**INCOME GENERATION COMPONENTS AND DAILY RETURNS OF CRYPTOCURRENCIES IN NIGERIA**

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**DECLARATION**

I, **ELLEKE OLORUNTOBI CRYSTAL, (10DB000646),** an MScStudent in the Department of Accounting and Finance hereby declare that the research dissertation titled ‘‘**Cryptocurrency and Other Financial Markets in Nigeria’** submitted by me is based on my original work. Any material obtained from other sources or work done by any other persons or institutions have been duly acknowledged.

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**CERTIFICATION**

We certify that the dissertation titled ‘**Cryptocurrency and Other Financial Markets In Nigeria’** is an original work carried out by ELLEKE Oloruntobi Crystal (10DB000646) in the Accounting and Finance Department, College of Business and Social Sciences, Landmark University, Omu-Aran, Kwara State, under the supervision of **Dr. A.I. Lawal** and **Dr. S.A. Fakile**. We have examined and found this work acceptable as part of the requirements for the award of Master of Science (MSc.) degree in Banking and Finance.

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**DEDICATION**

This study is dedicated to the Almighty God. He has been my source of inspiration and my divine director all through this study.

Also, I am dedicating this study to my beautiful family, most notably, my Beautiful Wife for her sacrifices, undying love, prayers, and constant support. I pray that GOD grants the righteous desires of your heart even as we live long to savour the fruits of our labour. AMEN

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***Abstract***

*The global financial system is no doubt embracing the current transition from physical currency to almost virtual currencies through the medium of technology. This tidal wave given rise to virtual currency. Cryptocurrency has been defined as an electronic career high device that uses funds to make note of buying and selling duties and is open to all brokers. The major aim of the study is to examine the integration between the cryptocurrency market and other markets in Africa specifically Nigeria. Secondary source of data was used in this research work. On the one hand, the time series evaluated in this paper consists of the standardized residuals of eleven digital coins by market valuation. The selected cryptocurrencies are Bitcoin, Ethereum, Tether, Bitcoin Cash, Bitcoin SV, XRP, Binance, EOS, Tezos, Cardano, Litecoin, Stellar. On the other hand, data on commodity market of income generation components extends from November 20, 2019 to June 30, 2021. As a result, the nonlinear ARDL cointegration approach (NARDL) was used in this study to predict asymmetries in the short and long run. This methodology is used to test whether the time series are discontinuously associated. It also looks for both short- and long-term inhomogeneity by decomposing the positive and undesirable provisional amounts of the explanatory variables. The results of the analysis confirm that Oil price show the greatest connection with the returns of the cryptocurrencies analyzed. In addition, both short-term and long- term results show a greater interdependence between income generation components and cryptocurrencies. It is therefore noted that eliminating the currency would be seen as unreasonable and unworthy of a country that seeks to promote domestic innovation. Hence, Central Bank of Nigeria should state a proper regulatory action*

*Keywords: Cryptocurrency, Bitcoin, Virtual Currency, Stock Market, Oil Price*

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**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background to the Study**

The present shift from tangible currency to practically virtual currencies via the use of technology is undoubtedly being embraced by the global financial system. Cryptocurrencies have just begun to emerge as a result of this surge. Flooz, Beenz, and Digi Cash are just a few examples of the numerous attempts to develop a digital currency during the 1990s tech boom that inevitably failed. Early in 2009, a computer programmer or a company of programmers operating under the pseudonym Satoshi Nakamoto unveiled Bitcoin, a type of crypto-currency. It has been described in a variety of associated ways for this virtual currency. According to one definition, Cryptocurrency is a type of online logbook system that employs accounts to keep transactions of commitments resulting from trading and that is accessible to the general public. Two factors—the money growth rate of averagely Zero (0) and the transaction fee charge rate of averagely Zero (0) define a cryptocurrency system. Numerous private cryptocurrencies have been created after the invention of Bitcoin in 2009, but Bitcoin has generally been regarded as the most successful one. Since its inception, cryptocurrencies have attracted a lot of media interest, and in 2019 its total market value amounted to 128.78 billion USD. It runs via a system known as "Blockchain." Because they are primarily shielded from discovery by governmental agencies for oversight, cryptocurrencies can operate largely without sovereign legislation. More significantly, a lot of central banks have recently begun to investigate the use of blockchain and cryptocurrency for small- and large-value payments. Blockchain technology is being studied for use in interbank payment systems by the Bank of Canada, the Monetary Authority of Singapore, and the People's Bank of China, for instance.

A subcategory of digital currencies is cryptocurrency. The latter may be built on decentralized networks or centralized institutions (Trautman, 2016). In a centralized currency system, a single organization issues the digital currency, ensuring that it may be converted back into fiat money or used to buy and sell digital commodities (Mazikana, 2019). On the other hand, decentralized currency schemes aim to minimize reliance on central entities, and instead depends on a network of transaction partners (Karlstrom, 2016). The couples will be able to create trust based on each other's behaviour if they are allowed to monitor one another. Critocurrencies are cryptographically based, decentralized monetary systems. According to Bryans (2016), a cryptocurrency is a digital token created by cryptographic algorithms and sent across the internet via peer-to-peer networking protocols. Its value is mostly determined by the supply and demand for similar tokens. The economic platform's decentralization in which they operate is a key component of their attractiveness.

Bryans (2016) claims that there have been varied degrees of support for the invention in the wider conversation about cryptocurrencies. The Financial Technology community has disputed over the eventual mainstream usage of cryptocurrencies, despite certain regulators being quite concerned about them. As an illustration, according to Madore (2015) referenced in Mazikana (2019), major financial institutions like Citibank have already implemented their own cryptocurrency due to the advantages of doing so. Because they can also be used as a medium of exchange for tangible goods, cryptocurrencies resemble physical money more than other virtual ones. According to Harvey (2015) and Mazikana (2019), the majority of the money in use today is digital, and as a result, can be thought of as taking the form of cryptocurrencies. Through improved financial security, cryptocurrencies provide the opportunity for broader socioeconomic inclusion. According to Stancel (2015), the rapid growth of Bitcoin has made cryptocurrencies more and more relevant throughout the world.

According to Harvey (2015), there are three main problems with the adoption of cryptocurrencies: a history of early illiquidity, excessive volatility, and possibly dubious usage. According to Harvey (2015), the majority of the problems with the effective adoption of cryptocurrencies stem from misunderstanding over whether they should be considered virtual or digital currencies and how their values should be decided.

Raffelini (2018) notes that there have been discussions in the financial literature on whether cryptocurrencies meet the requirements of money, such as whether they are a reliable source of funds or a useful medium of exchange. Additionally, politicians frequently rely on the fact that criminals use digital currency to commit crimes, a strategy that contributes to moral or ethical dilemmas rather than offering alternatives. There are two main schools of thinking about the value and prospect of cryptocurrencies in general and Bitcoins specifically, according to Bryman (2015). In contrast to individuals with libertarian views of life who are optimistic and accept the cryptocurrency system, some authors, economists, and experts in this field are cautious to embrace the use of cryptocurrencies in the system of payments and financial transactions. Cryptocurrency skeptics contend that the technology is extremely volatile and that it can be utilised for money laundry or invest in unlawful activities. Such people contend that the intrinsic contradictions of cryptocurrencies preclude their widespread adoption as a form of payment. They view Blockchain as merely a huge, straightforward database. For example, according to Raffelini (2018), economists Paul Krugman and Nouriel Roubini have voiced doubt regarding cryptocurrencies.

On the other hand, proponents of cryptocurrencies contend that the use of public and private keys in transactions allows for the easier movement of money between two parties. There aren't many processing costs associated with these financial transfers. Another defense used by proponents of Bitcoin is that, given the rising marketplace capitalization of Bitcoin, Ethereum, and other cryptocurrencies, the cryptocurrency market has grown to be extraordinarily powerful and huge, making it expensive for any nation to ban it (Bryman, 2015).

Whatever the drawbacks of cryptocurrencies may be, poor countries, especially those in Africa, seem to require an alternative method of facilitating money transactions. Approximately 350 million individuals in Africa, or 17% of the worldwide population, are considered to be unbanked, making it the continent with the second-highest percentage in the world, according to McKenzie (2018). According to published data, about two thirds of Sub-Saharan Africans are without bank deposit accounts, despite the fact that for many of their communities and households, international remittances have remained to be the main source of income. Lesotho is one example, where remittances from overseas account for nearly one-third of the country's GDP  (McKenzie,2018). As a result, specific remittance techniques other than those used by traditional banks are excessively needed in African nations. Despite the situation on the continent, governments, people, and businesses there have not yet widely embraced cryptocurrency (Gogo, 2019). Gogo claims that the extensive use of mobile money across the continent is one of the main reasons for this failure, in addition to hazy laws and a lack of awareness.

**1.2 Statement of Problem**

Since there is no regulatory framework from the apex bank, acceptance of cryptocurrencies into the Nigerian financial industry is growing in popularity but is also accompanied by concerns and skepticism regarding their functionality. However, the Central Bank of Nigeria is under widespread pressure to start taking appropriate regulatory action. The Central Bank of Nigeria's economic policy limits on foreign exchange, however, have encouraged Nigerians to use bitcoin in order to get foreign exchange, therefore it is important to highlight this. Therefore, abolishing the currency would be viewed as irrational and undeserving of a nation that wants to encourage local improvement.

Since the start of the coronavirus pandemic, oil price shocks have unquestionably had a considerable impact on the direction of the financial markets. Studies like those by Ghazani and Khosravi (2020) and Okorie and Lin (2020) demonstrate the above crude oil is a component of most significant commodities in the world, traded as the underlying asset for a variety of financial instruments on the global financial markets, and playing a significant role in the majority of economies. Additionally, during the past several years, it has become clear how important oil-dependent businesses are becoming and how much more impactful oil price shocks are on the world economy. Yin et al. (2021) assert that the price of oil may appear to be a significant source of doubt in the crypto market because the oil market has the potential to develop risk levels similar to macroeconomic news, particularly in the middle of the The securitization of the energy market began in the early 2000s. Furthermore, it has been found in past studies that variations in oil prices have a big impact on a variety of variables, including inflation, real output, monetary policy, variations in international interest rates, and more. Drop-in petroleum rates may thus play a significant role in the volatility of virtual currency.

According to Harvey (2015), there are three main problems with the adoption of cryptocurrencies: a history of early illiquidity, excessive volatility, and possibly dubious usage. According to Harvey (2015), the greater part of the problems with the effective acceptance of cryptocurrencies stem from misunderstanding over whether they should be considered virtual or digital currencies and how their values should be decided.

Whether cryptocurrencies fit the criteria for money, such as whether they are a trustworthy source of cash or a viable medium of exchange, has been discussed in the finance literature, according to Raffelini (2018). Additionally, politicians frequently use the fact that criminal’s profit from digital currencies as justification for their condemnation, that adds to moral or ethical dilemmas rather than offering alternatives. According to Bryman (2016). There are two primary schools of thought regarding the worth and future of cryptocurrencies in general and Bitcoins in particular. In contrast to individuals with libertarian worldviews who are optimistic and accept the cryptocurrency system, some authors, economists, and scholars in this field are cautious to embrace the use of cryptocurrencies in the system of payments, financial transactions, and revenue production. Cryptocurrency skeptics contend that the technology is extremely volatile and that it can be used for money laundry or funding of unlawful activities. They contend that the inherent contradictions in cryptocurrencies prevent their widespread adoption as a form of payment. They perceive Blockchain as just a sizable, simple database. For instance, Paul Krugman and Nouriel Roubini both expressed doubts about blockchain technology and cryptocurrencies, according to Raffelini (2018).

On the other hand, proponents of cryptocurrencies contend that the use of public and private keys in transactions allows for the easier movement of money between two parties. There aren't many processing costs associated with these financial transfers. Another argument in favour of Bitcoin is that any country trying to outlaw it would have to spend a lot of money because of how powerful and large the cryptocurrency market has become as a result of the expanding market capitalization of Bitcoin, Ethereum, and other cryptocurrencies (Bryman, 2016).

Whatever the drawbacks of cryptocurrencies may be, poor countries, especially those in Africa, seem to require an alternative method of facilitating money transactions. Approximately 350 million individuals in Africa, or 17% of the worldwide population, are considered to be unbanked, making it the continent with the second-highest percentage in the world, according to McKenzie (2018). According to published data, up to two thirds of Sub-Saharan Africans do not have bank accounts, despite the fact that for many of their communities and households, international remittances have remained to be the main source of income. Lesotho is one example, where remittances from overseas account for nearly a third of its Gross Domestic Product (GDP) (McKenzie, 2018). Therefore, there is a disproportionate need for certain remittance methods outside of the regular banks in African countries. Regardless of Africa’s existing situation, the continent's leadership, citizens, and companies have not yet used cryptocurrencies widely in order to earn income (Gogo, 2019). This study will evaluate the integration between the cryptocurrency market and other marketplaces in Africa in light of the problem that has been highlighted.

.**1.3 Research Questions**

1. What connections exist between Nigeria's stock market and cryptocurrency market?

2. Is there a connection between cryptocurrencies and markets for commodities like oil, gold, and gas in Nigeria?

3. What connections exist between cryptocurrencies and the fundamentals of the market?

4. Is there a connection between cryptocurrencies and exchange rates?

**1.4 Aim and Objectives**

The study's main goal is to investigate how the cryptocurrency market is integrated with other African markets, notably Nigerian markets. Consequently, the following are the specific objectives:

1. To investigate the connection between the Nigerian stock market and the cryptocurrency market
2. To determine how the price of commodities like gas, gold, and oil in Nigeria relate to cryptocurrencies.
3. To investigate the connection between market fundamentals and cryptocurrencies

**1.5 Research Hypothesis**

H1: There is no meaningful connection between cryptocurrencies and the Nigerian stock market.

H2: The price of market for commodities and cryptocurrencies do not significantly correlate.

H3: The association between cryptocurrencies and exchange rates is insignificant.

**1.6 Significance of The Study**

In order to advance general knowledge of several significant areas of cryptocurrency in Nigeria, this research will first examine the integration between the cryptocurrency market and other marketplaces in Africa, notably Nigeria. Moreover, to determine the potential economic significance this technology may have for the functioning of governmental institutions worldwide. Additionally, it will explore cryptocurrencies' advantages, disadvantages, dangers, and prospects. The study will also make an effort to show how widely cryptocurrencies and blockchain have been used. Additionally, it will highlight recent regulatory developments while summarizing significant recent blockchain and cryptocurrency developments in a few key jurisdictions.

It also improves knowledge of potential uses for virtual currencies and how their use may affect the expansion and development of the economy. It also identifies a course of action for the government, managers, decision-makers, and the general public in order to determine and comprehend the various relationships between cryptocurrencies and other commodities markets.

**1.7 Scope of The Study**

The incorporation of the cryptocurrency market with other markets in Nigeria, is the exclusive topic of this study; no attempt was made to include any other region of the world. The current analysis will further exclude those other aspects of the commodity market from its scope. Likewise it becomes important to note that this study merely examines how cryptocurrencies relate to other commodity markets, rather than being exclusively about the stock market.

