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ARTICLE



The inefficiencies of bitcoins in developing countries

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ABSTRACT

Cryptocurrency is an emerging phenomenon set to revolutionize the financial industry. It utilizes blockchain technology, which ensures data is immutable, transparent and reliable. Cryptocurrency is present in different forms like Blockchain and is present in most parts of the world. Developed nations have a significant interest in technology and have put a measure to investigate while developing nations are also following suit. The global interest in cryptocurrency is associated with the fact that the movement of money will be traceable and it will minimize activities such as money laundering and corruption. The paper analyzes a selected period of six years to establish the efficiency of the Blockchain in the markets. A graph and tables are essential in generating more data for interpretation of the events. The tests used in the analysis are the Ljung-box, R/S Hurst, BDS, Runs, AVR test, and Bartels tests. All the tests demonstrated inefficiencies in the Bitcoin trend, especially in the full sample and slightly low inefficiency in the later subsample. The conclusion made is that bitcoin will improve its efficiency over time as it is an emerging industry that needs to grow. Developing countries experience higher inefficiency combined with the prevalent policy challenges and issues like corruption and unemployment.

KEYWORDS

Bitcoin; cryptocurrency; blockchain; mining; monetary policy

JEL CLASSIFICATION

G10; G20; G30; E40

1. Introduction

The financial industry, the media, and academics have greatly embraced cryptocurrency since its inception in 2009. Its first decentralized form is bitcoin that was built upon blockchain technology offers various advantages over other payment methods like MasterCard and visa. Using the blockchain technology means that the transactions cannot be erased, edited, and it is highly transparent. There is a global interest in cryptocurrency, making it a key piece of financial technology that needs to be studied by academics, financial stakeholders, and the media. Cryptocurrency can change the structure of economic inclusion in developing nations and decrease the number of impoverished citizens. The technology is accessible to all but countries are reluctant to give it a chance meaning it will take a while before the benefits are visible (Guidici, Milne, and Vinogradov 2019).

Some developed nations have displayed an interest in cryptocurrency, and the United States is encouraging financial institutions to

study innovation. The UK government also intends to use bitcoins to pay research grants and China has demonstrated confidence in the technology. However, it's adaptability to developing countries may take a while because it's one of the relatively untapped markets especially, Bitcoin. Also, a big challenge in developing countries is corruption due to unaccounted and transactions that are not recorded. Cryptocurrency permanently records transactions on a public ledger to ensure perfect transparency (Chan et al. 2017). Despite its many advantages, it is not clear how efficient cryptocurrency is to the developing countries. There are so many cryptocurrencies in the market at the moment but only a few are at the top according to capitalization and they offer valid competition to the most popular Bitcoin in various places globally. The aspects of crypto currency has brought about various challenges in their efficiencies in developing countries. These challenges are due to the nature of crypto currencies, which include their high volatility,

technological revolutions and vulnerability to attacks. These aspects have led to bitcoin inefficiency in developing countries.

The inefficiencies of bitcoins need to be examined from an economic viewpoint, although politics, ethics, laws, and safety are key topics surrounding the same. The paper will look at the negative bubbles that characterize cryptocurrencies despite being a viable option in financial innovation for the future. Bitcoin will be tested on its efficiency globally and determine whether the behaviour would be hurtful to a developing country in any part of the world. However, the reason people have signed up for cryptocurrencies in developing countries is not the same as those in developed countries. Although bitcoin has had its advantages over the years, it has had some inefficiencies in developing countries making it hard for its adaption in these countries. These inefficiencies are a result of the nature of bitcoin, and generally, crypto currencies. Therefore, these challenges raise a discussion on the inefficiencies of bitcoin in developing countries giving focus to its aspects as a crypto currency. The paper is also organized to give an overview of the data and analysis as well as description and sources. The results will be examined for further discussion and then followed by a conclusion.

II. Literature review

The economy has been globalized, and so have the activities and the industry carried out on the international sector. The world has transformed into a regional community. The value of the economy and of the currency cannot be overlooked. In the emergence of borderless businesses and transactions, the availability of currency should also be simple. Many methods have been created to render the payment process simpler and quicker. E-money and e-commerce have long been seen as the main alternative in the market. Contemporary circumstances have experienced the value of electronic wallets and money transactions via smart phone apps. All of

these items accept an approach to a kind of money that might be used in a company. The launch of Bitcoin is one such term.

