-commerce has increased the popularity of cryptocurrencies. Along with the diversified forms of cryptocurrencies, its gradual advancement enables cryptocurrencies to share similar functions to those of fiat currency.

Bitcoin prices have regularly displayed high volatility and the presence of high volatility is commonly associated with owners of Bitcoin actively taking part in its economy.

Consequently, the possible replacement effects of fiat currency with cryptocurrencies led the discussion on the supply and demand of cryptocurrencies, for example: In May – 2021 Bitcoin plunges 15% after Elon Musk tweets that Tesla Company will not accept it as payment.

The results demonstrate that the effects of cryptocurrencies would be different in the short- and long-terms, which would pose challenges to the implementation of monetary system.

REFERENCES

- **Said, A.** (2019), The Economic Impact of Digital Fiat Currency (DFC): Opportunities and Challenges, *2nd Europe - Middle East - North African Regional Conference of the International Telecommunications Society (ITS)*.
- **Dharmapalan J. and McMahan C**. *(2016),* The Case of Legal Tender: Central bank issued Digital currency and its Impact on Financial Inclusion, *eCurrency.*
- **Kim J., Kim S., Kim S.** (2020), On the Relationship of Cryptocurrency Price with US Stock and Gold Price Using Copula Models, *Mathematics, 8*, 1859.
- **Luo M., Kontosakos E., Pantelous A., Zhou J.**(2019), Cryptocurrencies: Dust in the wind?; *Physica A* ,525 (2019) 1063–1079.
- **Corbet S., McHugh G., Meegan A.** (2017), The influence of central bank monetary policy announcements on cryptocurrency return volatility; *Investment Management and Financial Innovations*, Volume 14, Issue 4.
- **Miglietti C. and Skulanova Z.** (2019), Bitcoin, Litecoin, and the Euro: an annualized volatility analysis, *Emerald Publishing Limited 1086-7376.*

- European Central Bank (2015), Virtual currency schemes – a further analysis, *European Central Bank*, Frankfurt.
- **Erdas M., Caglar A**.(2018), Analysis of the relationships between Bitcoin and exchange rate, commodities and global indexes by symmetric causality test; *ASTERN JOURNAL OF EUROPEAN STUDIES*, Volume 9, Issue 2.
- **Tomić N., Todorović V., Čakajac B.** (2020), The potential effects of cryptocurrencies on monetary policy*; EJAE*, 17(1): 37 – 48.
- **Gulec M., Cevik E. and Bahadır N.** (2018), Investigation of the association between Bitcoin and financial indicators, *Journal of the Faculty of Economics and Administrative Sciences*, 7(2), pp. 18-37.