**1.8 Operational Definitions of Terms**

**Cryptocurrency:** A digital money that is managed by a computer network and employs encryption to verify transactions.

**Income:** The money received in the trade for products or services or from other sources like rent or investments.

**Blockchain Technology:** In its simplest form, a blockchain is a network of computers that copies and disseminates a digital log of transactions.

**Technology:** A practical application of scientific knowledge, particularly in industry.

**Virtual currency:** a specific kind of value representation in digital form that is only available online. It is kept and handled using specialized computer, mobile, or software applications.

**Economic growth:** A rise in the nation's actual production of products and services. Growth is the progression of one of the four primary components of GDP—consumption, government spending, investment, and net exports—over time.

**Economic development:** The method by which the economic prosperity and quality of life of a nation, area, local community, or an individual are improved in conformity with particular goals and objectives.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Conceptual** **Review**

**2.1.1 Virtual Currency Perspective**

A virtual currency (VC) is "a form of unregulated, digital money, manufactured and often controlled by its developers, and used and accepted among the members of a specific virtual community," according to the European Central Bank (ECB) (SEC, 2017). On page thirteen of the ECB report, it was acknowledged that its description might require modification in the future due to the possibility that virtual currency's essential properties will alter. Its definition today seems overly restrictive given that math-based decentralized virtual currencies like Bitcoin are not created or managed by a single inventor or programmer, and that virtual currencies are already subject to regulation in some countries (such as the United States, China, Thailand, and Sweden). ECB's description of VC has flaws that make it inadequate Given recent developments, VC was defined by Williams and Robert (2017) as "a digital representation of value that can be digitally traded and functions as (1) a medium of exchange; (2) a unit of account; and (3) a store of value, but does not have legal tender status" (i.e., when tendered to a creditor, is a valid and legal offer of payment) in any jurisdiction. The above VC functions are solely guaranteed by the agreement among its users; no national authority has issued this agreement (Williams & Thomas, 2017).

Fiat currency is distinct from virtual currency in that the former, which consists of a nation's coins and paper money, has been designated as that nation's legal tender, circulates, and is commonly used and accepted as a means of trade in the nation of issuance. VC differs from electronic money, a virtual representation of fiat money used to send and receive payments electronically denominated in fiat money (World Bank, 2019).

Mckenzie (2018) defines virtual money as a non-regulated virtual currency that is more often than not created and managed by its creators.

People in a specific online community make use of and accept it. Frankenfield (2019) claims that it is a type of money that is stored within the blockchain network but is unrelated to a centralised financial institution. Digital currency is different from virtual currency in that it is only money issued by a bank in a digital format. It has no regulations. The only actual driving factor behind trading on it is consumer mood, which leads to huge price fluctuations.

According to Mazikana (2019), virtual currencies have proliferated all over the world. Microsoft Points, Amazon Coins, and Facebook Credits are a few examples. Unlike Bitcoin, other virtual currencies are created by companies and are not linked to any claims on real assets (Harvey, 2015). According to Wagner (2016) in Mazikanaa, virtual currencies are frequently valued and distributed by a centralised authority, which is typically the issuing corporation, and are used to enable online sales (2019). Is that it, if there is a blockchain?. It serves as a public ledger that is updated after each transaction and is available to everyone. Each person has ownership over the ledger. Despite the possibility of a privacy violation, there could not possibly be a need for any government intervention given the very minimal interaction between these virtual currencies and conventional currencies.

Central banks are interested in five potential concerns connected to virtual currency. They are said to include reputation, financial stability, payment system stability, lack of regulation, and price stability. Price stability could become far more difficult if virtual currencies interfere with the central bank's ability to regulate the money supply through open market operations. Financial markets may be impacted if the amount of money in circulation is less tightly regulated. Through its power to interfere in the foreign exchange rate market, the central bank can nevertheless effect financial stability despite having less control over the money supply. Additionally, because of the history of cyberattacks and the lack of a lender of last resort for digital currencies, speculation in regard to virtual currencies is possible. Fiat money is a unit of account that the government has formally recognized as legal cash (Mckenzie,2018).

Different categories can be used to group virtual currency. Virtual currencies were divided into three categories in an ECB report from 2015: closed virtual currency schemes used in online games; unidirectional flow schemes used primarily for inflows in the purchase of virtual goods and services but occasionally for real goods and services; and bidirectional flow schemes where virtual currency is used in both directions. can be used like any other convertible fiat currency, including buy and sell conversion rates, to buy both physical and virtual products and services. Contrarily, the FATF (2015) report divided virtual currencies into convertible and non-convertible categories, however the term "convertibility" was used to refer to market accessibility rather than ex officio convertibility, as it was in the case of the gold standard. Since the convertibility is not supported by any regulation, a virtual currency is only convertible for as long as some private participants make offers and others accept them. Thus, convertible (or open) virtual money can be converted into real money and has a similar value to fiat money. Examples include Bitcoin, LibertyReserve, and the now-defunct e-Gold.

Non-convertible (or closed) virtual currency is designed to be exclusive to a certain virtual domain or universe, such as an MMORPG or Amazon.com, and under the regulations controlling its use, it is not convertible into fiat money. Examples include World of Warcraft Gold, Q Coins, and Project Entropia Dollars (Europol,2015). It is important to remember that non-convertible currency is only permitted to be transferred all in a specific simulated environment and is not interchangeable according to the supervisor's rules. Nonetheless, there may be a supplementary black economy that provides a means for the swap of the 'quasi' crypto money for physical cash or even another electronic cash. Most often, the administrator will penalize the offending member(s) by canceling their membership and/or taking away any residual virtual cash they may have to use or develop a secondary market while abusing the currency's regulations. A particular non-convertible virtual currency may, in fact, become a convertible virtual currency if a strong secondary illicit market develops for it. In that sense, a nonconvertible status is not always fixed.

The centrality of a virtual currency is another degree of categorisation. By definition, all virtual currencies that are non-convertible are centralized and are issued by a central body that sets the regulations governing their non-convertibility. On the other hand, convertible virtual currencies might be centralised or decentralized. With centralized virtual currencies, a third entity, the administrator, sets the rules for usage, issues the currency, and manages a central payment system ledger and is in charge of deciding whether to redeem the currency.

A convertible virtual currency's exchange rate may be set either by the administrator (pegged or fixed) or by the forces of market supply and demand (floating) at a predetermined value measured in fiat money or another real-world store of value, such as gold or a basket of currencies. Examples include World of Warcraft gold, E-gold (dead), Liberty Reserve dollars and euros, Second Life's Linden dollars, Perfect Money, and Web Money's WM units. Decentralized virtual currencies, often known as crypto-currency, are distributed, open-source, peer-to-peer virtual currencies based on math that are not under the control of a single administrative body. Examples include Ripple, LiteCoin, and Bitcoin. To transfer value from one party to another, it depends on public and private keys. It must be cryptographically signed each time it is transmitted from one (person or entity) to another. A network of parties with a mutual distrust known as miners (in Bitcoin) protects the network in exchange for the chance to win a fee that is distributed at random and is known as a "block reward" (in Bitcoin), though transaction fees may also be paid by users in some cases as an incentive for miners to include their transactions in the next block. In order to confirm transactions and maintain the block chain, Bitcoin uses a proof-of-work method, which has inspired the definition of hundreds of other cryptocurrency standards. Bitcoin supplied the first crypto-currency protocol that was fully deployed, however there is significant interest in developing alternative, possibly more effective proofing techniques, such as proof-of-stake based systems.

Altcoins are other math-based decentralized convertible virtual currencies that are not bitcoins, the original such currency. Ripple, PeerCoin, Lite-coin, ZeroCoin, AnonCoin, and DodgeCoin are a few examples. As of August 31st, 2019, the market capitalizations of Bitcoin and Altcoin were $172.7 billion and $73 billion, respectively. due to the fact that bitcoin holds a market share of more than 70%.

2.1.1.1 **Meaning and Development of Cryptocurrencies**

Cryptocurrency is a form of money that is created and maintained electronically. It uses cryptography to regulate the creation of units of currency and to confirm the transfer of payments.

Although the idea of electronic money has been around since the late 1980s, Satoshi Nakamoto, a pseudonymous programmer, developed Bitcoin in 2009, making it the first decentralized cryptocurrency to be a success and laying the groundwork for the creation of many more.

The founding idea of Bitcoin was articulated by its anonymous creator, Satoshi Nakamoto, as follows: "What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party." Transactions that are computationally challenging to reverse would safeguard sellers against fraud, while conventional escrow techniques would safeguard buyers. This way of thinking gave birth to the idea of the experimental cryptocurrency.

**2.1.1.2 Cryptocurrencies: Their Nature and Types**

Cryptocurrencies differ from conventional currency because they are digital. The issuance of currencies and currency transactions are also not regulated by a central bank or other entity in these countries. Additionally, they differ from online payment systems and services. This is thus because digital payment services, which are frequently pegged to such fiat currencies, are just means for online payment in fiat currency. On the other hand, cryptocurrencies represent money in digital form and typically are not pegged to fiat money. Currently, there are over 1,400 coins in the cryptocurrency market, all of which have different user bases and trade volumes. 6 Bitcoin, Ethereum, Dash, Monero, Ripple, Ethereum Classic, Litecoin, NEM, Augur, and Maidsafecoin are the most popular cryptocurrencies.

**2.1.1.3 Operating Principles of Cryptocurrencies**

By mining (described below), buying or exchanging cryptocurrencies for conventional fiat money like US dollars or pounds, using a cryptocurrency exchange, a trade platform, or directly from a coin owner, a person can become the owner of a cryptocurrency. The "digital wallet" associated with the purchased crypto coin would then belong to the coin owner. The system uses various cryptographic methods and encrypts the identities of the currency owners to guarantee the accuracy of record keeping. Coin owners can use their coins to buy any thing or engage in any economic activity by transferring their coins or funds from one digital wallet to another. A "transaction," often known as a money transfer between two digital wallets, is used to accomplish this.

A "public ledger" is consulted to confirm each transaction. The ledger makes sure that associated digital wallets have an exact spendable balance and those new transactions are verified for authenticity, that is, to make sure that each transaction spends only coins that the spender currently owns in order to prevent fraud or double-spending in the system. The transaction is documented on the open ledger after confirmation. The "mining" method of verifying new transactions and adding them to the public ledger uses an encrypted electronic signature (a cryptographic signature, which is actually an encrypted piece of data) to give a mathematical demonstration, which can take ten to twenty minutes, that the transaction is coming from the wallet owner. The verifiers of transactions (referred to as "miners," who can be anyone) must resolve an ever-more difficult computational challenge before they can add new transactions to the ledger (similar to a mathematical puzzle).

There are many miners in various places of the world. After a transaction is announced, the first of them to solve the computational task and verify it adds a "block" of transactions (similar to a page of the ledger) to the ledger. Once a block is recorded in the ledger, all subsequent transactions are final and irrevocable. The miner's wallet is additionally increased by a tiny transaction charge. Additionally important, new coins are produced. Additionally crucial, as payment for successful mining, new currencies are created "out of thin air" and added to the miner's wallet. The creation of new cryptocoins and the payment of miners, who are in charge of keeping the ledgers up to date—take place through the mining process.

Due to the widespread mining industry, duplicate ledgers may be created during the mining process. To solve this, the miners—who, as we said, can be anyone, but are typically developers or programmers—conduct a type of fictitious voting in which the ledger used by the majority of miners at any given time is the one that prevails and is used by all miners for ensuing transactions.

The aforementioned explanation highlights a few of the unusual characteristics of cryptocurrency functioning that set it apart from fiat money and the established financial system. To begin with, cryptocurrencies use cryptography to control coin generation and to verify transactions. Additionally, as was already mentioned, no central bank or financial institution has control over cryptocurrencies. Because of this, crypto-coin production and transactions are peer-to-peer, code-controlled, and open source (i.e., anybody can use or join the crypto-network). Furthermore, cryptocurrencies don't actually have any intrinsic value; rather, they derive their worth from participant perceptions of and reliance on the crypto-system.

**2.1.1.4 Benefits and Risks of Cryptocurrencies**

Both the potential advantages and risks of cryptocurrencies are clear from the previous explanation of how they operate.

The possible advantages include encouraging real-time financial transaction completion and supporting financial inclusion by enabling increased speed and efficiency when processing payments and transfers, especially over wide geographic borders. This may be the reason why their use is spreading across the globe. Additionally, the distributed ledger technology that underpins cryptocurrency schemes has potential advantages that go far beyond the virtual currencies themselves. It is an inventive decentralized method of monitoring transactions in a vast network. 8 Furthermore, cryptocurrencies are unaffected by the subtleties of governmental or national political power.

On the other hand, cryptocurrencies carry significant dangers. First off, they could be used as tools for tax avoidance, fraud, money laundering, and financing of terrorism. In reality, these dubious factors may have contributed to their development. Additionally, they pose long-term financial danger. Additionally, because there is no centralized authority controlling and overseeing transactions, transactions are irreversible once they have been confirmed. Due to some form of fixation in the supply of cryptocurrency, there are also worries about the potential of deflation.

**2.1.1.5 Commodity Market**

The most prominent non-renewable energy source in Nigeria historically has been oil and gas; at present, the industry accounts for about 80% of recurring and capital expenditures as well as 90% of the nation's foreign exchange revenues. As a result, the sector's earnings is crucial to the nation's economic development.

At present, the country produces more than 2 million barrels of light, sweet crude oil per day, and its condensate reserve is estimated to be 37 billion barrels. The oil output and reserves fall well short of the Vision 20:2030 growth objectives. The oil sector continues to be the main source of income to make that happen and to support the country for the foreseeable future, despite the government's vision and goal to diversify the economy.

MARKETS OTHER THAN OIL: Markets other than oil are those where goods other than crude oil are sold and generate income or profits. The non-oil industry comprises of a variety of businesses that are either unconnected to or different from the petroleum and gas industries, according to Kromtit and Gukat (2016). It is divided into industries including manufacturing, telecommunications, tourism, real estate, banking, building, and the health sector. According to Kasie and Chijindu (2016), who were referenced by Idisi and Mavenke (2018), non-oil exports are goods created in the country's industrial, mining, and agricultural sectors and exported to other countries in order to raise money for the economy's expansion.

Economic growth, which is the increase in the market value of the goods and services an economy generates over time and after accounting for inflation. Economic growth, according to Ochejele (2007), is essentially the quantifiable and ongoing rise in a nation's per-capita output or income that is accompanied by increases in the labor force, consumption, capital, and trade volume. Typically, it is calculated as a percentage rate of growth in real gross domestic product (RGDP). Real gross domestic product (also known as GDP) measures the value of finished products and services at constant base year prices.

EXCHANGE RATES are the costs associated with exchanging one country's currency for another countries. Valentine (2015) proposed that the exchange rate reflects how much the currency of a country is worth compared to the other currencies. The exchange rate is decided independently of the rate of economic expansion. Tejvan (2017) said that, along with other factors, exchange rates might affect economic growth. In general, countries with low inflation tend to have strong exchange rates since they are seen as indicators of economic strength. A lower exchange rate lowers the cost of exporting and raises consumer demand. A currency's cost in respect to another is what Mishkin (2017) defines as the exchange rate. A country's economy and standard of living are affected. For example, domestic goods become more expensive to foreigners and international goods get cheaper if the currency of country appreciates when compared to other currencies. According to Mishkin's (2017) argument, the exchange rate matters because it influences the relative costs of domestic and imported commodities. The way demand and supply interact in the foreign exchange marketplace will decide it. The basic balance of payments of the nation determines whether such supply and demand situations are in excess or deficit.