The concept of bitcoin

Bitcoin is a crypto currency built for the most current business situation. The currency was founded in 2009. The concept behind the development of the bitcoin is to use the white paper, in which the paper is named as bit and the currency as coin. The idea behind the development of Bitcoin is the simple movement of money without charging huge sums of transaction fees. Standard electronic payment pays a portion of the purchase price to be charged to the bank or other financial institution relevant to the sale. As suggested by Jarecki et al. (2016), the simple idea is to eradicate physical verification of currencies. Bitcoin is seen only as a balance in the wallet of the Bitcoin account owner. The amount shall be managed with both funds in view, like that of the balance sheet or the cash position. During the transaction, verification is carried out to insure that the monetary exchange has been carried out without any sort of difficulty or mismanagement. Böhme et al. (2015) note that some of the essential and original characteristics of Bitcoin are that it offered a way of promoting the adoption and usage of technology in its initial process of growth, thereby solving the normal challenges encountered by other technologies. It was built to revolutionize e-commerce and e-money. Currently, bitcoin functions both as an online transaction payment network and as an investment-enabled block chain, all of which are inextricably linked.

Giungato et al. (2017), point out that the growth of Bitcoin in developing countries had consequences for various sectors, requiring a wide interdisciplinary context for recognizing this trend, especially in developing countries. The consequences have followed different directions. Technical problems, volatility, system stability and susceptibility to attacks are the primary challenges in developing economies. First, cryptocurrencies are still volatile; hence many governments are quite sceptical about

adopting them as legal payment methods. It is, therefore, necessary to explore the factors and ensuring it stable and regulated. These observations are supported by Kesa and Mahoro (2019), who suggest that their volatility also makes them unstable, that is, they lack a constant value making them an unreliable measure of price. Technological revolutions are taking place in both developed and developing nations which means adopting cryptocurrency would result in improved online transactions and further these technologies. In the African continent, for instance, a Bitcoin can be widely accepted with proper design and harnessing. Some benefits of cryptocurrency to developing countries include adaptability, speed, and scalability. A few individuals or institutions do not control cryptocurrency as it is a vast universal system. Developing nations can highly benefit from these factors with proper infrastructure (Böhme et al. 2015). However, the technological advancement has led to an increase in cyber-crime which makes the system vulnerable to cyber threats. These threats place the security of the crypto currency at risk. These consequences have led to inefficiencies of bitcoin in developing countries.

III. Methodology and data

Data will be collected from www.bitcoinaverage.com as it aggregates Bitcoin prices from all over the world. Countries also have different currencies, and the popularity also differs from one country to the next. Getting the global price perspective is an effective way of testing its efficiency. The data collected runs from the beginning of August 2010 to the end of July 2016. The graph below shows the behaviour of the prices and volume during the selected period demonstrating an interesting trend. From the graph, the price peaked in 2013 before going back to normal. The following formula is used to calculate bitcoins

$$R_t = [L_n(P_t) / L_n(P_{t-1})] * 100$$

R_t = Return of bitcoin

$L_n(P_t)$ = Natural log of bitcoin prices at the time t (Bitcoin Average 2019)

The period selected is a sample, and the data can give descriptive statistics, as demonstrated in the table below. The period has been divided into three key subsamples to aid the analysis.

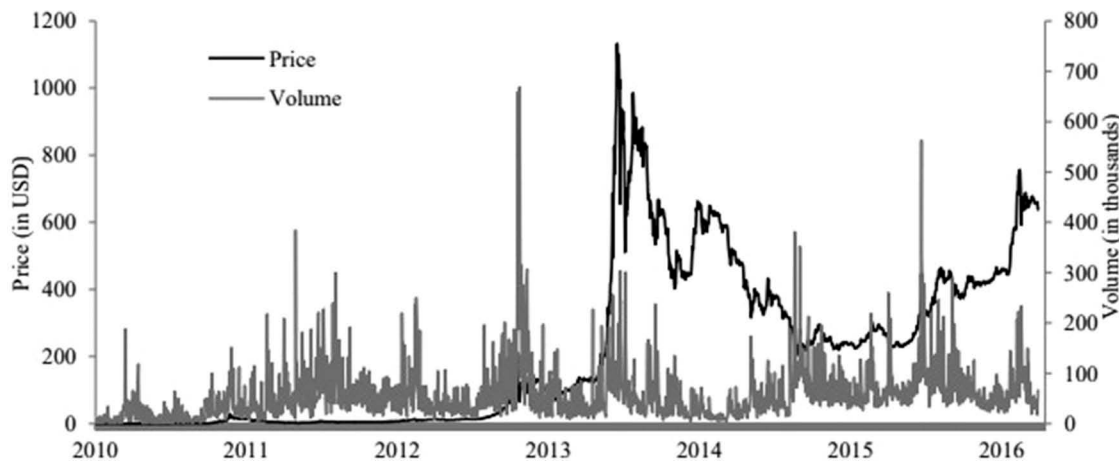


Figure 1. Time series graph plotting the daily bitcoin price and volume.

