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CRYPTOCURRENCY AND THE AFRICAN ECONOMY

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Abstract: *As an encrypted peer-to-peer network for ensuring digital trade, cryptocurrency is a technology developed some years ago. Amidst some threats, Bitcoin, the first and most popular type of cryptocurrency, is already gaining poularity universally as a near alternative to the age-long centralized financial payment systems. Some jurisdictions have even classified this class of virtual currencies and tokens as having the same status as taxable assets. This article aims at providing more update on cryptocurrencies and exploring their prospects and threats universally particularly in Africa. Specifically, the paper is aimed at examining and discussing bitcoin and its close variants. The study notes that while the private sector keeps heralding cryptocurrency enthusiastically in many countries, their governments have been generally apprehensive, reserved, and in some instances unreceptive of cryptocurrency. This paper observes that by using a simple endogenous process it is possible for countries to ensure the coexistence between fiat currency and cryptocurrency. Doing so is likely to enable them reap the economic benefits of both centralized and decentralized currency schemes. Consequently, this study urges for greater international cooperation on the adoption of cryptocurrency, as it reduces the effectiveness of monetary policy at the country level, Even at that, countries should be prepared for potential speculative attacks and incorporate this decentralized means of payment better into their financial systems.*

Keywords: Cryptocurrencies, Bitcoin, blockchain, decentralized systems, crypto technologies, Africa

1. Introduction

Cryptocurrency is a subset of digital currencies.The latter may either have centralized institutions or are based on a decentralized network (Trautman,2014). For a centralized currency scheme, the digital currency is issued by one institution that ensures that the digital coins can be exchanged back to fiat currencies or can be used to purchase and sell digital goods(Bryans,2014 cited in Mazikana,2019). In the contrary, the decentralized currency schemes try to avoid central institutions as much as possible and rely upon a network of transaction partners(Karlstrom, 2014). Once the partners can observe each other, they will be able to develope trust based on their behaviors. Critocurrencies are characterized by decentralized currency schemes based on cryptography. Bryans (2014) regards a cryptotocurrency as a digital token produced by cryptographic algorithms and transported across cyberspace using protocols such as peer-to-peer networking. Its value is mainly derived from the demand and supply for such tokens. An essential part of their appeal resides in the decentralization of the financial system in which they exist.

According to Bryans (2014), the general discourse on cryptocurrencies has heralded varying levels of support for the innovation. While some regulators have been very disturbed about them, the Financial Technology community have argued about the inevitable widespread use of cryptocurrencies. For instance,according to Madore(2015) cited in Mazikana(2019), global financial corporations like Citibank are already putting in place their own cryptocurrency because of the benefits of utilizing its protocols . Cryptocurrencies are closer in

form to physical currencies than other virtual currencies because they are also used as a medium of exchange for physical assets. Harvey (2015) cited in Mazikana (2019) argues that most of the modern world's money supply is in digital form; as such, they can be considered to be in the form of cryptocurrencies. Cryptocurrencies present the potential for greater socio-economic inclusiveness through enhanced financial security. Stancel (2015) asserts that the rise of Bitcoin in the recent times has caused cryptocurrencies to be increasingly more relevant across the universe.

The major issues with the adoption of cryptocurrencies as highlighted by Harvey (2015) include an early track record of illiquidity, high volatility and potentially questionable uses.For Harvey (2015), majority of the issues surrounding the successful adoption of cryptocurrencies rest on the confusion of whether they are digital or virtual currencies, and consequently, how their values are to be determined.

Acccording to Raffelini(2018), debates have been going on in finance literature on whether or not cryptocurrencies match the criteria of money- if they are a well stable store of money or an efficient medium of exchange. In addition,politicians have often relied on the fact that that criminals take advantages of digital currencies to codemn them – an approach which contributes to creating moral or ethical conflicts rather than providing alternative solutions. According to Bryman(2014). there are two major shools of thought concerning the usefulness and future of cryptocurrencies in general and Bitcoins in particular.While those with libertarian views of life are optimistic and accept the cryptocurrency system, other authors, economists, and scholars from this field are reluctant to embrace the use of cryptocurency in the system of payments and financial transactions.These critics of cryptocurrencies claim that cryptocurrencies are very volatile and can be used for money laundry or financing illegal activities.They claim that cryptocurrencies are afflicted with inherent contradictions which make their widespread use as money impossible. They consider Blockchain as just a simple big database. For instance according to Raffelini(2018), the economists Nouriel Roubini and Paul Krugman expressed their scepticism about cryptocurrencies and blockchain . On the other hand,the optimists argue that cryptocurrencies facilitate the transfer of funds between two parties in a transaction through the use of public and private keys.Such fund transfers are carried out with minimal processing fees. Another argument that promoters of Bitcoin use is the claim that,given the increasing size of the market capitalization of Bitcoin, Ethereum and other cryptocurrencies,the cryptocurrency market has become very large and powerful; hence, banning it would be costly for any country (Bryman, 2014).

Whatever may be the negative features of cryptocurrency , developing nations,particularly African countries are apparently in need of some alternative means of providing for money transfers. According to McKenzie (2018), Africa is reported to be having the second highest population of unbanked adults in the world with about 350 million people, or 17% of the global total. Literature, shows that up to two thirds of Sub-Sahara Africans do not own bank accounts at a time when foreign remittance has continued to be a primary source of income for many of their communities and households.A case in point is Lesotho that attribute about a third of its Gross Domestic Product(GDP) to remittances from abroad (McKenzie,2018). Hence, there is a disproportionate need in African countries for some remittance mechanisms outside the traditional banks.In spite of this prevailing situation in Africa, there is yet to be a widespread adoption of cryptocurrency by her governments, individuals and businesses (Gogo, 2019). Gogo claims that apart from opaque regulation and a lack of awareness, one of the major reasons for this failure is the expansive use of mobile money on the continent.The purpose of this work,therefore, is to ascertain the

economic importance this technology may bring to the global society in terms of the way government organizations work, along with possible implications. It also aims at providing more updates on cryptocurrencies and exploring their strengths,weaknesses,threats and opportunities . The paper will equally attempt to unveil the extent to which blockchain and cryptocurrency have been embraced .It will also summarize the latest and key developments taking place in selected jurisdictions in respect of blockchain and cryptocurrency, focusing on current regulatory approaches.