**2.1.2 Blockchain Technology**

Blockchain technology, which Bitcoin (a cryptocurrency) is based on, allows for secure electronic transactions without the use of a fundamental or dual expenditure (Europol,2015). In place of a centralized ledger, it creates a cooperative auditing by disseminating a shared (i.e., distributed) transaction records, which contains a full history of all previous blockchain applications. (FATF,2015). The cryptocurrency is this scorecard. When involved sides want to conduct a payment, they should telecast it to the core grid., essentially requesting that users of the network verify its legitimacy. The technique is demonstrated by the example below. In order to convey the agreement's conditions to the network, Party A first broadcasts a message to it. I, Party A, am handing Party B one bitcoin, for instance. Bailee then approves the transfer of funds by asking network users to confirm its legitimacy after transmitting its acknowledgement to the entire system.

The system either instantly affirms the payment or protects against the risk of twofold expenditure via a "proof-of-work validation system." (Florencio,2016). If the lender agrees, the log book is modified, along with the blockchain data of all network users. In other words, a payment that has been recorded in this outdoor community general journal cannot be changed after the reality. The solid evidence verification mechanism is essentially a competition among data traffic to appropriate material. Through the employment of their computational resources, network users take part in this competition. The amount of total proportional processing power that a user can utilize to unlawfully influence validation (i.e., double spend) is constrained under this approach. Users are motivated to pay the computational costs of validation because they can earn new bitcoin for participating successfully. Thus, it is claimed that additional bitcoins have been "mined," with the "(computational) time and electricity that is consumed" being "analogous to gold miners expending resources to add gold to circulation." The overall outstanding quantity is finite, thus there will eventually be nothing left to mine. Transaction costs will probably be the incentive at that point to validate transactions. The fact that this protocol is open-source is significant since it allows for open innovation about the different aspects of the technology. In conclusion, the blockchain creates trust between two parties to a transaction using a decentralized public record as well as a cryptographic technique that assures that transactions cannot be modified after they have been made. It is simple to understand why the technology's developer named it simply peer-to-peer electronic cash. Aside from counterfeiting, these severe issues with confidence and trust have never really affected physical transactions (FATF,2015). Simple two-party exchanges of value through electronic networks were not possible before the invention of the blockchain.

**2.1.2.1 Blockchain 2.0 Technology**

Although there are many competing ideologies around cryptocurrencies, the majority of interested parties agree that it is crucial to understand the fundamental idea  of a blockchain based ledger that is collaboratively retained by a collection of individuals. Due to this, there is now interest in blockchain 2.0 projects, which employ a crypto currency data base for recording information on transactions other than financial ones (Swan 2015).

Consider a ledger to be a dataset that is gradually developed by a system of involved actors that run the same apps and are bound by the limitations and guidelines set by the fundamental program they operate. As the name implies, a blockchain is created by gradually "chaining" together pieces of data. It almost makes sense to imagine it as a worksheet that is gradually built up by including more bacteria. As long as the program is active, a blockchain database is continuously created and updated. As a result, unlike a centralized database maintained by a single institution, it is still "alive" even if some players withdraw (or go bankrupt, for example). It produces a permanent record that cannot be altered by any one party.

Furthermore, altering the code of the participant-run underlying software changes the nature of the resulting blockchain, opening the door to the creation of blockchain databases that could store a variety of different types of data, such as, for instance, property titles, contracts, shares, voting results, or even reputation scores (Lee 2015). Platforms are being developed by organizations like Ethereum, Counterparty, and Blockstream25 to enable individuals or start-ups to use blockchain-based systems. For instance, the start-up Provenance is seeking to leverage the Ethereum platform to build a highly transparent record of data on the worldwide corporate supply chain. 26

Agreements, which are compact collections of software or story lines that can be stored on a cryptocurrency and with which attendees can communicate to carry out simple activities, are at the forefront of the scene. (Wright and De Filippi 2015). For instance, we could program a basic insurance contract (Mainelli and Von Gunten 2015). Imagine a blockchain-based written script that runs when two parties contribute bitcoins to an account used as an escrow and that is managed by the script and which, if a wager on the average amount of rainfall during a specific time is successful, will deliver the bitcoins to the winner in the future. This smart-contract is set up to receive weather data and, after a predetermined period of time, releases the bitcoins from escrow and sends them to a farmer who needs insurance against poor rainfall. This is a weather derivatives contract that runs on the blockchain.

Decentralized autonomous organizations (DAOs), which are more complicated multi-stage or multi-function entities, might be built upon the foundation of such straightforward building-block contracts (Pangburn 2015). Many people find it difficult to understand these DAOs and think they belong in the domain of science fiction, yet they are really just sophisticated multi-stage algorithms running on a decentralized computer network, as opposed to one run by a single management group For individuals with more urgent practical demands, recording basic data seems to be where blockchain technologies are most effective. The ability of blockchain systems to be used to permanently record property rights is one feature that has drawn the attention of proponents of free-market economics. Land registries are one example that is usually referenced for this (Williams 2015). A blockchain system that permanently records land title in a definitive public manner could potentially address the issues of double registries of land, land title fraud, or ambiguous title to land that arise in nations with inadequate governance and record-keeping systems. In fact, Honduras established a partnership with American startup Factom27 in 2015 to create a land registry powered by blockchain (Chavez-Dreyfus 2015).

According to Brian Singer, Hernando de Soto's dream of fortifying property rights in informal economies can only be realized through the use of blockchain technology, as he claims in an interview with Forbes with the extraordinary headline "How Bitcoin will end world poverty" (Forbes 2015). Inert capital can be activated if people are given names and titles to property. Collateralized property titles allow for more affordable bank lending to indiscriminate business owners. This approach is based on the claim that, as long as contracts and property are effectively safeguarded, market and capitalization processes will aid in the alleviation of poverty by revealing the untapped potential of informal economies. But rather than relying on a democratically run country to make these market decisions, another method of political "escape" is to replace inadequate governmental institutions with technology, which could activate the power of property and markets to eradicate poverty.

However, whether such a blockchain registry actually fixes core issues is debatable. Weak institutions frequently cause problems like ambiguous land titles by contributing to the ambiguity in the first place. Presenting a technology that can be used to record claims in such a situation is meaningless without strong legal institutions that will recognize the recorded blockchain claims and solid procedures in place for who gets to make the claims. There is some irony in this. The potential applications of blockchain technology are greatest where there are weak institutions and parties that cannot be in environments like Afghanistan, where governmental capacity is low and trust is low during conflict, people may not be able to easily trust one another, yet these nations are frequently the least able to use such technologies successfully.

**2.1.2.2 Bitcoin**

Böhme, Edelman, Christin, and Moore claim (2015), Bitcoin is a peer-to-peer communication protocol that permits the usage of a payment system and virtual currency. It is a type of digital money that was developed utilizing blockchain technology in accordance with the principles outlined in a white paper by Satoshi Nakamoto, a person whose identity is still unknown but is credited with inventing the blockchain movement. A team of unnamed developers or a single developer by the name of Satoshi Nakamoto created Bitcoin in 2008. (Nakamoto,2018). It was the introduction that led to the launch of thousands of additional virtual currencies known as altcoins. Despite the fact that the idea of cryptocurrencies was initially introduced and explained in 1998, Bitcoin served as the first "practical" demonstration of the notion (Kelly 2015). The most well-known cryptocurrency, Bitcoin, is utilized to demonstrate how an e-currency functions. The use of Bitcoin has increased significantly since its creation. 6.56 million people used bitcoin in 2016; 11.05 million did so a year later in 2017. (Weber, 2017). It has increased by more than 1,500% since the beginning of 2017. (Mezikana,2019). Despite its current ever-peaking success, the currency is incredibly volatile. Its value can increase by hundreds of dollars one day only to drop much farther the next day. Bitcoin, which is mostly used as a form of payment, traded at over $16,000 at the beginning of the year 2016 but was sold at $1,000 in 2017. Because Bitcoin transaction fees are maintained to an absolute minimum, it is simple and inexpensive to send large amounts of money at lightning-fast rates anywhere in the world. Transactions are carried out whenever and virtually instantly (Bitcoin, 2017).

It is still viewed as an addition to traditional cash, not a replacement for it. The primary usage of Bitcoin as a means of speculation rather than as a payment method has led to significant volatility that is significantly higher than that of other derivatives, such as currency exchange rates. Because of this fluctuation, the value of bitcoin is unknown, which causes it a dangerous investment, made further worse when used as an alternative to fiat money. DeVries asserts that there will never be an infinite supply of bitcoins. This ensures its rarity and prevents an abundance. According to Kelly (2015), the reason why bitcoin has value is because its users believe that if they take it as money, they would be able to use it elsewhere to make a purchase. Anything might be the valued object as long as the users continue to hold onto this belief. Krugman (2016), meanwhile, attacks Bitcoin for being a shaky store of value. Krugman (2016) rejects the idea that bitcoin can function as money, despite the fact that he acknowledges that it is probably a successful medium of trade.

According to DeVries (2016), unlike gold, bitcoin lacks inherent value. This is due to the fact that bitcoin cannot be used to create tangible, valuable items like jewelry. Nevertheless, because of trust and acceptance, its value endures. This isn't in line with the technologies that the current legal and financial systems are built on. The foundation of financial institutions is much ancient kinds of money. According to DeVries (2016), in order to handle this kind of competition, the mechanisms for trade would need to be radically altered if cryptocurrencies were to become the standard for transactions on a worldwide scale.

Therefore, it is possible that cryptocurrencies will be the one technology that most significantly disrupts the global financial and economic institutions. Considering BitPay to be the largest bitcoin processor in the world, Team (2016) reports that BitPay has in 2015, the transaction rate increased by 110 percent. Since the first bitcoin was generated in 2009, Bitcoin has dominated the market and was the first cryptocurrency to employ blockchain technology. More than 1,000 altcoins and crypto-tokens have surfaced since the creation of Bitcoin with the genesis block, with at least 900 of them currently trading on licensed or unregulated exchanges. According to Lee, Guo, and Wang (2018), as of October 6, 2017, 869 cryptocurrencies and 269 cryptotokens had been released and were being traded. They were worth more than US$148.4 billion together. Unlike conventional currency, cryptocurrencies have a total supply, a maximum supply, and a circulating supply.

Here, "maximum supply" refers to the closest estimate of the total number of coins that will ever be generated during the cryptocurrency's existence. Total supply, on the other hand, refers to all of the coins that are currently in circulation. Circulating supply is used to calculate market capitalization since it represents the quantity of coins in circulation and available to the general population. Additional cryptocurrencies with market capitalizations of over $1 billion include Ethereum, Ripple, and Litecoin. The cost of the coins varies from 0.002 US dollars to well over $1000 US dollars (Lee,Guo andWang,2018). There are some altcoins that closely resemble bitcoins, but others were developed using entirely different techniques or concepts. An increase in transactions is a sign that user acceptance is rising. According to DeVries (2016), a "fire triangle" of circumstances is necessary for the broad adoption of Bitcoin. Fire needs fuel and oxygen. Bitcoin needs user acceptance, vendor acceptance, and innovation to function in order to exist. Otherwise, bitcoin might not be accepted as a legitimate form of money. Currently, it is becoming more widely accepted and used (DeVries, 2016). However, Lee, Guo, and Wang (2018) contend that bitcoin is not flawless. A reason for creating new coins can be found in every new use. Coins were created to meet particular problems.

**2.1.2.3 Bitcoin's Features**

The characteristics of bitcoin are highlighted as follows by Lee, Guo, and Wang (2018):-

(i) Decentralization

Bitcoin can be used to make electronic purchases just like the traditional currencies that are traded online. The fact that bitcoin is a decentralized currency sets it apart from fiat money and platform-based digital currencies. This is so that no single organization or group is in charge of the bitcoin network. Its availability is controlled by a process, and anyone can access it via the Internet.

(ii) Flexibility

Without any costs or restrictions, it is simple to create a bitcoin wallet or address online. Transactions are not localized either. As a result, bitcoins can be moved between nations.

(iii) Transparency

The entire network will be informed of every bitcoin transaction. The mining nodes or miners that validate transactions will also record them in the block that they are building and disseminate the finished block to other nodes. The blockchain, which is public and dispersed so that each node has a duplicate and can confirm them, stores all transaction records.

(iv) Pace

The broadcast of transactions within a few moments. A bitcoin transaction will be validated by miners after 10 minutes. Since this is the case, sending bitcoins anywhere in the world will, in most cases, result in a few minutes of processing time.

(v) Minimal transaction costs

Historically, there hasn't been a transaction fee required, but the owner can choose to pay a little sum to speed up the process.

**2.1.2.4 Strengths and Drawbacks of Bitcoin**

Ivaschenko (2016) offers the following Bitcoin Strengths and Weaknesses.

**(a) Strengths**

(i) The set quantity of bitcoin that will be in existence. According to King (2016), until the maximum of 21 million bitcoins are reached, which will be mined with diminishing yields every four years, the value of bitcoin depends on this feature. Due to the finite supply of bitcoins, it will never experience an excessive inflation.

(ii) Like other cryptocurrencies, bitcoin is typically thought to be insulated from inflation brought on by adjustments to or limits imposed by national governments (Magro, 2016).

(iii) Despite the price of bitcoin having the potential to fluctuate greatly dependent on numerous other external factors, as is the case with most commodities, it swiftly demonstrates its strength as a safeguard against devaluing national currencies.

According to Desjardins (2016), The desire for a place of refuge asset, as well as the volatility of its premium, aided Bitcoin's rise to the top achieving exchange rate in 2015, according to the American Benchmark Index, indicating that Bitcoin was the top performing monetary system overall by the end of 2015, anywhere in the planet. Because it is the only form of money that can be quickly bought, sold, and used all over the world, cryptocurrency is strong. You can swap other fiat currencies.

However, doing so would necessitate traveling to a money exchange and ensuring that the intended use of the funds is permitted in the area. With Bitcoin, this is not the case (or any other cryptocurrency). One simply needs to create an online account with an exchange, submit their request, and the transaction is typically finished in a matter of minutes. They could shop at thousands of merchants around the world as long as they had bitcoin in their digital wallet.

(iv) The viability of Bitcoin solution for a currency that can fast increase in value with regards to the simplicity of entry and exit. Other fiat currencies might get stronger and more popular, but they can't match the speed and flexibility of cryptocurrencies.

(v) Because it is a peer-to-peer system, it is by definition capable of bridging gaps in financial technology and aiding in the resolution of issues with traditional banking. For instance, it aids in offering a solution to the issues associated with unbanked clients, which are typically present in sizable segments of the population in developing nations. According to Magro (2016), out of 600 million people living in Latin America, 60% do not have access to a bank account.

