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THE IMPACT OF CRYPTO CURRENCY ON ECONOMIC GROWTH OF AFRICAN COUNTRIES

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ABSTRACT

This study assessed the impact of crypto currency on economic growth in Africa. Specifically, the study determined the effect of Bitcoin on economic growth of selected African countries; assessed the relationship between Ethereum and economic growth of selected African countries and examined the impact of Binance Coin on economic growth of selected African countries. Secondary panel data spanning five (5) years (2016-2021) was gathered for five (5) African counties cutting across all regions in Africa. Data gathered was estimated using descriptive statistics, correlation analysis; pooled OLS estimation, fixed and random effect analysis. Discoveries from the study revealed that Bitcoin exert negative significant impact economic growth of developing African counties proxied with gross domestic product growth rate with reported coefficient estimate of -.00001 ($p=0.011<0.05$); Ethereum exert positive and significant impact on economic growth of developing African counties with coefficient estimate of -.00051 ($p=0.34<0.05$); and Binance coin exert significant negative impact on Africa economic growth of developing African counties with coefficient estimate of -.0011 ($p=0.027<0.05$). Premised on these findings, the study suggested that government across African countries in conjunction with regulatory agencies in the country should regulate the adoption of crypto currency; government of African countries in considering the regulation of Bitcoin should deploy measures to protect its users from the high volatility and vulnerability of the currency to criminal activities in Africa and government through its parastatals in African countries should continuously disclaim and prevent individuals and businesses from adopting crypto currencies.

Keywords: Economic Growth, Bitcoin, Ethereum, Binance Coin, Africa.

1.0 INTRODUCTION

Cryptocurrency has across nations of the globe remained an issue that has attracted severe debate; no doubt 21st century ushered in numerous development as well as changes especially in financial technologies, but block chain which birthed cryptocurrency has remained the most debatable issue (Sakiz & Gencer. 2019). It is quite clear that across developed and most developing economies, oil has almost been relegated as an important commodity because data has taken charge. In fact, smartphone and the World Wide Web have increased the abundance, recognition and ubiquity of data. Modern algorithms are now harnessed to predict when a customer would buy a car or when a car requires servicing and even when a prison is likely to be attacked by some disease (Sakiz & Gencer. 2019). Albeit, artificial intelligence methods tend to collect more valuable data, convert same into valuable knowledge which technology entrepreneurs explore to improve their processes which have in recent time increase their effectuality as well as guaranty prosperity for these entities which guarantees increase in the growth of the economy (Pradhan & Rudra, 2015). Prior to the achievement of the ultimate goal – economic growth, the sharing of this knowledge often require a decentralized, autonomous system with the capacity to cause fair sharing of this knowledge amongst individuals and corporations across countries of the world; block chain technology provides that system, the system describes a decentralized technology which adopts a shared ledger system (Sakiz & Gencer, 2019).

Technologies has in recent time increased opportunities available to individuals, government and corporate firms on open sources especially with the advent of several digital platforms and services (Lindman, Rossi & Tuunainen, 2017) Open source describes any programme whose source code is made available and open source software are usually created through concerted public effort and are usually freely provided (Sakiz & Gencer, 2019). More often, recent technologies draws the attention of numerous developers in the IT industry; this is noticed in the case of block chain as it is considered one of the most significant innovations. Block chain environment refers to a fully decentralized system for cryptographically capturing and maintaining an unchangeable, static and linear lo of transactions between networked users. The system describes a distributed ledger that is maintained with the consent of parties involved, secured, improved and updated by the parties involved in every transaction within the network (Risius & Shoprere, 2017). Similarly, block chain systems does not concern only monetary transactions as it also aid the processing of transactions with established programme rules in the form of smart contracts which gives parties the confidence to cause mutual transactions without the intrusion of a third party; a perfect example of this system is crypt currency (Tschorsch & Scheuermann, 2016).

Crypto currency which is noted as a digital currency that harnessed cryptography as security is a method of exchange that is created towards aiding the exchange of digital data through a series of actions that uses the crypto currency idea; in few words, crypto currency is a digital currency that is created in the block chain technology (Utomo, 2018). Crypto currencies which are built in the block chain technology are completely impossible to counterfeit due to the height of security features of the system. These currencies can be used as store of value, means of exchange and asset as they service the same functions as money; although, different from money crypto currencies has no real evidence as they are saved only in data. The adoption of crypto currency has been on the increase at the global level as institutions such as Citibank have created their crypto currency due to its significance particularly as a means of exchange of physical asset (Mazikana, 2019). He further asserted that money supply in the developed and emerging economies is now takes digital form and are often in crypto currencies which present bigger opportunities for socioeconomic inclusiveness with relatively high financial security.