The remaining part of this paper is structured as follows:. Section 2 provides a review of the related literature. Section 3 analyzes Bitcoin.Section 4 presents the status and regulation ``of cryptocurrencies in some selected countries.Section 5 will highlight the economic consequences of cryptocurrencies and blockchains while section 6 concludes the paper.

2. Review of the Related Literature

2.1 Conceptual Framework

2.1.1 The Concept of Blockchain

Mazikana(2019)refers to blockchain as a ledger that is updated constantly and maintained by computers. It is a distributed ledger technology which bundles transactions into groups called 'blocks', cryptographically chains those blocks together and then broadcasts them to the nodes of a peer-to-peer network.The essence is to create an immutable, distributed database of those transactions This technology is developed in order to create a database that is consensually shared and synchronized across the network spread across multiple sites, institutions or geographies.

Blockchain eliminates the traditional role of a middleman which is required in financial instittions like banks that are supervised by authorities. An important feature of blockchain is that it is public; every one can see it because it acts as a public ledger which is updated after every transaction. Everyone owns their own copy of the ledger. Although this might imply a lack of privacy, this is not entirely true as the transactions and accounts in the blockchain are anonymized by recoding it, a technically computerized process.

The main advantage of the public ledger is that one does not have to trust a third party or middle man anymore. Every transaction becomes a block which is then checked by others' computer and approved. These verifiers are what people call miners (Dwyer, 2014). After it is approved, the transaction is added to the chain of blocks, the blockchain, and goes through. Every transaction is public and if someone tries to corrupt it, the mathematics behind it would flag it and prevent a consensus among all the ledgers - thus basically preventing fraudulent transactions. Consequently, the financial intermediaris like banks are partly replaced by cryptographic verification (Swan, 2015 cited in Mazikana,2019)..

2.1.2 Virtual Currencies

According to Mckenzie(2018), Virtual currency refers to an unregulated digital currency which is typically issued and controlled by its developers .It is used and accepted among the members of a specific virtual community. Frankenfield(2019) considers it as a currency held within the blockchain network that is not controlled by a centralized banking authority.Virtual currency differs from digital currency since digital currency is simply a currency issued by a bank in digital form.It is unregulated. Consequently, it experiences dramatic price movements as the only real force behind trading on it is consumer sentiment.

Mazikana (2019) contends that there has been a proliferation of virtual currencies universally. Examples include Facebook Credits, Microsoft Points and Amazon coins. Unlike Bitcoins, other virtual currencies are issued by companies and are not linked to any claims on real assets(Harvey, 2015). Wagner (2014) in Mazikanaa (2019)explains that the value and distribution of virtual currencies are typically controlled by a centralized authority, which is usually the issuing corporation, and are employed to facilitate online purchases. If there is a

relatively low level of interaction between these virtual currencies and traditional currencies, there might not be a need for any regulatory intervention.

There are five potential risks associated with virtual currencies that are of interest to central banks. These are reportedly price stability, financial stability, payment system stability, lack of regulation and reputation. Virtual currencies can make the goal of price stability somewhat difficult, if they affect the central bank's control of the money supply through open market operations. This reduced control over the money supply can also affect financial stability through the central bank's ability to intervene in the foreign exchange rate market. In addition, speculation with respect to the virtual currency can take place owing to the history of cyber-attacks and since there is no lender of last resort for these currencies. 2.1.3 Fiat money Fiat money is a currency that government has declared to be legal tender(Mckenzie,2018).

2.2 Theoretical framework

2.2.1 Mises Regression Theorem

The regression theorem assumes that all money must ultimately derive their purchasing power from a historical tie to a commodity that was valued in a state of barter. According to Jeffrey(2014) cited in Mckenzie(2018), the theory of the value of money is able to trace the objective exchange value of money only to that point where it is no longer the value of money but merely the value of a commodity.In this way one can continually go further and further back and must eventually get to a point where one can longer find any component in the objective exchange value of money which emanates from valuations based on the function of money as a medium of exchange.At this point, the value of money is nothing other than the value of an object that is useful in some other way than as money. Mises solved this circularity through the regression theorem. Mises accepted that the value of money is the result of the marginal utility of goods for which it can be exchanged; its expected purchasing power.Mises further identified that people expect future purchasing power based upon current and previously observed purchasing powers. For the regression theorem to work, a medium of exchange must already have the attributes necessary for a medium of exchange, having a price and be accepted on the market. Bitcoinhas been identifie as violating this regression theorem .

2.2.2 Byzantine Generals Problem

When creating a decentralized ledger one faces a couple of obstacles; the most important one of them being trust. The challenge of enforcing trust in distributed systems where distributed components that need to communicate information between each other might do so inaccurately is called the Byzantine General's Problem. The situation was revealed for the first time by Marshall, Pease, Robert Shostak and Leslie Lamport in 1982. It was named The Byzantine Generals Problem (BGP) (see Antonopoulos, 2014, lecture 3)..The necessity for a reliable computer system to be able to cope with malfunctioning components that give incompatible information to different parts of the system can be expressed abstractly as a group of generals of the Byzantine army camping with their troops around an enemy city. These generals must agree upon a common battle plan, whereas communication amongst them can be maintained only by a messeger. Assuming that in this "network" of generals one or more of them are traitors trying to confuse the others,the possibility of those generals reaching agreement becomes questionable. The problem here becmes how to find an algorithm to ensure that they will do so if one should use only oral message. the problem will be settled only if more than two-thirds of the generals are loyal.This implies that a single traitor can throw into confusion two loyal generals. However,it there are nonchangeable written messages that restrict can traitors´ ability to lie, the problem can be solved for any number of generals and possible traitors. When there is an increase in the number of the parties in the system , the number of channels for communication would equally increase diametrically. In the same manner, there will be

an increase in the complexity of a decentralized system with thousands of parties involved for concensus to be built.

2.3 Empirical studies

Bouoiyour and Selmi (2016) cited in Mazikana(2019) studied daily Bitcoin prices using an optimal-GARCH model and found that its volatility has decreasing trend comparing pre- and post-2015 data after observing significant asymmetries in the Bitcoin market where the prices are driven more by negative than positive shocks.

Also, as reported in Mazikana(2019), Dyhrberg (2016) he found that bitcoin can be used as a hedging tool against stocks in the Financial Times Stock Exchange Index and against the American dollar in the short term.

Later,Mothokoa (2017) employed a desktop-research methodology to carry out an analytical, explorative and comparative study. Complex concepts of crypto-currency were analysed and explored. The author then used the comparative method to contrast the legal and regulatory frameworks of Canada, the US and the EU with the legal position of cryptocurrencies in South Africa.The study illustrated that crypto-currencies are decentralised convertible virtual currencies that are based on cryptographic algorithms.