(vi) Cryptocurrency has a significant edge over conventional money due to its flexibility in completing quick peer-to-peer transactions, particularly in global business-to-business circumstances. The security characteristics, convenience of usage on mobile devices, low production and transmission costs due to the block chain transmission protocol, and low long-term inflation risks are listed as the primary advantages. Harper (2015)

(vii) Certain cryptocurrency transactions involving bitcoin are entirely secret and anonymous (Chokun, 2015). Bitcoin transactions cannot be tracked or recognized, in contrast to bank payments, where this is possible.

**(b) Negatives**

There are some inherent flaws with Bitcoin that are part of its design and are difficult to fix.

(i) All users can access the public block chain. As a result of the ease of access, it is vulnerable to attacks (King, 2016).

(ii) According to how Bitcoin is constructed, its network is unable to support a large volume of transactions per second. Reluctant users must adopt despite these characteristics. Recent developments have given bitcoin a dubious reputation.

(iii) The semi-anonymity and lack of government tracking of bitcoin allow for fraudulent transactions. For instance, tales like Silk Road give bitcoin and other digital currency a bad rep. Thousands of drug traffickers and almost a million consumers may transact in illegal drugs on Silk Road, a hidden dark-net marketplace, using digital currencies, particularly bitcoin (Bearman, 2015).

(iv) There is already concern about the security of cryptocurrencies. Previously, the built-in security flaws. These oversights allowed hackers to steal bitcoin from the exchange, which caused customers to sell their bitcoin out of concern that it would be stolen, significantly devaluing the currency. Etherium, a different type of digital money and an open-source, public, blockchain-based distributed computing platform and operating system, reportedly experienced a sort of theft in the amount of a 50 million USD heist, according to Price (2016). These breaches typically target major bitcoin holders who do not maintain current security requirements.

(v)The capacity of cryptocurrencies to be traded similarly to commodities can also be seen as a negative because commodity-based marketplaces reveal a significant value volatility due to various market events. Investors' confidence in commodities is ultimately limited by this value fluctuation.

(vi) Because the factors determining the price of bitcoin have not been established, the trading environment is unstable. This causes value volatility and has far-reaching impacts on people who use bitcoin as money. Price volatility, according to PwC (2015), creates risk and deters both buyers and sellers from holding cryptocurrencies for any period of time. Consumer trust in cryptocurrencies is diminished by excessive risk. This consequently reduces the authenticity of validation.

(vii) At this time, cryptocurrency does not appear to be a fully developed form of money.

(viii) If one loses their bitcoin wallet, they have lost all of their bitcoins there, and there is no way to get them back unless they have a backup phrasecode for their wallet (Khan,2015).

(ix) The deflationary aspect of bitcoin is also a drawback because it will be negatively impacted by a severe recession if it falls into the hands of speculators (Hildi, 2016). Bitcoin is currently under a lot of threat. If it is to gain widespread user acceptability, a few obstacles must be overcome; First off, the inherent value volatility in it casts suspicion on both consumers and investors. Additionally, bitcoins have historically been vulnerable to theft and fraud because of system configuration errors by exchange businesses. Once more, cryptocurrencies are not now a subject of widespread legal regulation. As a result, user acceptability has remained modest. The main cryptocurrency rivals represent yet another significant threat. They are working frantically to offer a substitute for digital currency. Examples include Apple, one of the primary rivals with ApplePay, the conventional credit card issuers like Visa and MasterCard, who are collaborating with ApplePay's infrastructure, and PayPal.

The hurdle of US legislation will need to be overcome before there is widespread user adoption of bitcoin, according to PwC (2015), and it is no less of a challenge that works against the global cryptocurrency. although several important markets are still. The United States may have significant legislation affecting bitcoin taxation, which might have a detrimental impact on how transactions involving bitcoin are handled. This is probably going to have a bad effect on how legitimate cryptocurrency is as a form of money (DeVries, 2016).

**2.1.3 Problems with Crypto-Currency**

The crypto-currency system presents two types of challenges: first, to the regulatory bodies (which FATF is primarily concerned with), and second, to the community of its users (or investors). The hazards to users (or investors) are outside the purview of this article, but they should still be taken into consideration. They include, but are not limited to, price fluctuation on a large scale, theft, and lack of assurance from any national government. Tax evasion, money laundering, and financing of terrorism are some of the main issues facing regulators that are addressed in this article.

**TERRORISM FINANCE:** Traditionally, arranging for the financing of international terrorist activities has been one of the most difficult tasks. This is due to the fact that terrorism is heavily reliant on cash flows, which range from the purchase of munitions to websites and pamphlets (Brantly, 2014). Terrorist groups have historically used a range of techniques to finance and launder their operations. They most frequently use Hawala networks and traditional international banking as techniques. A different form of remittance that operates outside of conventional banking institutions is the hawala network. Because the system is primarily dependent on trust, transactions between hawala brokers (also known as hawaladars) are made without promissory documents. Because money launderers and terrorists utilize this network to transfer money from one place to another, the network is also known as underground banking. Hawala networks are effective in moving money from one location to another anonymously, but they are ineffective at collecting money decentralized from various donors and distributing it to one or more geographically scattered end points. Therefore, the limitations imposed by a trust-based network (such as Hawala) in the dynamic collecting and flow of funds limit the process of funding, planning, and carrying out assaults (Europol, 2015).

Conversely, traditional banking systems that adhere to current commercial banking protocols and standards such as SWIFT-BIC or the Society for Worldwide Interbank Financial Telecommunication are effective ways to carry out global financial transactions. Banks' tight adherence to strict regulatory frameworks inside codified national and international agreements, such as those created by the Financial Action Task Force, poses a barrier to terrorists with regard to these systems (FATF).

Therefore, when terrorist organizations use normal banking systems, their operational security is open to scrutiny by banks, law enforcement, and intelligence agencies. Cryptocurrency (Bitcoin) seems to offer better alternatives, or at least has the ability to do so, due to the shortcomings of these outdated mechanisms in the collecting and disbursement of cash for the actions of terrorist organizations. This is due to the lack of names or other forms of consumer identification associated to Bitcoin addresses, which serve as accounts, and the absence of a central server or service provider in the system. Once more, the Bitcoin protocol does not demand or supply participant identification and verification, nor does it produce transaction history records that are inextricably linked to real-world identities. One example is Silk Road. In order to facilitate illegal activities, including the purchase and sale of firearms, Silk Road operated a covert website. It managed to remain anonymous by using the covert Tor network and only taking Bitcoins as payment.

Since only the anonymous Bitcoin address or account may be used to identify senders and recipients of peer-to-peer (P2P) transactions, using Bitcoins as the sole form of payment on Silk Road allowed buyers and sellers to further hide their identities (Staples, 2017).

**MONEY LAUNDERING:** Money laundering is a criminal activity that is continually changing, with new methods of operation and novel business strategies (Omri, 2016). One of the major obstacles a criminal company faces is developing a good cash-out strategy, which is difficult to do. Without laundering methods, crime would become an unprofitable enterprise unless it is done exclusively for lifestyle expenses.

Traditionally, money mules, offshore accounts, or opulent goods like artwork, homes, boats, or a mix of things have made it easier to launder criminal money (FATF, 2016; Freeman, 2016) Alternative payment options like Perfect Money and Western Union purportedly play a significant role in money laundering activities. Gift cards, prepaid credit cards, and other easily exchangeable non-traditional value products are frequently linked to the laundering of criminal proceeds. Nowadays, 'new' payment mechanisms are playing a bigger role in actual money laundering schemes (Starnes, 2016; World Bank, 2016). Cryptocurrencies stand out among the new payment alternatives. It's clear that there has been a change in how often criminals use cryptocurrencies to cash out the spoils of their crimes (Schwarch, 2018). Even more so, according to Europol, "almost 40% of all recognized criminal-to-criminal payments" in cybercrime investigations are made using bitcoin.

The protocol's secrecy and resilience through flexibility are some of the key aspects of Bitcoin that draw money launderers in while also undermining the efforts of anti-money laundering regulations (Europol,2015). Without the ability to connect a specific user to a single Bitcoin address, AML enforcement would have a very difficult time monitoring the infusion, combining, and reintegrating of money used in laundering. The Bitcoin blockchain includes control the troubles of completing frames based on the collective processing capabilities of all prospectors, and each network node in the network obtains and mechanisms every transaction. As a result, shutting down the Network necessitates deactivating each node on the channel. As a result, the target of AML activities is both obscure and virtually impervious to disruption.

Bitcoin may make it possible for anyone, including money launderers, to send money at almost instantaneous speeds for little to no cost, with very minimal entry barriers, and while maintaining a high level of anonymity without the need for a visible paper trail. AML attempts are further hampered by users' capacity to exchange bitcoins for other currencies directly, send money through an infinite variety of various Bitcoin addresses for obscurity, and engage in physical products trading with other users. In essence, Bitcoin and comparable virtual currencies could make it easier than ever for money launderers to shift illegal monies covertly, quickly, and cheaply.

**TAX EVASION:** Bitcoin and other cryptocurrencies give tax evaders a new advantage over traditional methods. This is because Bitcoin does not require the presence of financial middlemen like banks in order to function. Bitcoin appears to be resistant to the emerging international anti-evasion system because it is peer-to-peer exchangeable. Cryptocurrencies may so one day serve as the supreme offshore banking system (tax haven) (FATF,2016). A service provider might, in theory, take Bitcoin payments for genuine services. It would be exceedingly challenging to connect the earnings accumulated in this wallet to the service provider because she is not needed to give her identity while creating her online Bitcoin wallet. Such money is obviously taxable in the majority of countries (if not all), but it is doubtful that the tax authority will be aware of the income until the service provider if it is voluntarily reported. Third parties may play a role in another aspect of (even more advanced) methods of tax evasion using bitcoin. For instance, a Bitcoin-equity swap contract can be used to invest in traded stocks and commodities utilizing tax-exempt buying agents. These schemes allow a Bitcoin user (the "investor") to pay a buying agent (the "agent") the amount of Bitcoin they wish to invest in the stock of a certain company. The agent would next apply the stock's purchase price in dollars. Any profits paid by the corporation to the agency would be converted into bitcoin by the agent and transferred to the investor. After the contract expired, the agent would either pay the investor the stock's increase in value in bitcoins or the user would pay the agent the stock's decrease in value in bitcoins. The agent would never owe any taxes as a result of its tax-exempt status. The agent is apathetic because it has no financial stake in the stock's performance.

The investor, on the other hand, is totally exposed to the stock's performance as though they had made a direct investment in it. Because the tax authorities are fully ignorant of the Bitcoin investor's involvement, neither the return on investment nor taxes are filed by the investor (Freeman, 2015).

**2.1.4 Cryptocurrency Prospects**

Although the cryptocurrency technology poses regulatory problems, it has valid applications. It facilitates international trade, especially at the micro level, and it has the potential to increase financial inclusion. It also makes international remittances cheaper and faster.

International remittances are under pressure in a number of different ways. For instance, in Somalia, the Hawala systems have been threatened with closure because of worries from banks and governments that they are funding terrorism. The Somalian economy depends heavily on remittances, yet businesses like Dahabshiil that offer this essential service have been singled out for exclusion by banks in countries like the United Kingdom, which has a sizable Somalian population. Theoretically, Bitcoin might be used to create an alternative remittance channel and circumvent such banks (many Australian workers frequently send money home). Individually, remittances are low-value payments. Nevertheless, in certain developing nations, they account for up to 10% of GDP (27 percent in Tonga and 20 percent in Samoa, World Bank, 2016). Therefore, hefty remittance fees have a significant impact on these countries' socioeconomic progress. The Pacific Island nations, however, have some of the highest remittance prices in the world. For instance, sending $200 from Australia to Vanuatu costs $33.20 (16.6 percent fee charge), and sending $200 to Samoa costs $28.60 (14.3 percent fee charge) (Mackie, 2016). The chain of transactions used to make these payments may involve numerous parties, and there may not always be full disclosure of the complete cost of exchange rates and fees. The challenges of adhering to AML/CTF (Anti-Money Laundering/Counter Terrorism Financing) law, particularly in cases where the recipient party may not have a bank account, can complicate and increase the cost of remittance payments. It costs less than 2 percent to use Bitcoin. Nigeria received $24.3 billion in remittances in 2018, or 6.1% of GDP (Nakamoto, 2018). Therefore, using the rate of transfers from Australia to Vanuatu and Samoa, respectively, Nigeria may save up to 14.6 percent and 12.3 percent on remittance costs. Bitcoin transfers are instantaneous, unlike Western Union transfers, which can take anywhere from an hour to five days (NDIC, 2019).

**SMALL-SCALE INTERNATIONAL COMMERCE:** Bitcoin may also help small-scale international business. Local business owners in less developed nations could find it challenging to use international payment systems to sell their products overseas. A rural crafts cooperative in Nigeria, for instance, would find it challenging to put up a website with an integrated credit card payment system, but obtaining a Bitcoin address might allow them to sell goods for Bitcoin tokens instead of using conventional e-commerce platforms (which often involve having to set up a merchant account with a formal bank). This could be helpful if a market develops to convert such bitcoins acquired through trade back into a usable local currency. Consider a case where a small-scale, independent manufacturer of goods made with sustainable cocoa butter offered them to US customers in exchange for Bitcoin tokens that were then exchanged for national or international money on a Bitcoin exchange. Similarly, a modest non-governmental organization setting up a donation system for Bitcoin tokens is simple. However, it seems that there isn't much solid empirical data available yet to show how widespread this use of bitcoin is. There are numerous anecdotal examples of people utilizing it to make foreign transfers or to buy things from small businesses abroad (found on internet forums, media websites, and social media feeds), but there are no systematic studies beyond proxy studies of Bitcoin users.

**FINANCIAL INCLUSION:** In the aforementioned instances, Bitcoin was employed as a middle currency to ease currency transactions. This may presuppose that the user has access to a bank account but has trouble using e-commerce platforms or overseas transfers due to their high cost or complexity. However, it is feasible to concentrate on the Bitcoin system as a specific kind of decentralized bank, though. A person can get a public key that represents their account on the global system if they have a personal computer or mobile device that can be used to download a Bitcoin wallet. This then starts to resemble a sort of savings account where you can accumulate money. Such a technology might be a safer way to store money and a practical means to move money in regular transactions in the setting of a nation with weak banking infrastructure and a reliance on cash. Bitcoin may be used for more than just remittance networks, serving as a foundation for routine local payments in shaky, unofficial environments. In this regard, Bitcoin has the ability to compete with or supplement mobile banking software. Up to a quarter of the working population in Kenya may now send money through text messages utilizing their mobile phones as a form of digital wallet thanks to M-PESA, which has already established itself as a significant mobile banking service. However, the politics of mobile banking are complex and involve conflicts between regulators, banks, and telecom firms. Nigerian banks' efforts to convince regulators to permit only banks, not telecom companies, to run mobile money services have in part contributed to the country's slower development of mobile money. By avoiding the established institutions and their internal politics, Bitcoin may provide non-formal solutions that work outside of the established institutions' formal channels.