Period of sampling	N	Mean	SD	Maximum	Minimum	Kurtosis	Skewness
1/8/2010- 31/7/2016	2183	0.4245	5.4176	37.2239	-44.5621	13.0323	-0.3993
1/8/2010- 31/7/2013	1089	0.6853	6.4539	37.2239	-44.4607	8.4745	-0.1400
1/8/2013- 31/7/2016	1094	0.1681	4.1247	25.9477	-44.5641	23.7367	-1.5167

Throughout the sample period, bitcoins demonstrate positive mean return, with negative skewness and excess kurtosis. Bitcoins over the same sample period also display small standard deviation and mean return in the second subsample and greater negative skewness and kurtosis for the same sample.

In an efficient market, prices will be random because future events are unforeseeable. Various tests will be run to determine whether Bitcoin is efficient. The first tests examine autocorrelation and capture all aspects of bitcoin, and it is called the Ljung-Box with a no autocorrelation null hypothesis (Ljung and Box 1978). Secondly, wild-bootstrapped AVR test of Kim known to improve small AVR properties. Thirdly, runs test and Bartels tests to determine the independence of returns with a null hypothesis (Wald and Wolfowitz 1940; Bartels 1982). The fourth test checks serial dependence for stock returns, the BDS test (Brock et al. 1996). The rescaled Hurst exponent will be the last test with long memories of stock involved (Dimitrova et al. 2019).

IV. Results

The table below summarizes results from all the tests which all report on p-values but the Hurst exponent which reports the Hurst statistics;

Test	Ljung test	AVR test	Runs test	Bartels test	BDS	R/S Hurst
1/8/2010 – 31/7/2016	0.0	0.0	0.0	0.01	0.0	0.353
1/8/2010 – 31/7/2013	0.0	0.0	0.0	0.0	0.0	0.363
1/8/2013 – 31/7/2016	0.35	0.0	0.0	0.64	0.0	0.406

(Bitcoin Average 2019).

The full sample period indicates significant efficiencies with bitcoin, especially from the R/S Hurst exponent. It shows the returns are not random which is anti-persistence. Just like the full sample period, the split sample periods reject the hypothesis and show non-randomness with the R/S Hurst exponent. Generally, the bitcoin turns out to be inefficient in both full time and subsample periods.

Cryptocurrency might a giant financial event in the future, but developing economies are not ready when it comes to policies to fully and effectively

embrace it. Bitcoin, as demonstrated by the tests above, has inefficiencies in its markets that might be disadvantageous to the developing countries. A majority of them are grappling with war, corruption, high unemployment, inflation, and poverty. These factors contribute to political instability sinking the nations to an economic crisis. Cryptocurrency and Bitcoin technologies have not become fully efficient to be relied upon by such economies. There may be positive contributions but the intentions cannot be proven for its credibility. For example, Venezuela launched its cryptocurrency but it was speculated to be a means of avoiding sanctions by the US (Kesa and Mahoro 2019).

Cryptocurrency is not properly capitalized due to fear of market volatility and unexpected sharp price changes that may hurt specific economies. The US and UK currencies are fairly strong globally, and they will have a similar impact on the crypto market. The inefficiencies instil fear into the market and people prefer the traditional currencies as it is. Regulatory frameworks have to be synchronized to allow governments to work harmoniously in the cryptocurrency era and it seems to be a difficult undertaking since they will not have the control that they currently have on banks.

V. Conclusion

The analysis in this paper shows that Bitcoin's inefficiency is quite strong and has the potential of having random returns in the second subsample. Therefore, the beginning suffers strong inefficiencies while, in the end, the inefficiencies tend to get weaker. Bitcoin and cryptocurrencies are still young and will need more time to adjust to the market and be more efficient. As investors continue to trade and analyse, it will become more efficient in existing and emerging markets. It is a process that may take some time and all parties involved have to analyse the behaviour to understand its dynamics.

Developing countries are at the receiving end of the inefficiencies as they have more unstable economies. It is easy to lose money in countries

where inflation is high, or the economy is not good. Governments have different policies in regulating and this also contributes to the uncertainties as anything could happen anytime. The 2013 incidence where prices went extremely high before levelling down again is a good example of why regulation is needed. Developing countries also have policy challenges that contribute to vulnerability to these efficiencies. The developing countries cryptocurrency is inefficient in general and needs more time and change of policies to stabilize.

Disclosure statement

No potential conflict of interest was reported by the authors.

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