In a related study, Katsiampa (2017) estimated the volatility of Bitcoin through a comparison of GARCH models and found that the AR-CGARCH model gives the most optimal fit. He underlined that the Bitcoin market is high speculative.

El Bahrawy and Alessandretti (2017) examined the behaviour of entire market of 1469 cryptocurrencies between April 2013 and May 2017 and found that cryptocurrencies appear and disappear continuously and that their market capitalization is increasing exponentially while several statistical properties of the market have been stable for some years

Moving forward,Chiu and Koeppl.(2019) first reviewed the incentives to stop and continue with secret mining. They found that having started , it is never optimal for a buyer to stop a double-spending attack if successful in the first no of steps

Few of the other works that also studied the dynamics and indeterminacy of equilibrium prices of a cryptocurrency include Fernandez-Villaverde and Sanches (2016), Schilling and Uhlig (2018), Eyal and Sirer (2018), Saleh (2018), Pagnotta (2018), Choi and Rocheteau (2019) and Auer(2019)

2. Bitcoin

Böhme, Edelman, Christin and Moore (2015) define Bitcoin as a communication peer-to-peer protocol that enables a payment system and use of virtual currency. It is a form of digital currency which is created using the blockchain technology based on the ideas set out in a white paper by Satoshi Nakamoto, a person whose identity is yet to be verified, and who pioneered the blockchain movement.

Bitcoin was introduced in 2008 by a group of anonymous developers or a single developer named Satoshi Nakamoto (Nakamoto,2008). This introduction has brought about the launch of hundreds of other virtual currencies collectively referred to as Altcoins.Although the concept of cryptocurrencies was described and suggested firstly in 1998, Bitcoin became the first "practical" proof of the theory (Kelly 2014). The most famous example of a cryptocurrency, namely Bitcoin is used to explain how an e-currency works. Since it came into existence, the usage of Bitcoin has been growing rapidly. Bitcoin had 6.56 million users in 2016 and 11.05 million one year later in 2017 (Weber, 2017). It has risen more than 1,500 percent since the start of 2017(Mezikana,2019). The currency is extraordinarily volatile despite its recent ever-peaking performance by its value rising by thousands of dollars in value on one day only to fall by even more the next day.For example, Bitcoin traded at around $16,000 in the beginning of the year 2016 but it was sold at $1,000 in 2017,

Bitcoin is mainly used as a means of payment. The transaction costs for Bitcoins are kept very low, making it

easy and affordable to transfer sums of money with fast speeds all over the world.. Transactions are executed almost immediately and anytime (Bitcoin, 2017). However, it is still considered as a complement and not a substitute for traditional currency. The use of Bitcoin mainly for speculative purposes rather than a mean of payment has resulted in a lot a volatility that is much higher than similar derivatives, such as currency exchange rates. This volatility results in uncertainty about bitcoin value and therefore makes it a risky investment - even riskier as a substitute for traditional currency/

According to DeVries, the number of bitcoins that will ever be generated is finite. This prevents an overabundance and ensures its rarety. For Kelly (2014), value exists for bitcoin because its users have trust that if they accept it as payment, they will be able to use it elsewhere to buy something they need. As long as the users maintain this faith,anything could be the valued object. However,Krugman (2013) criticizes Bitcoin for being an unreliable store of value.Even though he concedes that bitcoin is likely a successful medium of exchange, Krugman (2013) denies the validity of bitcoin as money.

DeVries(2016) asserts that as different from gold bitcoin does not have intrinsic value. The reason for this is that bitcoin cannot be used to make physical objects like jewelry that have value.All the same,its value continues existing as a result ot trust and acceptance.This is contrary to the technology based on which the current legal and financial structures are designed. Financial institutions are built on much older forms of currency. DeVries(2016) contends that if cryptocurrencies should become the global norm for transactions, the systems for trade would need to be completely reformed in order to deal with this type of competition. Consequently,cryptocurrencies could possibly be the single technology that most dirupts the worldwide financial and economi systems According to Team (2016), BitPay which is regarded as the largest bitcoin processor in the world has of recent seen transaction rate grow by110% in 2015. Bitcoin was the first cryptocurrency to use blockchain and has been the market leader since the first bitcoin was mined in 2009. After the birth of Bitcoin with the genesis block, more than 1,000 altcoins and crypto-tokens have emerged, with no less than 900 trading actively on unregulated or registered exchanges. Lee,Guo and Wang(2018) posit that as of October 6 , 2017, 869 cryptocurrencies and 269 crypto-tokens were launched and traded.They had a total market capitalization of more than US$148.4 billion. Contrary to the case with fiat money, cryptocurrencies have a circulating supply, total supply, and maximum supply. Maximum supply here means the best approximation of the maximum amount of coins that will ever be created in the lifetime of the cryptocurrency. On the other hand,total supply refers to the total number of coins existing at the present moment. When determining the market capitalization, circulating supply is employed because it denotes the amount of coins circulating in the market and which is accessible to the public Ethereum, Ripple, and Litecoin also have large market capitalizations of more than US$1 billion. The price of the coins ranges from US$0.002 to well over US$1,000(Lee,Guo and Wang,2018). Some altcoins are very similar to bitcoins, but others are created by adopting very different methods or idea Transaction increase is an indicator of user acceptance growing. DeVries(2016) describes the conditions for Bitcoin‟s widespread adoption as a “fire triangle”. Just as fire needs fuel, oxygen, and heat to exist, bitcoin requires user acceptance, vendor acceptance, and innovation in order to be functional.Otherwise, bitcoin may not become a legitimized mainstream currency. Currently, it is experiencing an increase in user acceptance and use(DeVries, 2016).However, according to Lee,Guo and Wang(2018), bitcoin is not perfect. Every new purpose constitutes a justification for inventing new coins. Coins are invented to address specific issues.

The Features of Bitcoin

Lee, Guo and Wang(2018) highlights the features of bitcion as follows:-

(i) Decentralization.

Just like the conventional currencies that are traded digitally, bitcoin caalso be used topurchase things electronically.However, bitcoin differs from any fiat money or platform-based digital currencies as a b decentralized currency. This is because no single group or institution controls the bitcoin network. Its supply is governed by a procedure, and anyone can have access to it through the Internet.

(ii) Flexiblility.