**2.1.5 Cryptocurrency's Status and Regulation**

**2.1.5.1 Global Status and Regulation of Cryptocurrency**

Law Library of Congress (2019) offers a study on 130 nations that have enacted laws or policies relating to cryptocurrency, as well as several regional organizations. The paper claims that cryptocurrencies have spread widely in recent years. More national and local authorities are now battling to regulate cryptocurrencies as a result of this. The development has made it possible to spot the new pattern. The report has examined the global legal and legislative environment surrounding cryptocurrency. Despite the fact that they are all fundamentally built on the same type of decentralized technology known as blockchain with inherent similarities among the various varieties of what are often known as cryptocurrencies. The nomenclature used to describe them differs significantly from one jurisdiction to another, according to Law Library of Congress (2019). Digital currency (Argentina, Thailand, and Australia), virtual commodity (Canada, China, Taiwan), cryptotoken (Germany), payment token (Switzerland), cyber currency (Italy and Lebanon), electronic currency (Colombia and Lebanon), and virtual asset are some of the alternative names some nations use to refer to cryptocurrencies (Honduras and Mexico).

Government-issued warnings regarding the risks of participating in the cryptocurrency markets were one of the most frequent actions found throughout the assessed jurisdictions. Such warnings, which are typically issued by central banks, are simply intended to inform the public about the distinction between cryptocurrencies, which are not issued or guaranteed by the government, and fiat currencies. The majority of the countries emphasise that citizens who invest in cryptocurrencies do so at their own personal risk and that there is no legal recourse available to them in the event of loss, in addition to highlighting the additional risk associated with doing so. In addition, they have expanded the scope of its legislation to cover counterterrorism, organised crime, and cryptocurrency exchanges. Banks and other financial institutions that support such markets must now fulfil their legal due diligence duties under all of these regulations.

Some nations, including Algeria, Bolivia, Morocco, Nepal, Pakistan, and Vietnam, have gone even further in restricting cryptocurrency ventures. The scope, nevertheless, differs from one jurisdiction to the next. As long as the cryptocurrency-related activities take place outside of Qatar's and Bahrain's territorial limits, both countries permit their citizens to use cryptocurrencies in any way. Bangladesh, Iran, Thailand, Lithuania, Lesotho, China, and Colombia are a few examples of such nations. By forbidding national financial institutions from enabling cryptocurrency transactions within their borders, governments can impose indirect restrictions without outright preventing their citizens from investing in cryptocurrencies.

The number of nations that control initial coin offers (ICOs), which employ cryptocurrencies as a means of money raising, is rather few. Some of them jurisdictions, like China, Macau, and Pakistan, outright forbid them, while the majority, like New Zealand, tend to regulate them. Depending on how an ICO is classified, the regulation of ICOs and the pertinent regulatory organizations differ in the majority of these latter cases. Similar to this, in the Netherlands, the regulations that apply to a particular ICO rely on whether the sold token is recognized as a security or a component of a collective investment. This determination is decided on a case-by-case basis. Not all nations see the emergence of cryptocurrencies and blockchain technology to be a threat. While not recognizing cryptocurrencies as legal tender, nations like Spain, Belarus, the Cayman Islands, and Luxembourg see the potential in the technology underpinning them and are creating a legislative framework that is cryptocurrency-friendly as a way to draw investment in technological firms.

Additionally, there are several nations who work to create their own cryptocurrency system, including Lithuania, the Marshall Islands, Venezuela, and the nations that make up the Eastern Caribbean Central Bank (ECCB). Although nations like Belgium, South Africa, and the United Kingdom have warned the public about the risks of investing in cryptocurrencies, they do not believe the market's size is large enough to warrant regulation.

**2.1.5.2 Nigeria's Cryptocurrency Regulatory Framework**

The legal standing of virtual (or crypto) currency in Nigeria is unclear. This is due to statements made by the Central Bank of Nigeria (CBN) and Securities and Exchange Commission (SEC), two regulatory bodies in Nigeria, that are inconsistent with the reality of the country's financial landscape. The CBN warned banks and other financial institutions in a circular sent to them in January 2017 not to get involved in the activities of venture capitalists in Nigeria. As stated in the circular:

"Because VC transactions are largely anonymous and untraceable, criminals may take advantage of them, particularly for money laundering and financing terrorism. VCs are traded on unregulated trading platforms all over the world. Therefore, in the event that these exchangers fail or go out of business, customers can lose their money without any legal recourse. (2017 CBN Circular)

Although the aforementioned statement acknowledged the risks that VCs face in the fight against money laundering (AML) and counter financing terrorism (CFT), the focus was on safeguarding investors from loss of investment, as bolded letters indicate. In a news release from February 2018 the CBN emphasized the need for investors to exercise caution while funding venture capital firms, saying the following:

"In Nigeria, there is no legal protection for traders or investors in crypto currencies of any kind. All across the world, virtual currencies are traded on unregulated exchange platforms. Therefore, in the event that these exchangers fail or go out of business, customers can lose their money without any legal recourse. (2018 CBN Press release)

This public notice about cryptocurrency investments was released by the Nigerian Securities and Exchange Commission (SEC) in January 2017. The SEC advised that "...none of the individuals, businesses, or organizations marketing cryptocurrency has been recognized or allowed by it or by other regulatory agencies in Nigeria to collect deposits from the general public or to offer any investment services or other financial services in or from Nigeria. Additionally, the general public ought to be aware that any investment options advocated by these people, businesses, or organisations are probably dangerous in nature and have a substantial risk of financial loss. (Freeman, 2015). It is evident from the aforementioned that all regulatory organisations in Nigeria, including Nigeria Deposit Insurance Corporation Levi (2015), are more concerned with the asset feature of cryptocurrencies than the currency aspect, which on the one hand can facilitate international trade, remittances, and financial inclusion and on the other can be vulnerable to abuses like money laundering, foreign exchange fraud, and tax evasion. Interestingly, despite the frequent warnings from the CBN and other regulatory bodies, usage or investment in cryptocurrency appears to be booming in Nigeria. In Nigeria, there are thirteen (13) active cryptocurrency exchanges with daily trading volumes above $10 million (Nakamoto,2018). The point of entry and exit for fiat money into the cryptocurrency ecosystem are cryptocurrency exchanges. While there is no specific country that may control Bitcoin trading (unlike the internet), exchanges can be required to follow AML and CFT standards in order to prevent the usage of cryptocurrencies for illegal purposes.

**2.1.5.3 Nigeria's Use and Regulation of Cryptocurrency in Relation to Other African Nations**

Although acceptance of cryptocurrencies is rising quickly in Africa, it has not yet reached the levels seen in industrialized nations like the US and Russia. For instance, trading volumes in South Africa have increased to an average of $10 million from $5 million in early 2017. Zimbabwe's Reserve Bank recently put a ban on all types of cryptocurrency trading in the country, which significantly slowed down the adoption of cryptocurrencies there. The Reserve Bank of Zimbabwe banned the listing of cryptocurrencies and initial coin offerings (ICO) in the nation in May 2018, which caused confusion among thousands of merchants (Omri, 2016).

Any type of cryptocurrency trading is prohibited in Morocco. Trading cryptocurrencies in Morocco is a serious offense that carries a jail sentence or fines, similar to Egypt, one of the first African nations to outlaw Bitcoin for religious reasons. Government officials often allow cryptocurrency trading in Kenya, the largest economy in East Africa. In fact, the well-known peer-to-peer lending platform LocaBitcoins.com recently declared that it had seen unheard-of growth rates in the country's Bitcoin market. However, Kenya's Central Bank (CBK) does not support the trade of Bitcoin. Trading in cryptocurrencies or initial coin offerings is not advised, according to the CBK. Nevertheless, the country has more than a dozen cryptocurrency firms, some of which are already well-established in other African nations, much like Nigeria. Ugandan cryptocurrency dealers, like those in Kenya and Nigeria, have continued to operate in the absence of government assistance. However, Uganda has recently become more receptive to the notion of collaborating with cryptocurrency firms. Zhao Changpeng, CEO of Binance, recently suggested Kampala as the location for an African bitcoin exchange. Working with Uganda might significantly alter the economics of the nation given that Zhao's Binance is the biggest exchange in the world (Readling, 2016).

**2.1.6 Bitcoin and The Nigeria Economy**

Even in a developing nation like Nigeria, the emergence of Bitcoin as a virtual currency has been causing waves in the global economy. The impact of cryptocurrencies on the Nigerian economy has received a lot of discussion in light of this epidemic, both positively and negatively. In contrast to countries like Morocco and Algeria where there is a clear ban on trading in Bitcoins and a breach is subject to severe fines, the Nigerian government has attempted to outlaw cryptocurrency through its regulatory agencies, such as the Central Bank of Nigeria (CBN) and the Securities and Exchange Commission (SEC). The primary goal of the warnings is to inform the populace of the distinction between traditional currencies—which are issued and guaranteed by the government—and virtual currencies. Nigerian MPs have encouraged the regulatory bodies to expedite efforts to develop a legal framework for cryptocurrencies in the nation in response to the actions taken by the CBN and SEC.

**Effect on Financial Policy**

Currently, cryptocurrencies coexist with conventional money. The current amounts are negligible and do not call into question the dominance of official currency. But as algorithms advance to reduce cryptocurrency volatility, their use and popularity tend to grow. This would result in the coexistence of another legal tender. The key query here is: Could this lead to the central bank losing control over the economy? Fernandes-Villa Verde and Sanches go into great length about how monetary policy and cryptocurrency interact (2018). Their theoretical framework holds that the monetary actions of the central bank are what determine whether private money and bank money can coexist. Privately produced currencies would be utilised, especially if the official currencies do not ensure price stability, but they would lose their usefulness as a medium of exchange if the central bank formally guaranteed the value of money balances. As a result, there are two outcomes. First, the coexistence of official currency and digital currencies that are traded as units of value is not theoretically inconceivable. Second, the ability for central banks to choose a certain monetary policy framework and prevent the use of cryptocurrencies as a medium of exchange is a benefit (but they could still be valued for other reasons, for instance as a pure speculative asset). The coexistence of fiat currency and cryptocurrencies, in this opinion, can be advantageous for society by serving as a check on central banks rather than being a threat. Currency competition can be useful for lowering inflation and preventing the kinds of price and interest rate manipulation that governments traditionally have been prone to. As a means of ensuring the stability of the financial system, Hayek (1976) advocated in favor of ending the state's monopoly on money. From a more practical standpoint, however, central banks might experience some issues with the growth of cryptocurrencies as meaningful vehicles of exchange with stable purchasing power due to their high level of volatility.

**Fiscal Policy's Effect**

Cryptocurrencies and fiscal policy may have an asymmetrical relationship. In an economy with a sparsely developed financial system, it may be difficult to oversee cryptocurrency activities, and as a result, investors, both private persons and corporate entities, may have a platform to escape taxes. According on the degree of market activity, this could lead to poor government income generation, which could affect the government's financial objectives.

This circumstance might obstruct governmental financial goals, which would have an impact on macroeconomic fiscal goals. Additionally, in a country with a highly developed financial sector, the correct coordination of cryptocurrencies might lead to an increase in tax revenue, which would improve the government's fiscal projections. This circumstance may contribute to improving government fiscal goals, improving fiscal macroeconomic goals, and stabilizing the economy.

**Agricultural Sector Effects**

Farmers have always been quick to accept technology that are effective and provide substantial benefits. Blockchain technology holds great promise for solving important issues in agriculture. Connecting the technology to workable business models and appealing use cases is a barrier for blockchain and agtech in general. Blockchain technology has enormous potential to expand and improve agricultural sector access to finance, ultimately addressing the issue of food scarcity. Result for the Education Sector

In conclusion, the technical jargon, complexity of bitcoin as a virtual money, and demand for digital education boost cryptocurrency's influence on education. As a result, the idea of virtual currency as a whole could seem overly vague. But education might help close the gap and increase the use of cryptocurrencies. Therefore, cryptocurrencies and education can be considered to be "Siamese twins," since their connections and interdependence can serve to advance the goal of financial inclusion and steer the trajectory of economic growth in a positive direction (Bech M, 2017 and BIS, 2018).

**2.1.6.1 Economic Effects of Cryptocurrencies and Blockchains**

Although cryptocurrencies have long been studied and contested, they have only recently emerged as financial tools that may be helpful and accessible to a wide range of people (Finextra, 2019) than just ardent connoisseurs. Finextra asserts that cryptocurrencies have the power to accelerate global social and economic development, particularly that of poor nations. They achieve this by making financial services and capital more accessible. Overall, |Cryptocurrencies, and Bitcoin in particular, have great utilitarian value, while having a disorderly value that has gradually started to interfere with how the current economic structure runs (Finextra,2019). Finextra highlights some of the significant effects of cryptocurrencies on the global economy (2019). the following

**2.1.6.2 All-Round Economic Benefits of Cryptocurrencies**

**(i) A Positive Increase in Economic Activity**

Already, a whole sector of the economy is based on cryptocurrency. It is controlled by organizations whose sole purpose is to monitor all global exchanges of digital coins. The early adopters of cryptocurrencies, especially bitcoin, who got wealthy overnight and discovered chances to increase their wealth witness to how quickly the market is expanding.

**(ii) Great Chances for Poorly Banked Countries**

The previous surveys revealed that more than a third of the world's population is unable to access even the most essential banking services, which might be lifesaving in the event of a personal financial emergency. These people, who are frequently already financially vulnerable, frequently turn to dubious lending tactics and unfair interest rates. Cryptocurrencies can help in this situation thanks to their high volatility and user-friendliness.

**(iii) Low Transaction Costs**

The transaction costs for cryptocurrencies and blockchain are practically negligible because they don't need a physical brick-and-mortar structure to exist.

**(iv) Improved Transaction Transparency**

All cryptocurrency and blockchain transactions are digitalized, automated, and recorded in a distributed ledger. The latter is impervious to manipulation by both people and businesses. As a result, there is significantly less chance of fraud and corruption. The opportunity for impoverished nations to participate in financial transactions and improve their commercial and social chances is also larger.

**(v) Give Entrepreneurs More Power**

Entrepreneurs can benefit from receiving payments in more currencies thanks to blockchain technology and cryptocurrencies. For instance, BitPesa enables owners of enterprise or business in African to conduct commercial operations with corporations in the West, ssuch as Europe and America, as well as Asia.

When considering blockchain, it's crucial to remember that not all cryptocurrencies are decentralised and use evidence based work or evidence based stake procedures, therefore the blockchain as a technology is not exclusively linked to Bitcoin. Another crucial point that must be taken into account is the fact that blockchain research is a relatively new area that is constantly innovating, led mostly by cryptocurrency enthusiasts, young business owners, and technology start-ups. In addition to being a technology closely related to the cryptocurrency network, blockchain can be used in the subsequent contexts:

**(I) Escrow Services**

Services for Escrow is described as a contractual arrangement in which money is sent through a third party (in this case, a smart contract) who supervises and checks to see if the contract's conditions are satisfied. The transactions that are part of the Bitcoin protocol and require multiple signatures can be used by escrow services (Mckenzie,2018).

**(ii) Metacoins**

By utilizing bitcoin's current blockchain and adding certain extra features on top of it, Meta Coins expand the features of the cryptocurrency.

**(iii) Certification**

The ability of authorized nodes to keep an eye on how other nodes behave in the network is referred to as attestation. Blockchains allow for the detection of bad activity and, if it is widespread, the disconnection of the offending nodes from the network.