Bitcoin wallets or addresses can be easily created online without any fees or regulations. Also, transactions are not localized.Hence, bitcoins can be transferred among different countries.

(iii) Transparency

Every bitcoin transaction will be broadcast to the entire network. Transactions are validated by mining nodes or miners who will also record them in the block which they are creating and broadcast the completed block to other nodes.The records of all transacti are stored in the blockchain, which is open and distributed so that every miner will have a copy and is enabled to verify them.

(iv) Speed

Transactions are broadcast within a few seconds. It will take about ten minutes for a bitcoin transaction to be verified by miners. This being the case, one can transfer bitcoins to any part of the universe and the transactions will under normal circumstance be completed few minutes later.

(v) Low transaction fees

No transaction fee is neede d to make a transfer historically, but the owner can opt to pay a little amout to make a transaction faster.

Strengths and Weaknesses of bitcoin

Ivaschenko (2016) provides the
Strengths and Weaknesses of bitcoin as stated below.

(a) Strengths

(i) The fixed limit of bitcoin that will exist.According to King (2013), Bitcoin will be mined with diminishing returns every four years until a total of 21 million which is the maximum number of bitcoins are reached. This feature of bitcoin is important for its value.As a result of the limited amount of bitcoins, it will never become inflated excessively.

(ii) As is the case with other cryptocurrencies, bitcoin is generally regarded as being protected from inflation originating from national government changes or restrictions (see Magro, 2016).

(iii) Eventhough, as is the case with most commodities, the price of bitcoin can fluctuate wildly based on many other external factors, it quickly shows its strength as a refuge against inflating national currencies.As reported by Desjardins(2016), it is the combination of demand for a safe haven option and its price volatility that helped Bitcoin to become the best performing currency of 2015 using the US Dollar Index - implying that Bitcoin was the highest valued currency in the entire world at the end of 2015

Cryptocurrency is strong, being the only currencythat can be bought and sold expeditiously, and still be used worldwide. It is possible to exchange other fiat currencies However, that would require visiting a money exchange in person, and that the money to be spent is acceptable locally. This situation is not the case for Bitcoin (or any other cryptocurrency).In order to buy bitcoin, one is only required to set up an online account with an online exchange,make their request, and the transaction is usually completed in minutes. So long as the bitcoin is in their digital wallet, they would be able to make purchases from thousands of vendors worldwide.

(iv) Bitcoin is a more viable solution with regard to the ease of entry and exit for a currency that can quickly gain value.Even though other fiat currencies may become stronger and be more desired, they are incapable of competing with the agilities of cryptocurrencies.

(v) It is by its very nature capable of filljng gaps currently existing in financial technologies and be able to help solve traditional banking problems by being a peer-to-peer system. For instance, it helps to provide a remedy for the problems related to unbanked consumers which are usually found in significant portions of the population in developing countries. Magro(2016)asserts that in Latin America, 60% of 600 million inhabitants do not have access to bank accounts.(vi) Cryptocurrency has a major advantage over traditional currencies as a result of its agility in making fast peer-to-peer transactions, especially in international business-tobusiness scenarios. The main benefits are summarized as including the security features, ease of use on mobile devices, relatively cheap costs of production and transmission via the block chain transmission protocol and low long-term inflation risks(Harvey, 2015) (vii) Cryptocurrencies in specific bitcoin transactions are completely anonymous and private (Chokun, 2014). Unlike in payments through bank, where the transactions can be tracked and identified, Bitcoin transactions cannot be identified.

(b) Weaknesses

Bitcoin has some internal weaknesses which are part of its design and cannot easily be modified..

(i)The public block chain is shared with all users.Consequently, it is susceptible to attacks as a result of to easy access (King, 2013;.Hileman, 2016).

(ii)Based on the manner in which Bitcoin is designed, its: network can not handle a high load transaction rates. Adoption by reluctant users must be in spite of these attributes.Bitcoin has developed a questionable reputation through recent events.

(iii) Due to the lack of government tracking and semi-anonymity of bitcoin,it paves way for fraudulent transactions.For instance stories like Silk Road portray a negative image of bitcoin and other digital currencies Silk Road was an online marketplace buried in the dark-net, which allowed thousands of drug dealers and nearly a million customers to make illegal drug deals through the use of digital currencies especially bitcoin(see Bearman, 2015). (iv)Cryptocurrencies are already being considered as having questionable security. In the past,the in-built security flaws and oversights created room for hackers to skim bitcoin from the exchange- a situation that made it severely loose value when users sold their bitcoin for fear of it getting stolen.According to Price(2016), Etherium, another form of digital currency and an open-source, public, blockchain-based distributed computing platform and operating system, suffered a form of theft to the tune of a 50 million USD hack. Such hacks are generally targeted at large holders of cryptocurrency that do not keep their security standards up- to- date.

(v)The ability of cryptocurrencies to be traded like a commodity can also be regarded as a weakness since commodity- based markets disclose a huge fluctuation in value from various events in the marketplace. This fluctuation in value ultimately limits the trust of investors in the commodities.

(vi) The failure to establish the determinates of bitcoin price creates an uncertain trading environment. This has overreaching effects on those that use bitcoin for currency and creates value fluctuations.According to PwC(2015), price volatility generates risk which discourages both sellers and buyers from holding cryptocurrency for any significant length of time. Too much risk in criptocurrency reduces consumer trust.This in turn limits validation of legitimacy.

(vii) Cryptocurrency does not seem to be a mature form of currency in its current state.

(viii) It is not possible for one to recover one's bitcoin if one loses one's bitcoin wallet, he has lost all of his bitcoins in that wallet and cannot recover same except if it has been backed up with a backup phrasecode(Khan,2014).

(ix) The deflationary featureof bitcoin is also a disadvantage because if bitcoin gets in the hands of speculator a huge recession will affect it(Hildi, 2013). At present, Bitcoin faces a lot of threat.Their are some

hurdles that require to be cleared if its user acceptance is to become widespread,In the first place, value fluctuation which is intrinsic in it puts doubt in users, as well as investors.Also,cryptocurrencies have been amenable to fraud and theft, generally due to faulty system setups by exchange companies. Again, cryptocurrencies are not yet an area covered by law generally.Consequently,user acceptance has continued to be limited. Yet another source of serious threat comes from the major competitors to cryptocurrency. They are making frantic efforts to provide an alternative to digital currency.Examples are Apple, which is one of the main competitors with their product ApplePay, the traditional credit card companies like Visa and MasterCard that are partnering with ApplePay‟s infrastructure (Gerber, 2015) and PayPal.Finally,according to PwC(2015), a no less important challenge militating against the worldwide acc cryptocurrency is the hurdle of the US regulations that would need to be passed through before there is a mainstream user acceptance of cryptocurrency. While many major markets are yet to have important legislation regarding bitcoin taxation,legislation in the United States might negatively affect the manner that bitcoin transactions are to be processed. This is likely to have a negative impact on the legitimacy of creptocurrency as a currency (DeVries, 2016).

4. The Status and Regulation of Cryptocurrency

4.1 The Status and Regulation of Cryptocurrency around the World

Law Library of Congress (2019) provides a report covering 130 countries as well as some regional organizations that have issued laws or policies on cryptocurrencies. According to the report, the recent years have seen cryptocurrencies become everywhere.This has prompted more national and regional authorities to battle with providing some regulation for cryptocurrencies. The growth has enabled the identification of the emerging pattern. The report has surveyed the legal and policy landscape surrounding cryptocurrencies around the universe. Despite the fact that the various forms of what are broadly known as cryptocurrencies are similar as they are all primarily based on the same type of decentralized technology known as blockchain with inherent encryption, Law Library of Congress(2019) observes that the terminology used to describe them varies greatly from one jurisdiction to another. The alternatve names used by some countries to reference cryptocurrency include: digital currency (Argentina, Thailand, and Australia), virtual commodity (Canada, China, Taiwan), crypto-token (Germany), payment token (Switzerland), cyber currency (Italy and Lebanon), electronic currency (Colombia and Lebanon), and virtual asset (Honduras and Mexico).

One of the most common stepsidentified across the surveyed jurisdictions is government-issued notices about the dangers in investing in the cryptocurrency markets. The intention behind such warnings, mostly issued by central banks, are essentially to educate the citizenry about the difference between fiat currencies, which are issued and guaranteed by the state, and cryptocurrencies, which are not.

Apart from highlighting the added risk resulting from the high volatility associated with cryptocurrencies and the fact that many of the organizations that facilitate such transactions are unregulated,most of the countries emphasize that citizens who invest in cryptocurrencies do so at their own personal risk and that no legal recourse is available to them in the event of loss.They have also expanded their laws on money laundering, counterterrorism, and organized crimes to include cryptocurrency markets, and require banks and other financial institutions that facilitate such markets to conduct all the due diligence requirements imposed under such laws.

Some countries such as Algeria, Bolivia, Morocco, Nepal, Pakistan, and Vietnam have even moved further to impose restrictions on investments in cryptocurrencies.However, the extent varies from one

jurisdiction to another. Qatar and Bahrain allow their citizens to engage in any kind of activities involving cryptocurrencies so long as they do so outside their jurisdictions. Countries such as Bangladesh, Iran, Thailand, Lithuania, Lesotho, China, and Colombia. while not banning their citizens from investing in cryptocurrencies, impose indirect restrictions by prohibiting the financial institutions within their borders from facilitating transactions involving cryptocurrencies

However ,there is a limited number of the countries that regulate initial coin offerings (ICOs) that use cryptocurrencies as a mechanism to raise funds. Among those the jurisdictions that , some of them like China, Macau, and Pakistan ban them altogether, while most others like New Zealand tend to focus on regulating them. In most of these latter instances, the regulation of ICOs and the relevant regulatory institutions vary depending on how an ICO is categorized. In the same vein,milarly,in the Netherlands, the rules applicable to a specific ICO is dependent on whether the token offered is regarded as a security or a unit in a collective investment: the assessment is made on a case-by-case basis.

It is not all countries see the advent of blockchain technology and cryptocurrencies as a threat. Countries like Spain, Belarus, the Cayman Islands, and Luxemburg while not recognizing cryptocurrencies as legal tender, see a potential in the technology behind it and are developing a cryptocurrency-friendly regulatory regime as an avenue for attracting investment in technology companies.

Further, there are some jurisdictions that strive toseeking even develop their own system of cryptocurrencies,namely the Marshall Islands, Venezuela, the Eastern Caribbean Central Bank (ECCB) member states, and Lithuania. Though the countries such as Belgium, South Africa, and the United Kingdom have issued warnings to the public about the pitfalls of investments in cryptocurrencies,they do not consider the size of the cryptocurrency market significant enough to be cause for sufficient concern to warrant regulation and/or a ban at the moment(Law Library of Congress(2019.).

4.2 The Status and Regulation of Cryptocurrency In Nigeria

In early 2017, the Central Bank of Nigeria warned financial institutions not to use, hold or trade virtual currencies until the time that "substantive regulation or decision would have been made by the Central Bank of Nigeria(CBN) as they were not legal tender in Nigeria (McKenzie,2018) Further, citing its scepticism of cryptocurrencies on the possible exploitation of Nigerian citizen by criminals and terrorists, the Central Bank of Nigeria stated that banks who trade in cryptocurrencies do so at their own risk. In spite of those warnings, McKenzie(2018) reports that a bitcoin-related Ponzi scheme reportedly resulted in almost 2 million Nigerian residents losing a combined sum ofUSD 50 million to cryptocurrencies in early 2017.

Following this, the Nigerian Deposit Insurance Corporation (the NDIC) warned Nigerians that they would not be afforded consumer protection or insurance from the NDIC when trading in cryptocurrencies as virtual currencies have not been issued by the Central Bank of Nigeria. The NDIC stated further that "[n]o central bank will accept digital currency as a substitute for its national currency or part of its monetary system, when it is not able to control it."

In the later part of 2017, the Deputy Director of the CBN disclosed the CBN's inability to control or regulate bitcoin and blockchain. [The] Central bank c blockchain.In spite of this comment, the Deputy Director announced that the CBN had "taken measures to create four departments in the institution that were making effort to harmonize a white paper on Crypto currency.

In January 2018, the Governor of the CBN likened the cryptocurrency or bitcoin to a gamble and asserted that the CBN was not capable of giving support to situations where people would risk their savings to gamble. The

CBN Governor stated further that the CBN might later, make some very concrete pronouncements with regard to the direction of the regulation of cryptocurrency. The Nigerian Senate subsequently launched an investigation into the viability of bitcoin as a type of investment. Also, a circular was reportedly released by the CBN prohibiting the trading of cryptocurrencies by financial institutions in Nigeria.Expectedly, a violation by the financial institutions of this circular would result in sanctions by the Central Bank of Nigeria.