**(iv) Smart property and contracts**

Smart contracts are another intriguing way that blockchains are being used. Smart contracts are legal pacts between parties that are carried out using software. They are computer protocols that confirm, uphold, or make contract performance negotiations easier. A smart contract acts as though it has the software necessary to check whether certain requirements were satisfied. Smart property refers to real estate whose ownership is managed by a blockchain. It is digitally transferred and cryptographically secured.

**(v) Financial instruments and contracts**

Since the majority of them are simply contracts that are governed by a set of rules and conditions, cryptocurrencies also play a vital role when it comes to the need to create financial contracts and instruments. Authorities oversee the payee and client of the agreements' adherence to the established regulations while regulating markets. These authorities could be substituted by so-described oracles, which are mathematical algorithms. (Lewis, 2015; Antonopoulos, 2015)

**(vi) Ethereum and Political Speech**

Another place where the effects of adopting a blockchain could be seen is in political speech. Projects like Bit Congress aim to establish a decentralized voting system based on blockchain technology.

**(vii) Central company register and cadaster**

The central cadaster and corporate registration, which effectively assign a piece of information to an entity, are other areas where blockchain can demonstrate its utility. They can use blockchain technology to improve manageability, transparency, and redundancy.

**(viii) Governmental purchasing**

Independent of the current state of their perfection, which naturally varies from country to country, public procurement is another another method that Bitcoin-based technology might improve government services. Typically, all public authority contracts for goods, services, and supplies fall under this category (Finextra,2019).

By employing Smart or Distributed Contracts to oversee the entire process, government entities can make public bids more automated, transparent, and self-enforcing.

**(ix) Public funds**

The use of a cryptocurrency as legal cash has a number of benefits for both the state and the populace. The capacity to restrict the supply of money is one of them. Another advantage of cryptocurrencies is that they cannot be copied or faked in any way, unlike fiat money.

**(x) Budgeting and revenue service**

The government can scarcely come up with a much better forecast of how much revenue tax it should get if a cryptocurrency created by the government is widely used. Analyzing every transaction recorded in the block chain would enable the government to spot businesses and other entities that do not pay their taxes in full.

**2.2 Theoretic Framework**

**2.2.1 Theorem of Mises Regression**

According to the regression theorem, all money must ultimately derive its ability to buy things from a historical connection to a good that was valued through barter. The theory of the value of money, according to Jeffrey (2015) referenced in Mckenzie(2018), can only follow the objective exchange value of money up until the point where it is no longer the value of money but rather the value of a commodity. The objective exchange value of money, which derives from values based on the function of money as a medium of exchange, must finally reach a point where one can no longer locate any component. This can only be done by progressively going further and further back. At this stage, the value of money is only the worth of an item that serves some other purpose than serving as money. This circularity was eliminated by Mises using the regression theorem. Mises agreed that the expected purchasing power of money—its value—is determined by the marginal utility of the items it can be used to purchase. Mises went on to say that consumers base their expectations of future purchasing power on their experience with present-day and historical purchasing power. A medium of exchange must already have the properties required for a medium of exchange, such as having a price and being accepted on the market, for the regression theorem to hold true. It has been determined that Bitcoin violates this regression theorem.

**2.2.2 The General Problem of Byzantine**

One encounters a few challenges when building a decentralized ledger, with trust being the most significant. The Byzantine General's Problem refers to the difficulty of enforcing trust in distributed systems when distributed components that must communicate information amongst each other may do so incorrectly. Marshall, Pease, Robert Shostak, and Leslie Lamport made the first public disclosure of the situation in 1982. The Byzantine Generals Problem (BGP) was given to it (Antonopoulos, 2015). A group of Byzantine army generals camped with their forces surrounding an enemy city can serve as an abstract representation of the need for a dependable computer system to be able to handle faulty components that provide incompatible information to different portions of the system. These generals must agree on a common strategy for combat, but only a messenger can keep them in touch. It becomes unlikely that these generals will come to an agreement if it is assumed that one or more of them in this "network" are traitors trying to mislead the others. Finding an algorithm to guarantee that they will do so in this situation becomes a challenge if only oral communication is used. Only if more than two-thirds of the generals are loyal will the issue be resolved. This suggests that just one traitor is capable of confusing two loyal generals. However, the issue can be resolved for any number of generals and potential traitors if there are irrevocable written communications that limit the ability of traitors to lie. There will be a diametrically opposite growth in the number of communication channels as there are more participants involved in the system. Similar to this, a decentralized system with hundreds of people engaged will become more complex as consensus is developed.

**2.3 The Empirical Studies**

Bouoiyour and Selmi (2016), cited in Mazikana (2019), studied daily Bitcoin prices using an optimal-GARCH model after observing significant asymmetries in the Bitcoin market, where the prices are driven more by negative than positive shocks. They found that its volatility has been declining over time when comparing pre- and post-2015 data. Aside from that, Dyhrberg (2016) and Mazikana (2019) both mentioned that using bitcoin as a short-term hedging strategy against companies included in the Financial Times Stock Exchange Index and against the US dollar is possible. Later, Mothokoa (2017) conducted an analytical, exploratory, and comparative study using a desktop-research methodology. Crypto-intricate currency's principles were examined and analyzed. The comparative method was then utilized by the author to compare and contrast the legal and regulatory frameworks of South Africa with those of Canada, the US, and the EU. The study demonstrated how decentralized convertible virtual currencies built on cryptographic techniques are known as crypto-currency.

In a related study, Katsiampa (2017) compared GARCH models in order to gauge the volatility of Bitcoin and found that the AR-CGARCH model offers the greatest fit. He made a point of emphasising how very speculative the Bitcoin market is. El Bahrawy and Alessandretti (2017) examined the behaviour of the entire market of 1469 cryptocurrencies between April 2013 and May 2017 and found that, despite some statistical market characteristics remaining stable for some time, cryptocurrencies continue to emerge and vanish while their market capitalization is increasing exponentially. The incentives to stop and continue hidden mining were examined by Chiu and Koeppl (2019) before they continued. They discovered that once a buyer has begun a double-spending attack, even if they are successful in the first few phases, it is never ideal for them to stop. There were not many previous studies that looked at the volatility and dynamics of bitcoin equilibrium pricing.

**CHAPTER THREE**

**METHODOLOGY**

**3.1 Research Design**

The research design adopted for this study is the descriptive research design. This is because the data has occurred and cannot be manipulated. Lewis and Thornhill (2012) state that it is appropriate when the researcher wishes to provide an accurate representation of persons, events, or situations.

**3.2 Population of the study**

The population of the study consists of all the cryptocurrencies in Nigeria listed on coinmarketcap.com. The period of the study is from 2019 to 2021.

**3.3 Sample size and Sampling Technique**

The sample size for this study consists of eleven crypto currencies out of 20,268 total cryptocurrencies listed in the world.

The sampling technique used for this study is the Judgmental sampling technique. This is because the cryptocurrency was chosen based on its popularity, value it has.

**3.4 Methods of Data Collection**

In this research, secondary data was adopted. The data set examined in this study consist, on the one hand, of the daily returns of eleven notable cryptocurrencies ranked by market capitalization. The selected cryptocurrencies are XRP, Binance, EOS, Tezos, Litecoin, Stellar, Bitcoin, Ethereum, Tether, BitcoinCash, Bitcoin SV, and BitcoinCash. The data was obtained from the coinmarketcap website and pertains to the top cryptocurrencies by market capitalization from June 2021 to December 2021. The top eleven cryptocurrencies as of November 9, 2021, account for approximately 88 percent of the market value for cryptocurrencies, with Bitcoin dominating the market to a degree of about 65 percent.

The data on the commodity market also covers the interval of November 20, 2019 and June 30, 2021, totaling 396 daily data observations. For the obvious reason that the commodity market is a government market and that the information is classified and difficult to obtain, the judgmental sample technique was employed. The statement from the Central Bank of Nigeria that was verified by FIRS was chosen to supply the data for the study as a result.

**3.5 Data Analysis Techniques**

The nonlinear autoregressive supplied lag (NARDL) model created by Shin et al. (2016) was employed in order to accomplish the goal specified in the present study. The highly-established ARDL model of Pesaran and Shin (2019) and Pesaran et al. has an asymmetric extension in this case (2016).

Several authors, including Arize et al. (2017) and Jare et al. (2019, 2020), claim that the NARDL approach has some advantages in this area.

The long-run asymmetric regression between the returns of the top eleven cryptocurrencies and other markets is an approach to simulate asymmetric cointegration based on partial-sum decompositions:

Rjt = α1 + α+ RS+ t + α RSt + εjt 1

RSt =v1t

Rjt = α2 + α+ DS+ t + αDSt + εjt

DSt =v2t

Rjt = α3 + α+ SS+ t + αSSt + εjt

SSt =v3t

where Rjt, RSt, DSt and SSt are scalar I(1) variables. In particular, Rjt are the proceeds of the leading eleven cryptocurrencies relating to period t, RSt is the risk changes for time t, which decomposes as RSt = RS0+RSt++RSt-, where RSt+ and RSt- are part figures of positive and negative changes in the market. DSt is the demand change for period t, which decomposes as DSt = DS0+DSt++DSt-, where DSt+ and DSt- are partial sums of positive and negative changes in demand shocks. Likewise, SSt is the resource shock for time t, which decomposes as SSt = SS0+SSt++SSt -, where SSt+ and SSt - are part amounts of positive and negative variations in supply shocks. ϵjt y vt are random shocks and α = (α0, α+, α-) is a vector of long-run parameters to be estimated. In detail, the coefficients α+ y α- capture the long-run relationship between the returns of the eleven major cryptocurrencies and increases (α+) or decreases (α-), respectively, in oil price shocks.

RS+ t = Σt i=1 =RS+ i = Σt i=1 max (=RSi, 0)

RS+ t = Σt i=1 =RS+I = Σt i=1 min (=RSi, 0)

DS+ t = Σt i=1 =DS+ i = Σt i=1 max (=DSi, 0)

DS+ t = Σt i=1 =DS+I = Σt i=1 min (=DSi, 0)

SS+ t = Σt i=1 =SS+ i = Σt i=1 max (=SSi, 0)

SS+ t= Σt i=1 =SS+I = Σt i=1 min (=SSi, 0)

**3.6 MODEL SPECIFICATION**

Following Pesaran and Shin (2019), Pesaran et al. (2016), Shin et al. (2016) and Jare˜no et al. (2019), the interconnection between commodity such as Oil market changes and the cryptocurrency market can be integrated into a NARDL configuration as follows:

*Rjt* =*β*0 + *β*1⋅*Rt* 1 + *β*2⋅*RS*+*t* + *β*3⋅*RSt*+ *β*4⋅*DS*+*t* + *β*5⋅*DSt*+ *β*6⋅*SS*+*t* + *β*7⋅*SSt*+Σ*p i*=1

*φiRt* *I +Σq i=0 (γ+iΔRS+ti +γi ΔRSti + γ+iΔDS+ti +γi ΔDS ti +γ+iΔSS+ti +γi ΔSSti) + β*

where φi is the autoregressive parameter, p is the number of lags of the dependent variable and q is the number of lags for the regressors, γ+i y γI are the asymmetric distributed lag parameters. ϵjt is a variable with zero mean and constant variance, σ2ε. α+ = β2/β1 and α- = β3/β1 are the coefficients of the relationship of increases and decreases in oil market respectively on each of the returns of the eleven most popular cryptocurrencies in the long run. *q i*=0 *γ*+*i* and Σ *q i*=0 *γi ,* on the contrary, it measures the short-term effects of increases and decreases (respectively) of oil price changes on the returns of major cryptocurrencies.

**3.7 *APRIORI EXPECTATION***

From this study, we expect that

Cryptocurrency have a significant relationship with Stock Market in Nigeria.

There is a significant relationship between Cryptocurrency and Oil price.

There is a significant relationship between Cryptocurrency and Market Fundamentals

**CHAPTER FOUR**

**DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS**

**4.0 Introduction**

The estimation results for the returns of the cryptocurrencies chosen for this article (Bitcoin, Ethereum, XRP, Bitcoin cash, Tether, Bitcoin sv, Litecoin, EOS, Binance coin, Tezos, and Cardano) and income generation are shown in this section, which is broken down into three main categories (stock market, oil price, and exchange rate).

The model was estimated using the NARDL methodology for a sample period spanning November 20, 2019, through June 30, 2021. Additionally, this study examines if the relationship between the primary variables under study exhibits a distinct behavior depending on the stage of the economy in order to contrast the robustness of the conclusions.

**4.1: Descriptive Statistics**

**Table 1: Components of Income Generation Variables and Descriptive Statistics of Daily Log-Returns of Eleven Leading Cryptocurrencies Mean Median Max. Min. Std. Dev. Skewness Kurtosis Stat JB. Stat ADF. stat PP. KPSS data.**

|  |
| --- |
| **Table 1: Descriptive Statistics of Daily Log-Returns of Eleven Leading Cryptocurrencies and the Components of Income Generation** |
| **Variables** | **Mean** | **Median** | **Max.** | **Min.** | **Std. Dev.** | **Skewness** | **Kurtosis** | **JB stat.** | **ADF stat.** | **PP stat.** | **KPSS stat.** |  |
| Bitcoin | 0.0017 | 0.0014 | 0.2008 | 0.4973 | 0.0516 | 2.1586 | 25.6136 | 8745.3\*\*\* | 22.3580\*\*\* | 22.2652\*\*\* | 0.0911 |  |
| Etherum | 0.001 | 0.0006 | 0.2523 | 0.5896 | 0.064 | 1.8517 | 22.3404 | 6398.1\*\*\* | 12.8752\*\*\* | 23.4340\*\*\* | 0.0514 |  |
| XRP | 0.0025 | 0.0015 | 0.2334 | 0.4252 | 0.0531 | 1.0443 | 14.2093 | 2145.2\*\*\* | 22.4574\*\*\* | 22.4961\*\*\* | 0.0407 |  |
| Bitcoin\_cash | 0.0008 | 0.0017 | 0.4179 | 0.5977 | 0.0806 | 0.9548 | 16.9756 | 3282.9\*\*\* | 18.8393\*\*\* | 18.8360\*\*\* | 0.0672 |  |
| Tether | 0.0001 | 0 | 0.0181 | 0.0151 | 0.0031 | 0.9933 | 14.0689 | 2086.7\*\*\* | 14.7412\*\*\* | 22.5888\*\*\* | 0.2644 |  |
| Bitcoin\_sv | 0.0021 | 0.0015 | 0.8979 | 0.6226 | 0.1037 | 2.657 | 28.93 | 11559.9\*\*\* | 21.8388\*\*\* | 21.7495\*\*\* | 0.0395 |  |
| Litecoin | 0.0004 | 0.0004 | 0.2582 | 0.4868 | 0.0632 | 0.8193 | 13.4274 | 1838.4\*\*\* | 21.1380\*\*\* | 21.1353\*\*\* | 0.1836 |  |
| EOS | 0.0013 | 0.0009 | 0.2664 | 0.5446 | 0.0702 | 1.1775 | 14.0617 | 2110.5\*\*\* | 21.1870\*\*\* | 21.1700\*\*\* | 0.06 |  |
| Binance\_coin | 0.0022 | 0.002 | 0.1803 | 0.5813 | 0.0634 | 2.1027 | 21.3848 | 5868.9\*\*\* | 21.5723\*\*\* | 21.5469\*\*\* | 0.2897 |  |
| Tezos | 0.0026 | 0.0001 | 0.2638 | 0.6144 | 0.0751 | 1.2622 | 15.0157 | 2487.3\*\*\* | 12.0084\*\*\* | 21.1563\*\*\* | 0.0888 |  |
| Cardano | 0.0012 | 0.0009 | 0.2235 | 0.5361 | 0.0667 | 1.4248 | 14.223 | 2212.2\*\*\* | 22.0335\*\*\* | 21.9117\*\*\* | 0.1187 |  |
| Stock Market (SM) | 0.2531 | 0.8988 | 39.9042 | 21.3079 | 8.7379 | 1.4241 | 6.8184 | 374.42\*\*\* | 21.1514\*\*\* | 21.1108\*\*\* | 0.267 |  |
| Oil Price (OP) | 0.1016 | 0.1151 | 14.0218 | 13.9575 | 1.9052 | 0.9007 | 24.453 | 7647.33\*\*\* | 19.4783\*\*\* | 19.7330\*\*\* | 0.0435 |  |
| Exchange Rate (ER) 0.0128 0.1575 24.1785 39.9501 4.4886 1.8965 28.8108 9592.1\*\*\* 9.3207\*\*\* 19.5448\*\*\* 0.0520 |

Notes: The primary descriptive statistics are compiled in this table. The acronyms are: JB, max (maximum value), and min (minimum value) (Jarque-Bera test for normality). We give the results of the stationarity tests known as the ADF (Augmented Dickey Fuller), PP (Phillips-Perron), and KPSS (Kwiatkowski et al.). With statistical significance levels of 10%, 5%, and 1%, respectively, we denote \*, \*\*, and \*\*\*.