Inspite of those responses by the Central Bank of Nigeria and the NDIC and measures taken by the Nigerian Senate , Nigeria is allegedly having the world's third largest bitcoin holdings as a percentage of gross domestic product and the third largest holder of bitcoin in the world (McKenzie,2018). Even in the face of this situation, McKenzie(2018) claims that there has been no litigation or court action reported in Nigeria yet.

5. Economic Consequences of Cryptocurrencies and blockchains

Even though cryptocurrencies have long been discussed and debated,it is only recently that they are coming to light as financial tools which can be accessible and useful to many(Finextra,2019). more than only die-hard connoisseurs.According to Finextra, cryptocurrencies have the potential of boosting both social and economic growth throughout the universe, including the developing countries.This they do by offering easier access to capital as well as financial services.

Although also disrupting quality which has slowly and consistently commenced to interfere with the manner the traditional financial system functions, cryptocurrencies in general and

Bitcoin in particular have high utilitarianvalue(Finextra,2019).Some of the major economic impacts of cryptocurrencies on the global economy are highlighted by Finextra(2019).as follows;-

5.1 General economic advantages of cryptocurrencies

(i) A Beneficial Rise in Economic Activities

Already there exists an entire industry which is built around cryptocurrencies.It is held by institutions dedicated to supervising all the digital coin exchanges that are taking place throughout the world. The early adopters of cryptocurrency,particulaarly bitcoin, that became rich overnight and found opportunities to grow financially attest to the rate at which the industry is growing

(ii) Great Opportunities for Poorly Banked Countries

Literature reveals that more than a third of the world population have no access to basic banking services that can bail them out in case of a personal financial crisis. Such people that are most of the time already financially disadvantaged usually resort to doubtful and dangerous lending practices at unfair interest rates which consequently lead to more instability among them. This is where cryptocurrencies intervene with their high volatility and ease-of-use.

(iii) Low Transaction Costs

Since cryptocurrencies and blockchain donot require an actual brick-and-mortar building to exist, the costs associated with their transaction are essentially minimal.

(iv) Increased Transparency of Transactions

All blockchain and cryptocurrencies transactions are automated and digitized - they are all tracked in a distributed ledger. Thee latter cannot be manipulated by either people or companies.Consequently, the possility of fraud and corruption is greatly diminished The underdeveloped countries also have a greater opportunity to enter the financial transactions game as well as boost their own economic and social prospects.

(v) More Power to Entrepreneurs

The blockchain technology and cryptocurrencies can assist entrepreneurs to receive payments in more currencies. For instance, BitPesa helps business owners in Africa to engage in financial transactions with European, American and Asian companies.

When thinking of Blockchain it is always important to keep in mind that the blockchain as a technology is not

connected only to Bitcoin, neither is it connected to all cryptocurrencies because not all of them are decentralized and using proof-of-work or proof-of-stake algorithms. Another important fact that needs to be considered is that research of the blockchain is just a recently discovered field of constant innovation lead mainly by crypto enthusiasts and young entrepreneurs and technological start-ups. Despite of this, I will lay out some of the conceivable uses of the blockchain.

Apart from being a technology that is deeply entwined with the ctyptocurrency network,blockchain is employable in the following areas:-

(i) Escrow service

Escrow serviceI is defined as a contractual arrangement in which money flows through a third party (in this case a smart contract) who supervises and confirms if the conditions of the contract are fulfilled The transactions that are built in to the Bitcoin protocol require multiple signatures and can be used by escrow services(Mckenzie,2018).

(ii) Meta coins

Meta Coins extend the characteristics of bitcoin by utilizing its existing blockchain while at the same time providing some additional functions on the top of it.

(iii) Attestation

The term attestation refers to the ability of authenticated nodes to monitor the way that other nodes behave in the network. With blockchains, misbehavior can be detected and the vicious nodes can be disconnected from the network, if global consensus is reached.

(iv) Smart contracts and Smart property

Some other interesting application of blockchains are smart contracts. Smart contracts are contractual agreements between parties that are implemented using software. They are computer protocols which verify, enforce, or facilitate the negotiation of the performance of a contract. A smart contract is enforces itself as if contains the software that is monitoring whether specific conditions were met.

Smart property is property whose ownership is controlled vthrough the blockchain. It is cryptographically protected and digitally transferable.

(v) Financial contracts and instruments

Cryptocurrencies equally play significant role when there is the need for drawing financial fontracts and instrument, since most of them are essentially contracts defined by some set of rules and conditions. Markets are regulated by authorities monitoring the compliance of the issuer and user of the contracts to the rules set. These authorities could be replaced by mathematic algorithms so called oracles.

(see Antonopoulos, 2014, lecture 9;Lewis, 2014).

(vi) Political Speech and Ethereum

Political speech is another area where consequences of using a blockchain might be evident. Projects such as BitCongress come with the idea of implementing a blockchain-based decentralized voting system.

(vii) Central cadaster and company register

Another area where blockchain can prove its usefulness include central cadaster and company register which essentially assign a piece of information to an entity. They can employ the blockchain technology to achieve better transparency, redundancy and manageability.

(viii) Government procurement

Another means whereby Bitcoin-based technology can improve government services, regardless of its current level of quality, which of course differs from one country to another is public procurement. This usually includes all public works, services and supply contracts made by a public authority (McCurden, 2007:121 cited in Finextra,2019).

Public tenders organized by governmental agencies can be made to be more transparent, automated and self-enforcing by usingSmart or Distributed Contracts to manage the whole process. .

(ix) Government money

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Using a cryptocurrency as a legal tender offers several advantages to both the government and citizens.One of them is the ability to limit the money supply.

Another benefit is that, unlke fiat money,the cryptocurrency cannot be counterfeit or duplicated in any way.

(x) Revenue service and budgeting

If there is a universal use of a government-issued cryptocurrency, the government can hardly make a much better estimate of how much revenue tax it should receive. Equally, the government would be capable of identifying merchants and other entities that donot pay their taxes in full by analyzing all the transactions stored in the block chain.