**4.2 Inferential Statistics**

**4.2.1 NARDL MODEL RESULTS FOR THE WHOLE SAMPLE PERIOD (NOVEMBER 20, 2019 TO JUNE 30, 2021)**

**Table 2: Results of non-linear ARDL models' regressions, as well as asymmetry and cointegration tests between returns on the most well-known cryptocurrencies and movements in the stock market during the length of the data period (November 20, 2019 to June 30, 2021).**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cryptocurrencies** | **PCorr**  |  **Coint** | **Eq**  |  **LAsym**  |  **SAsym**  |  **Lags +**  |  **Lags -** |  **Adj. R2** |
| Bitcoin   | 0.1287\*\*\*  | 1.8174 |  e+: 7.6659E-05  |  | 0.0055 |  - | - | 0.0366 |
|  |  |  | e-: 8.1521E-05 |  |  |  |  |  |
| Etherum | 0.1819\*\*\* | 2.9606\*\* |  e+: 8.1309E-05 | 0.0506 |  -  |  - | - | 0.0783 |
|  |  |  | e-: 6.7302E-05 |  |  |  |  |  |
| Ripple |  0.1803\*\*\* | 2.0522 | e+: 3.9570E-05 | 0.1931 | - | - | - | 0.0444 |
|  |  |  | e-: 1.0724E-05 |  |  |  |  |  |
| Bitcoin\_cash |  0.1036\*\* | 0.5973 | e+: 0.0005 | 0.2876 | - |  - | - | 0.0187 |
|  |  |  | e-: 0.0006 |  |  |  |  |  |
| Tether | 0.0443 | 1.7609 | e+: 7.792E-08 | 1.3497 | - |  - | - | 0.0747 |
|  |  |  | e-: 6.518E-06 |  |  |  |  |  |
| Bitcoin\_sv |  0.1695\*\*\* | 1.23 | e+: 4.4666E-04 | 0.003 | - |  - | - | 0.0312 |
|  |  |  | e-: 4.3700E-04 |  |  |  |  |  |
| Litecoin |  0.1642\*\*\* | 0.6986 | e+: 0.0005 | 0.4258 | - | (2): 0.0010\*\* | - | 0.0418 |
|  |  |  | e-: 0.0007 |  |  |  |  |  |
| EOS |  0.1496\*\*\* | 0.5713 | e+: 6.7730E-05 | 0.0006 | - |  - | - | 0.0274 |
|  |  |  | e-: 7.1560E-05 |  |  |  |  |  |
| Binance\_coin |  0.2279\*\*\* | 1.4938 | e+: 0.0006 | 0.9098 | - | (2): 0.0001\* | - | 0.0727 |
| Tezos |  0.2581\*\*\* | 0.6862 | e+: 0.0013 | 0.3021 | - - |  | - | 0.1113 |
|  |  |  | e-: 0.0015 |  |  |  |  |  |
| Cardano |  0.2038\*\*\* | 2.4268\* | e+: 0.0008 | 0.7335 | - |  (2): 0.0010\* | - | 0.0643 |

**Table 3: Shows the results of tests for asymmetry and cointegration between the returns of the top cryptocurrencies and changes in the price of oil (OP) throughout the course of the entire sample period (November 20, 2019 to June 30, 2021).**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cryptocurrencies** | **PCorr** | **Coint** | **Eq** | **LAsym** | **SAsym** | **Lags +** | **Lags -** | **Adj. R2** |
| Bitcoin | 0.3079\*\*\* | 1.848 | *e*+: 0.0104\* | 0.8602 | 7.2251\*\*\* | - | (1): 0.0045\*\* | 0.1688 |
|   |   |   | *e-*: 0.0089\* |   |   |   | (3): 0.0047\*\* |   |
| Etherum | 0.3054\*\*\* | 7.8289\*\*\* | *e*+: 0.0102\*\*\* | 2.0851 | 6.1169\*\*\* | - | (3): 0.0096\*\*\* | 0.1823 |
|   |   |   | *e-*: 0.0088\*\*\* |   |   |   |   |   |
| Ripple | 0.2717\*\*\* | 4.5554\*\*\* | *e*+: 0.0094\*\* | 1.377 | 6.0443\*\*\* | - | (3): 0.0039\* | 0.1138 |
|   |   |   | *e-*: 0.0081\*\* |   |   |   |   |   |
| Bitcoin\_cash | 0.2359\*\*\* | 1.7619 | *e*+: 0.0066 | 0.0835 | 5.7142\*\*\* | - | (1): 0.0079\*\* | 0.1159 |
|   |   |   | *e-*: 0.0060 |   |   |   | (3): 0.0060\* |   |
| Tether |  0.0386 | 2.4112\* | *e*+: 2.0432E-04 | 0.0005 | - | - | (1): 0.0003\*\*\* | 0.0897 |
|   |   |   | *e-*: 2.0329E-4 |   |   |   |   |   |
| Bitcoin\_sv | 0.1812\*\*\* | 2.8624\*\* | *e*+: 0.0238\*\* | 1.3425 | 3.8256\*\*\* | (3): 0.0080 | (3): 0.0080\* | 0.07 |
|   |   |   | *e-*: 0.0199\*\* |   |   |   |   |   |
| Litecoin | 0.2763\*\*\* | 0.8703 | *e*+: 0.0163 | 0.528 | 6.5658\*\*\* | - | (3): 0.0049\* | 0.1292 |
|   |   |   | *e-*: 0.0132 |   |   |   | (4): 0.0052\* |   |
| EOS | 0.2501\*\*\* | 0.7111 | *e*+: 0.0201 | 0.2259 | 5.9587\*\*\* | - | (1): 0.0051\* | 0.1155 |
|   |   |   | *e-*: 0.0180 |   |   |   | (3): 0.0056\*\* |   |
| Binance\_coin | 0.2952\*\*\* | 1.0128 | *e*+: 0.0468\* | 0.148 | 6.7686\*\*\* | - | (1): 0.0047\* | 0.1482 |
|   |   |   | *e-*: 0.0381\* |   |   |   | (3): 0.0067\*\*\* |   |
| Tezos | 0.2945\*\*\* | 0.7389 | *e*+: 0.0279 | 0.0602 | 6.3036\*\*\* | - | (1): 0.0108\*\*\* | 0.2107 |
|   |   |   | *e-*: 0.0256 |   |   |   | (3): 0.0099\*\*\* |   |
| Cardano | 0.3043\*\*\* | 6.0105\*\*\* | *e*+: 0.0119\*\* | 0.3339 | 6.9926\*\*\* | - | (3): 0.0063\*\* | 0.1445 |
|   |   |   | *e-*: 0.0111\*\* |   |   |   |   |   |

**Table 4: Shows the results of regression using non-linear ARDL models, as well as tests for asymmetry and cointegration between changes in exchange rate (ER) and returns on the most popular cryptocurrencies during the entire experimental cycle (November 20, 2019 to June 30, 2021).**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cryptocurrencies** | **PCorr** | **Coint** | **Eq** | **LAsym** | **SAsym** | **Lags +** | **Lags -** | **Adj. R2** |
| Bitcoin |  0.0052 | 1.8786 | *e*+: 0.0028 | 0.6255 | - | - | (2): 0.0020\*\* | 0.0468 |
|   |   |   | *e-*: 0.0025 |   |   |   | (3): 0.0020\*\* |   |
| Etherum |  0.0123 | 3.8708\*\*\* | *e*+: 0.0032\*\* | 0.3235 | - | - | (3): 0.0023\*\* | 0.0687 |
|   |   |   | *e-*: 0.0031\*\* |   |   |   |   |   |
| Ripple |  0.0321 | 3.4610\*\* | *e*+: 0.0040\*\* | 0.5438 | - | - | (3): 0.0023\*\* | 0.0352 |
|   |   |   | *e-*: 0.0038\*\* |   |   |   |   |   |
| Bitcoin\_cash | 0.0166 | 0.9652 | *e*+: 5.3941E-03 | 0.0000297 | - | - | (3): 0.0030\*\* | 0.0149 |
|   |   |   | *e-*: 5.3773E-03 |   |   |   |   |   |
| Tether |  0.0262 | 1.5127 | *e*+: 9.5224E-06 | 0.7888 | - | - | - | 0.073 |
|   |   |   | *e-*: 5.8163E-06 |   |   |   |   |   |
| Bitcoin\_sv | 0.0351 | 1.3854 | *e*+: 0.0029 | 0.0022 | - | (2): 0.0036\* | - | 0.0345 |
|   |   |   | *e-*: 0.0030 |   |   |   |   |   |
| Litecoin |  0.0042 | 1.6361 | *e*+: 0.0083\* | 0.8 | - | - | (3): 0.0021\* | 0.0182 |
|   |   |   | *e-*: 0.0075\* |   |   |   |   |   |
| EOS | 0.0021 | 1.1079 | *e*+: 0.0065 | 0.3202 | - | - | (3): 0.0023\*\* | 0.0147 |
|   |   |   | *e-*: 0.0061 |   |   |   |   |   |
| Binance\_coin |  0.0264 | 2.7419\*\* | *e*+: 0.0076\*\* | 1.5497 | - | - | (3): 0.0025\*\* | 0.0279 |
|   |   |   | *e-*: 0.0068\*\* |   |   |   |   |   |
| Tezos |  0.0028 | 0.9373 | *e*+: 0.0126 | 0.2107 | - | (1): 0.0029\* | (3): 0.0028\*\* | 0.0805 |
|   |   |   | *e* : 0.0120 |   |   | (2): 0.0026\* |   |   |
| Cardano |  0.0183 | 3.8325\*\*\* | *e*+: 0.0063\*\* | 0.0132 | - | - | (3): 0.0027\*\* | 0.0339 |
|   |   |   | *e-*: 0.0064\*\* |   |   |   |   |   |

**Notes:** This table describes the coefficient estimations of the NARDL model between cryptocurrency returns and components of income generation. PCorr indicates the Pearson’s correlation coefficients described by the null of PCorr = 0. Coint refers to the Wald test for the presence of cointegration defined by β1 = β2= β3 = 0. Eq reveals the cointegration equation (long-run elasticities) between cryptocurrency returns and supply shocks (SS) Rjt-i = e+⋅ SS+ t-i + e—⋅SS—t-i. LAsym indicates the Wald test for the null of long-run symmetry defined by — β2/β1 = — β3/β1. SAsym refers to the Wald test for the null of short-run symmetry defined by γi+ = γi—. Lags þ and Lags – show the effect of the cumulative sum of positive and negative changes (respectively) in Bitcoin returns for ()-lags on the rest of relevant cryp- tocurrencies returns. Normally, \*, \*\*, \*\*\* suggest statistical significance at the 10%, 5% and 1% levels, correspondingly. In the event of a small sample size, Narayan (2005) provides the critical values.

**4.3 Testing of Hypothesis**

The first hypothesis says Cryptocurrency have no significant relationship with Stock Market in Nigeria. In Table 2, a negative and statistically significant relationship at 1% level can be observed between changes in stock market and the returns of Bitcoin, Ethereum, XRP, Bitcoin\_sv, Litecoin, EOS, Binance\_coin, Tezos and Cardano. Hence, the null hypothesis is rejected and the alternative is accepted which means that there is a significant relationship between Cryptocurrency and Stock Market

The second hypothesis indicates that There is no significant relationship between Cryptocurrency and Oil Price. Tables 2–4 show that the null hypothesis of no correlation (H0: PCorr 0) is rejected for all cryptocurrencies. However, in Table 3, a positive correlation of at least 20% can be observed between the oil price and all cryptocurrency returns (except for Tether) and, moreover, all cryptocurrencies show a high degree of statistical significance with the oil price.

The third hypothesis shows that there is no significant relationship between Cryptocurrency and Market Fundamentals. Tables 2–4 show that this null hypothesis is not rejected by any cryptocurrency for Exchange rate component. The null hypothesis of no cointegration (H0: β1 = β2 = β3 = 0) is rejected for two cryptocurrencies, Ethereum and Cardano (Table 2); for five crypto- currencies, Ethereum, XRP, Tether, Bitcoin\_sv and Cardano (Table 3) and for three cryptocurrencies, Ethereum, Binance\_coin and Cardano (Table 4). These results indicate a long-run connection between changes in stock market, oil price, exchange rate and those cryptocurrency returns. Hence, the null hypothesis is rejected and the alternative hypothesis is accepted

**4.4 Discussion of Findings**

Asymmetries and cointegration tests between the returns of the top eleven cryptocurrencies (Bitcoin, Ethereum, XRP, Bitcoin Cash, Tether, Bitcoin-SV, Litecoin, EOS, Binance-coin, Tezos, and Cardano) and the three sources of income (stock market, oil price, and exchange rate), respectively, for the entire sample period examined in the current study are shown in Tables 2-4. (November 20, 2019 to June 30, 2021).

The following structure is shown in these tables. The information regarding the Pearson correlation coefficient is found in column 2, and the Wald test, which is used to determine whether cointegration is present, is found in column 3. The equilibrium relationship between changes in the price of oil and returns on cryptocurrencies is represented by the cointegration equation (long-run elasticities) in columns 4 and 5. The Wald test for long-run symmetry is displayed in column 5, and the Wald test for short-run symmetry is displayed in column 6. Finally, column 9 displays the R2 for each cryptocurrency. Columns 7 and 8 present the influence of the cumulative sum of positive and negative changes (respectively) in the components of revenue generation for (1-4) delays on the set of analyzed cryptocurrencies.

First, the Pearson's correlation coefficients reported in the second column of Tables 2-4 demonstrate that all cryptocurrencies, with the exception of Tether, reject the null hypothesis of no correlation (H0: P-Corr 0) for the stock market and oil price components, whereas no cryptocurrency rejects this null hypothesis for the exchange rate component. More specifically, Table 2 shows a negative and statistically significant association between stock market fluctuations and returns for Bitcoin, Ethereum, XRP, Bitcoin-sv, Litecoin, EOS, Binance-coin, Tezos, and Cardano at the 1% level. The statistical significance is 5 percent only for Bitcoin cash. However, Table 3 shows that all cryptocurrency returns (apart from Tether) have positive correlations with the price of oil of at least 20%, and that all cryptocurrencies also exhibit a high level of statistical significance with the oil price. However, Table 4's findings show that the third factor in income generation, exchange rate, has a smaller impact than the other two factors (stock market and oil price).

Second, the Wald F test is used to demonstrate the presence of cointegration in the third column of Tables 2-4. For two cryptocurrencies, Ethereum and Cardano (Table 2), for five cryptocurrencies, Ethereum, XRP, Tether, Bitcoin-sv, and Cardano (Table 3), and for three cryptocurrencies, Ethereum, Binance-coin, and Cardano (Table 4), for the stock market, oil price, and exchange rate, respectively, the null hypothesis of no cointegration (H0: β1 = β2 = β3 = 0) is rejected. These findings suggest a long-term relationship between fluctuations in the stock market, price of oil, exchange rate, and profits on cryptocurrencies. Furthermore, the three components of income generation changes have positive, statistically significant long-run coefficients. Overall, across the whole data period, Ethereum and Cardano exhibit cointegration for the three sources of income (stock market, oil price, and exchange rate).

Third, the fourth column of Tables 2-4 reports the cointegration equation between changes in the three revenue generating components and the returns of the eleven cryptocurrencies. With the exception of Tether in terms of the exchange rate, all cryptocurrency returns react in the same way to both positive and negative changes in the three sources of income. Additionally, Tether has the lowest coefficients across all three income generation components, with all cryptocurrencies showing extremely low coefficients. However, these long-run elasticities are positive and statistically significant for siX cryptocurrencies (Bitcoin, Ethereum, XRP, Bitcoin-sv, Binance-coin, and Cardano) for oil price as well as for five cryptocurrencies (Ethereum, XRP, Litecoin, Binance-coin, and Cardano) for exchange rate. The long-run elasticities for the cumulative sum of positive and negative changes in income generation returns are not statistically significant for any cryptocurrency

Fourth, Tables 2-4's fifth column illustrates the Wald test for evaluating long-run symmetry. The findings produced demonstrate that none of the cryptocurrencies for the three components of the income generating returns refute the null hypothesis of long-run symmetry (H0: β2/β1 - β3/β1). The Wald test concludes that there is no evidence of asymmetric responses of cryptocurrency returns to changes in the stock market, oil price, and exchange rate during the entire data period.

Fifth, the Wald test for short-term symmetry, which is displayed in the sixth column of Tables 2-4, shows that all cryptocurrencies for the price of oil (Table 3) reject the null hypothesis of short-term symmetry (H0: yi+ yI showing positive and highly significant coefficients at the 1% significance level, even though there is no data for Tether. As a result, there is convincing evidence of asymmetric short-run reactions of all cryptocurrency returns to changes in oil price, but there is no support for asymmetric long-run responses. For the stock market and exchange rate, there isn't any information on short-run symmetry, though.

Sixth, the seventh and eighth columns of Tables 2-4 present the impact of the cumulative sum of positive and negative changes in the three components of oil price returns for delays 1 to 4 on the eleven main cryptocurrency returns. Only three cryptocurrencies—Litecoin, Binance Coin, and Cardano—are negatively and statistically significantly impacted by positive changes in the stock market (Table 2) for 2 lags at the 1% significance level, whereas there is no information available for negative effects. Additionally, there is a negative and statistically significant effect for the cumulative sum of positive changes in oil price (Table 3) for Bitcoin sv returns (for 3 lags), while there is a positive and statistically significant effect for the cumulative sum of negative changes in oil price on all eleven cryptocurrency returns (for 3 lags except Tether for 1 lag) (for 1 lag except Litecoin for 4 lags). Additionally, Table 4 shows that the cumulative sum of positive exchange rate changes has just one positive and statistically significant effect on Tezos returns (for one lag) and two negative and statistically significant effects on Bitcoin sv and Tezos returns (for 2 lags). On the other hand, the cumulative aggregate of negative exchange rate fluctuations has a positive and statistically significant impact on the returns of nine out of eleven cryptocurrencies, including Bitcoin, Ethereum, XRP, Bitcoin cash, Litecoin, EOS, Binance coin, Tezos, and Cardano (for 3 lags). The aggregate sum of unfavorable changes in exchange rates has a detrimental and statistically significant impact on Bitcoin returns (for 2 lags). Overall, the impact of only negative changes in oil price and exchange rate on most cryptocurrency returns is highly persistent across the whole data period.

The ninth column of Tables 2-4 displays the nonlinear ARDL model's explanatory capability in detail. The R2 values for the stock market, oil price, and exchange rate during the course of the study period range from 1.87 percent (Bitcoin cash) to 11.13 percent (Tezos), from 7 percent (Bitcoin sv) to 21.07 percent (Tezos), and from 1.47 percent (EOS) to 8.05 percent (Tezos), respectively. In the event of a small sample size, Narayan (2005) provides the critical values.

**CHAPTER FIVE**

**SUMMARY, CONCLUSIONS AND RECOMMENDATION**

**5.0 Introduction**

The primary conclusions and recommendations for the study are summarized in this chapter, along with the chapter's contributions to knowledge and conclusions.

**5.1 Summary of The Study**

This study looks at how the cryptocurrency market is integrated with other markets in Africa, notably Nigeria. Using technology, the global financial system is undoubtedly embracing the present shift from fiat currency to practically virtual currencies. Cryptocurrencies have just begun to emerge as a result of this surge. A subset of digital currencies is cryptocurrency. It is described as a computerized record-keeping system that all traders can access and that uses balances to maintain track of the commitments resulting from trading. Bitcoin (BTC), Litecoin (LTC), Ethereum (ETH), Ripple (XRP), Bitcoin Cash, Neo, Iota, Dash, Qtum, Monero, and Ethereum Classic are a few examples of crypto currencies. According to Bryans (2016), a cryptocurrency is a digital token created by cryptographic algorithms and sent across the internet via peer-to-peer networking protocols. According to Harvey (2015), there are three main problems with the adoption of cryptocurrencies: a history of early illiquidity, excessive volatility, and possibly dubious usage. Since there is no regulatory framework from the apex bank, acceptance of cryptocurrencies into the Nigerian financial industry is growing in popularity but is also accompanied by concerns and skepticism regarding their functionality. Studies like those by Ghazani and Khosravi (2020) and Okorie and Lin (2020) show that crude oil is one of the most important commodities in the world and that it is traded as an underlying asset for a variety of financial instruments on the international financial markets, playing a significant role in the majority of economies. In light of the oil market's potential to develop risk levels akin to macroeconomic news, particularly in the mid-2000s with the financialization of the oil market, Yin et al. (2021) claim that oil market price may appear as a significant source of uncertainty for the cryptocurrency market.

The primary goal of this study is to explore how the cryptocurrency market is integrated with other markets in Africa, notably Nigeria. Data sources entail a variety of tasks, such as information extraction from vast amounts of study materials available in libraries by the researcher conducting the research. Recognizing that there are two basic methods for collecting data (i.e. the primary and secondary sources). On the one hand, the daily returns of eleven prominent cryptocurrencies by market capitalization will make up the data set analyzed in this study. Bitcoin, Ethereum, Tether, BitcoinCash, Bitcoin SV, XRP, Binance, EOS, Tezos, Litecoin, and Stellar are the chosen cryptocurrencies. The information was taken from the coinmarketcap website and relates to the leading cryptocurrencies by market capitalization between June 2021 and December 2021. Contrarily, data on the commodity market covers the period from November 20, 2019, to June 30, 2021, producing a total of 396 daily data observations. The use of judgmental sampling was made. The Shin et al. (2016) nonlinear autoregressive distributed lag (NARDL) model was applied. The well-known ARDL model of Pesaran and Shin (2019) and Pesaran et al. has an asymmetric extension in this case (2016).

Tables 2-4 present the analysis' findings and the results of the asymmetry and cointegration tests between the returns of the top eleven cryptocurrencies (Bitcoin, Ethereum, XRP, Bitcoin Cash, Tether, Bitcoin SV, Litecoin, EOS, Binance coin, Tezos, and Cardano) and the three sources of income (stock market, oil price, and exchange rate), respectively, for the entire sample period (November 20, 2019 to June 30, 2021). First, the Pearson's correlation coefficients reported in the second column of Tables 2-4 demonstrate that all cryptocurrencies, with the exception of Tether, reject the null hypothesis of no correlation (H0: PCorr 0) for the stock market and oil price components, whereas no cryptocurrency rejects this null hypothesis for the exchange rate component. Second, the Wald F test is used to demonstrate the presence of cointegration in the third column of Tables 2-4. For two cryptocurrencies, Ethereum and Cardano (Table 2), for five cryptocurrencies, Ethereum, XRP, Tether, Bitcoin sv, and Cardano (Table 3), and for three cryptocurrencies, Ethereum, Binance coin, and Cardano (Table 4), for the stock market, oil price, and exchange rate, respectively, the null hypothesis of no cointegration (H0: β1 = β2 = β3 = 0) is rejected. These findings suggest a long-term relationship between fluctuations in the stock market, price of oil, exchange rate, and profits on cryptocurrencies. Furthermore, the three components of income generation changes have positive, statistically significant long-run coefficients.

Third, the fourth column of Tables 2-4 reports the cointegration equation between changes in the three revenue generating components and the returns of the eleven cryptocurrencies. With the exception of Tether in terms of the exchange rate, all cryptocurrency returns react in the same way to both positive and negative changes in the three sources of income. Additionally, Tether has the lowest coefficients across all three income generation components, with all cryptocurrencies showing extremely low coefficients. Fourth, Tables 2-4's fifth column illustrates the Wald test for evaluating long-run symmetry. The findings produced demonstrate that none of the cryptocurrencies for the three components of the income generating returns refute the null hypothesis of long-run symmetry (H0: β2/β1 - β3/β1). The Wald test concludes that there is no evidence of asymmetric responses of cryptocurrency returns to changes in the stock market, oil price, and exchange rate during the entire data period.

Additionally, the Wald test for short-term symmetry, which is displayed in the sixth column of Tables 2-4, shows that all cryptocurrencies for the price of oil reject the null hypothesis of short-term symmetry (H0: yi+ yI showing positive and highly significant coefficients at the 1% significance level, even though there is no data for Tether. As a result, there is convincing evidence of asymmetric short-run reactions of all cryptocurrency returns to changes in oil price, but there is no support for asymmetric long-run responses. For the stock market and exchange rate, there isn't any information on short-run symmetry, though. The seventh and eighth columns of Tables 2-4 report the impact of the cumulative sum of positive and negative changes in the three components of oil price returns for lags 1 to 4 on the eleven top cryptocurrency returns. The ninth column of Tables 2-4 displays the nonlinear ARDL model's explanatory power. In the entire study period, the R2 values for the stock market, oil price, and exchange rate range from 1.47 percent (EOS) to 8.05 percent (Tezos), from 1.87 percent (Bitcoin cash) to 11.13 percent (Tezos), respectively.

**5.2 Conclusion**

Since the NARDL model explains more than 56 percent, 61 percent, and 26 percent of the top cryptocurrency returns with stock market, oil price, and exchange rate, respectively, our results demonstrate a higher degree of interconnection between the three income generation variables and cryptocurrency returns in times of crisis. The results are stronger in volatile market situations, which is consistent with what has previously been established in much of the financial literature.

The following are the key conclusions of this essay. First, for the whole sample period, there is a strong, positive, and statistically significant association between oil prices and all of the top cryptocurrencies, with the exception of Tether. Additionally, all of the studied cryptocurrencies, with the exception of Tether, have a negative and statistically significant link with the stock market during the full time frame. However, there is no proof that exchange rates and cryptocurrencies are related. Second, most bitcoin returns and changes in the chosen income production have a favorable long-term relationship, or cointegration (in each of its components). Cointegration is only seen for a small subset of cryptocurrencies, though. Third, with very few exceptions, the cointegration equation shows that cryptocurrency returns typically react equally to changes in selected income generating returns, both positive and negative. Additionally, for all cryptocurrencies, the long-run elasticities for the total sum of positive and negative changes in oil prices are statistically significant.

Tether also reacts the least to modifications in the 3sources of revenue creation revenues over all time cycles, both positively and negatively. Fourth, the long-term effects of various income generation components on the examined cryptocurrency returns for the time periods taken are not shown to be asymmetrical. Furthermore, it was discovered that a statistically significant relationship between the cumulative sum of revenue generating components changes and cryptocurrency returns for lags of one to four. This relationship is particularly pertinent for oil price across all periods. To be more precise, the oil price component consistently demonstrates the highest explanatory power across all times within this range of R2 values, and Tezos consistently exhibits the highest R2 as previously noted. As a result, it can be said that the findings provided by the NARDL approach chosen for this study are completely appropriate given that they confirm the likelihood that the pattern of dependency between financial variables will change in response to the market's economic conditions.

**5.3 Recommendation**

* Tether merits special consideration. Since Tether is the cryptocurrency that is least linked to the three sources of revenue generation returns, it might be employed in diversification plans or even serve as a haven for investors.
* The currency's abolition would be viewed as irrational and unbecoming of a nation that aims to encourage local innovation.
* Governments and decision-makers need to be aware of the enormous effects that shifting sources of income, particularly the price of oil and stock market, may have on the stability of the cryptocurrency market.
* Future study should be urged to do a thorough assessment of the functions that cryptocurrencies can play as a hedge, a safe haven, or a diversifier versus other conventional assets.

**5.4 Contribution to Knowledge**

Both investors and policymakers should take note of the study's conclusions. On the one hand, as was previously mentioned, investors and portfolio managers have a helpful avenue for risk diversification because Tether and the income production component have less of a link with one another than other cryptocurrencies. On the other hand, given that cryptocurrencies are becoming increasingly popular across the globe, governments and policy makers should be aware of the significant impact that changes in the income generation component (particularly the oil price and stock market) may have on the stability of the cryptocurrency market. Furthermore, it is crucial to consider the probability of enduring disruptions in the sources of changes in the components of revenue formation. Last but not least, some future research directions may involve conducting a thorough investigation of the roles that cryptocurrencies can play as a diversifier, a hedge, or a safe haven against other traditional assets, with the aim of enhancing the body of financial literature.

**5.5 Limitation of Study**

**1.** The study scope only focuses on eleven cryptocurrency within the period of two years.

**2.** The study adopted the use of only secondary data.

**5.6 Suggestion for Further Studies**

1. The researcher can add more cryptocurrencies into the scope of the study to make the work more comprehensive

2. The research can adopt both the use of primary and secondary data in order to compare both data and get a reliable data

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