5.2 Cryptocurrenciy as an avenue for tax revenue generation

Law Library of Congress (2019) reveals that one of the many questions that arise when considering allowing investments in and the use of cryptocurrencies is the issue of taxation.According to Mazikana(2019),there has basically been no global consensus on whether to define cryptocurrency as an asset or a currency.The challenge in this regard appears to be how to categorize cryptocurrencies and the specific activities involving them for purposes of taxation. This is an issue because deciding on whether the gains made from mining or selling cryptocurrencies should be categorized as income or capital gains invariably determines the applicable tax bracket. Some of the countries surveyed by the Law Library of Congress in 2019 have categorized cryptocurrencies differently for tax purposes, as demonstrated by the following examples:

Israel	→	taxed as asset
Bulgaria`	→	taxed as financial asset
Switzerland	→	taxed as foreign currency
Argentina &Spain	→	subject to income tax
Denmark	→	subject to income tax and losses are deductible
United Kingdom:	→	corporations pay corporate tax, unincorporated businesses pay income tax, individuals pay capital gains tax

It is mainly as a result of a 2015 decision of the European Court of Justice that gains in cryptocurrency investments started to be exempted from value added taxation in the European Union(Law Library of Congress, The UnitedStates(U.S.) Inland Revenue Service considers cryptocurrency as a virtual currency and therefore classifies it as an asset. Under U.S. financial law,such property is largely subject to capital assettaxation(Drawbaugh and Temple-West (2014) cited in Mazikana,2019) .According to Mazikana, some other jurisdictions that had earlier adopted cryptocourrency , such as Norway, Sweden and Canada equally recognize it as an asset. However, for Germany which is also a very early adopter of cryptocurrency, it is a unit of account to be used for trading and taxation within Germany.This is done but in the form of private money.

South Africa also considers virtual currencies(VCs) in general as verital sources of tax revenue.According to Law Library of Congress (2019) the South African Revenue Services (SARS)had on April 6, 2018 issued some clarifications on the tax status of VCs. SARS asserted that it would continue to apply normal income tax rules to cryptocurrencies and would expect affected taxpayers to declare cryptocurrency gains as part of their taxable income. The revenue authority made it mandatory for taxpayers must to declare all their cryptocurrency income failing which could result in the imposition of interest and penalties (Law Library of Congress,2019).

6..Conclusion

Cryptocurrency is a technology that was developed few years in the past. Bitcoin is the first and most popular type of cryptocurrency The recent rise of the cryptocurrencies has paved way for building some purely decentralized systems and networks where zero trust is needed, the possibility of fraud, malicious manipulation

and the mediation fees are minimizedCountries such as Zimbabwe and Namibia have reportedly taken off, though with difficulty. Mauritius takes a prominent position in this kind of trade among the African countries.As for Nigeria, it is reportedly having the world's third largest bitcoin holdings as a percentage of gross domestic product and the third largest holder of bitcoin in the world Some tax authorities have classified the entire class of cryptocurrencies and tokens as having the same status as commodities. This paper attempted to ascertain the extent to which blockchain and cryptocurrency have been embraced as well as summarize the latest and key developments taking place in selected jurisdictions in respect of blockchain and cryptocurrency, focusing on current regulatory approaches. Specifically,the paper examined and discussed bitcoin and its close variants as well as the eeconomic consequences of cryptocurrencies Literature reveals that cryptocurrencies have faced a lot of threats especially from public authorities. While the private sector in many countries of is aggressively progressing in the adoption of cryptocurrencies, governments have been apprehensive and reserved as they claim that that that criminals take advantage of digital currencies to cmmit financial fraud.

This paper recommends as follows:-

(i)Given that cryptocurrencies reduce the effectiveness of monetary policy at the country level, there should be greater international cooperation through the International Monetary Fund (IMF). This is because typically central banks hold reserves to counter speculative attacks against their currencies. They can also raise interest rates or intervene in the currency market. If the central bank runs out of reserves, it can draw down on its quota's at the IMF. However, if wealthy Bitcoin investors launch a speculative attack on a currency there is relatively little that can be done at present as neither the central bank nor the IMF hold bitcoin. The IMF could either attempt to excise indirect control of the currency or it could offer the digital currency quasi-membership status. Such approaches will need to be further discussed as there are governance issues that would need to be addressed.

(ii)With the Bitcoin becoming incresingly popular, there is a clear need to be prepared for potential speculative attacks and incorporate this means of payment better into the financial system. For cryptocurrencies not tied to a particular platform for instance Bitcoin, these currencies can impact on price stability, financial stability and payment stability(Gans and Halaburda,2013).

(iii) Education on the economic benefits of cryptocurrency and the pssibility of their co-existing with fiat currency should beintensified at all levels, especially at the executive level.This will enable governments to develop the required blockchain mindset to evaluate business opportunities and challenges around potential blockchain solutions

(iv)There is also the need to stimulate the blockchain industry and cluster.

(v)The African nations, including the industrial and public sectors are advised to take a global perspective, similar to countries such as Estonia, Singapore and Switzerland. These countries focus on an active development of a thriving public private stimulating structure aimed at gaining synergy effects(see Beck, Kubach, Jørgensen, Sellung& Gentile ,2019).

Fiaally, this paper recommends a country – specific study aimed ay finding out the impqact of cryptocurrency on economic growth.

References

Antonopoulos, A.(2014).. *Introduction to Digital Currencies MOOC 2.0.* University of Nicosia, Accessible at: http://mooc.universityofnicosia-online.com/ (Retrieved: 20/04/2015).

Auer, R. (2019). \Beyond the doomsday economics of 'proof-of-work' in cryptocurrencies." CEPR *Discussion Paper* No. DP1350

Bearman, J. (2015, May). The Untold Story of Silk Road, Pt. 1. Retrieved from Wired.com Website:

Beck, R., Kubach,M., Jørgensen, K.P., Sellung,R.& Gentile,L. (2019). Study on the economic impact of blockchain on the danish industry and labor market. Isbn European Blockchain Center, It University Of Copenhagen Fraunhofer Institute For Industrial Engineering Iao

bitcoin/#23ac58a0b4b6

Bitcoin: A New Global Economy. (2015, August 4). Retrieved July 2016, from BitPay, Inc. Website:https://blog.bitpay.com/bitcoin-a-new-global-economy/

Böhme, R., Christin, N., Edelman, B., & Moore, T. (2015). Bitcoin: Economics, technology, and governance. *Journal of Economic Perspectives,29*(2), 213–238.

Chiu,J. & Koeppl,T.V.(2019). The Economics of Cryptocurrencies—Bitcoin and Beyond ISSN 1701-9397 Bank of Canada Staff Working Paper 2019-40. September

Choi, M. and G. Rocheteau. (2019). \Money mining and price dynamics." SSRN 3336367.

Chokun, J. (2014). Who Accepts Bitcoins As Payment? List of Companies, Stores, Shops. Retrieved June 20, 2015, from Bitcoinvalues.net: visualcapitalist.com/its-official-bitcoin-was-the-topperforming-

DeVries, P.D.(2016). An Analysis of Cryptocurrency, Bitcoin, and the Future, *International Journal of Business Management and Commerce, 1 (2);1-9*

Dwyer, G. P. (2015). The economics of bitcoin and similar private digital currencies. *Journal of Financial Stability,17*, 81–91.

Eyal, I. & Sirer. E. G. (2018). \Majority is not enough: Bitcoin mining is vulnerable." Commu-

Fernández-Villaverde, J., & Sanches, D. (2019). Can currency competition work? *Journal of Monetary Economics, in press,*. https://doi.org/10.1016/j.jmoneco.2019.07.003.

Frankenfield, J,(2019,Oct 3). Cryptocurrency Cryptocurrency Strategy & Education

Finextra(2019).HowCryptocurrencies Can Help Global Economy and Build a Better Future Accessed at https://www.finextra.com/blogposting/18159/how-cryptocurrencies-can-help-global-economy-and-build-a-better-future

Gerber, R. (2015, January 29). Why Apple Pay And Dollars Are Killing Bitcoin. Retrieved from Forbes Investing Website: http://www.forbes.com/sites/greatspeculations/2015/01/29 /why-apple-pay-and-dollars-arekilling-

Gogo, J. (2019). Crypto Secularizes Wealth byReturning Power to the People, . Emerging Markets

Hildi. (2013, January 11). Irvin Fisher's Deflationary Spiral. Retrieved Juli 6, 6, from http://snbchf.com/:http://snbchf.com/economic-theory/deflationary-spiral/

Hileman, G. (2016, January 28). State of Bitcoin and Blockchain 2016: Blockchain Hits Critical Mass. Retrieved from Coindesk Website: http://www.coindesk.com/state-of-bitcoin-blockchain-2016
https://www.wired.com/2015/04/silk-road-1/

Ivaschenko, A.I. (2016). Using Cryptocurrency in the Activities of Ukrainian Small and Medium Enterprises in order to Improve their Investment Attractiveness. Problems of economy, 3(5):267-273.

Karlstrøm, H. (2014). Do libertarians dream of electric coins? The material embeddedness of bitcoin.

Scandinavian Journal of Social Theory,*15*(1), 25–36.

Kelly, B. (2014). The Bitcoin Big Bang : How Alternative Currencies Are About to Change the World.

Khan, M. (2014, June 1). Bitcoin: The White Paper Explained. Part-1. Retrieved May 21, 2015, from Mashariqkhan.com:https://www.mashariqkhan.com/blog/2014/01/06/bitcoin-the-whitepaper-explained-part-1

King, R. S. (2013, December 17). By reading this article, you're mining bitcoins. Retrieved from Quartz.comWebsite: http://qz.com/154877/by-reading-this-page-you-are-mining-bitcoins/

Krugman, P,(2013). The Antisocial Network, New York Times

Law Library of Congress(2019). Regulation of Cryptocurrency Around the World Accessedfromhttps://www.loc.gov/law/help/cryptocurrency/index.php

Lee,D.,Chuen,K., Guo,L. & Wang,Y,(2018). Cryptocurrency: *A New Investment Opportunity?*The Journal of Alternative Investments, 20(3) 16-40; DOI: https://doi.org/10.3905/jai.2018.20.3.016

Magro, P. (2016, July 16). What Greece can learn from bitcoin adoption in Latin America. Retrieved July 2016,from International Business Times Website: http://www.ibtimes.co.uk/what-greece-can-learn-bitcoinadoption-latin-america-1511183,*International Journal of Business Management and Commerce Vol. 1 No. 2; September 2016*

Mazikana,A.T.(2019). The impact of cryptocurrencies in Zimbabwe:An analysis of BitcoinsDoi: 10.13140/Rg.2.2.17100.26243 Https://www.researchgate.net/publication/332292924_literature_review_on_cryptocurrency_adoption_in_zimbabwe_by_anthony_tapiwa_mazikana_20_introduction

McKenzie,B.(2018).Blockchain and Cryptocurrency in Africa:A comparative summary of the reception and regulation of Blockchain and Cryptocurrency in Africa.Johannesburg

Nakamoto,S.(2008). Bitcoin: a peer-to-peer electronic cash system.https://bitcoin.org/bitcoin.pdf. Accessed 14 Sept 2019. nications of the ACM, 61:7, 95-102.

Nirupama, D.B. & Lee. D.K.C. (2015). Bitcoin Mining Technology.*Handbook of Digital Currency*, edited by D.K.C. Lee,pp. 45-65. San Diego: Elsevier.

Pagnotta, E. (2018). \Bitcoin as decentralized money: Prices, mining, and network security." SSRNWorking paper.

Pieters, G. (2020). Central banks and digital currencies. In R. Rau, R. Wardrop, & L. Zingales (Eds.), *The Palgrave handbook of alternative finance*. Basingstoke: Palgrave MacMillan.

Price, R. (2016, June 17). Digital currency Ethereum is cratering because of a $50 million hack. Retrieved from Business Insider Website: http://www.businessinsider.com/dao-hacked-ethereum-crashing-in-value-tensof-millions-allegedly-stolen-2016-6

publications/assets/pwc-cryptocurrency evolution.pdf

PwC. (2015, August). Money is no object: Understanding the evolving cryptocurrency market. Retrieved from PricewaterhouseCoopers, LLP. Financial Services Website: https://www.pwc.com/us/en/financialservices/

Raffelini,A.(2018). The false dilemma of cryptocurrencies.ALTCOIN MAGAZINE

Saleh, F. (2018). \Blockchain without waste: Proof-of-stake." Manuscript.

Schilling, L., & Uhlig, H. (2019). Some simple bitcoin economics. *Journal of Monetary Economics*(forthcoming).

Stancel,D.(2015) Economic Consequences of Cryptocurrencies and Associated Decentralized Systems.Ph.D Thesis. Department of Economics. Faculty of Economics and Administration Masaryk University https://www.researchgate.net/publication/280794376

Team, B. (2016, January 20). Understanding Bitcoin's Growth in 2015. Retrieved from Bitpay Website:https://blog.bitpay.com/understanding-bitcoins-growth-in-2015/

Trueman, B. (1994). Analyst forecasts and herding behavior. *The Review of Financial Studies,7*(1), 97–124.