Even though the recent increase in the value of crypt currencies particularly Bitcoin further enhanced the significance of electronic money and most importantly block chain technology in nations round the globe (Stancel, 2015). But since crypto currency does not have any physical evidence, the digital crypto currency balance could be lost on the device being used to store basic information about a certain coin especially if the backup copy of the information does not exist; this follows the fact that prices of the currency are premised on supply and demand and the rate at which the digital currency is exchanged remains very volatile. Based on this peculiarity, the technology may aggravate inflation, reduce investment in the real economy which may drag down level of labour and capital needed to improve economic growth as postulated in Solow growth theory (Utomo, 2018).

The acknowledgement of block chain technology which is evident in the acceptance of crypto currency in the financial sector of some countries in Africa has due to its peculiarity out a feeling of fear in government, corporate firms and individuals about the acceptance due to the fact that the admission of crypto currency has not been approved and recognized in the regulatory framework of the Central Bank of most African states (Ahannaya, Oshinowo, Sanni, Arogundade & Ogunwole, 2021). Surprisingly, the attention of some Central Banks in Africa has been drawn to the deployment of regulatory actions which is evident in the case of Central Bank of Nigeria which has per time restricted Nigerians from associating themselves with crypto currency as it is utterly rejected in the country due to its increased volatility; that which may constrain the growth of the economy of the country as obtained in other African nations. Albeit, notwithstanding the restrictions of most African Central Banks, the use of block chain technology and most importantly the use of crypto currencies (Bitcoin, Ethereum, Binance etc) to access foreign has been on the increase over time especially when the value of these currencies are on the rise; the rejection of crypto currency by most authorities follows the notion that its elimination would guarantee increase in domestic investment and consequently boosts economic growth of African countries (Ahannaya *et al.*, 2021).

The basic issue with the acceptance of crypto currency is due to the track record of increased volatility, illiquidity and doubt about the used cases of most coins (Mazikana, 2019). Similarly, policy makers and politicians have persistently maintained that criminals harness the technology wrongly to cause immoral and unethical issues that communicate adverse signs to other countries around the globe (Agbo & Nwadialor, 2020). Other critics of the use of crypto currency posited that the adoption of the currency should not be acknowledged as they are uncontrollably volatile and are increasingly used for money laundering; they further asserted that crypto currency records are full contradictions which increase the doubt about its usage as legal tender (Raffelini, 2018). Despite these criticisms, the technology still improve the transfer of funds between two or more parties thus aiding effective transaction with the use of secured private codes; such funds are successfully transacted with relatively low transaction fees which has improved its usage notwithstanding its adverse implications which hold grave implications for the growth of African counties if not properly controlled. However, the increased usage of the technology has shoot up market capitalization of these coins particularly Bitcoin, Ethereum and Binance which has increased per time thereby making the crypto currency market highly powerful and robust; this has frustrated efforts by regulatory agencies across countries in Africa over the restriction of these coins (Bryman, 2014).

Although few studies that exists across developed countries and developing countries indicates that crypto currency is noticeable causal factor for economic prosperity (Ahannaya, Oshinowo, Sanni, Arogundade & Ogunwole, 2021, Enitan & Akadiri, 2020; Agbo & Nwadialor, 2020; Polasik, Piotrowska, Wisniewski & Lightfoot, 2019; Alo & Ishola, 2019; Salawu & Moloi, 2018; Utomo, 2018; Naboulsi & Neubert, 2018). However, the researcher observed that most studies adopted content analysis and descriptive analysis including frequency counts and percentage (Enitan & Akadiri, 2020; Agbo & Nwadialor, 2020; Sakiz & Gencer, 2019; Alo & Ishola, 2019; Danho & Habte, 2019; Jepkoech & Shibwabo, 2019; Ebelogu, Oriahki, Ojo & Agu, 2019; Salawu & Moloi, 2018; Naboulsi & Neubert, 2018; Witeld & Tomasz, 2015), the basic weakness of the content analysis and descriptive analysis including frequency counts and percentage is that in most cases their results cannot be generalized, hence giving potential users a relatively reduced confidence in the estimation. However, very limited studies established the specific relationship between crypto currency/block chain technology and economic growth using econometric methods (Ahannaya, Oshinowo, Sanni, Arogundade & Ogunwole, 2021; Polasik, Piotrowska, Wisniewski & Lightfoot, 2019; Utomo, 2018) while no study has established the country specific effect of crypto currency and economic growth in Africa. It is based on this premise that this study intends to evaluate the impact of crypto currency on economic growth in Africa.

2.0 LITERATURE REVIEW

Block chain Technology

Blockchain can be described as “the trust machine” indicating that it takes care of trust issues between individuals (Sakiz & Gencer, 2019). It is an open source ledger that is visible to users across the network brings a level of security that is unmatched. Blockchain puts the trust in its users and their ability to maintain the ledger. In other words, blockchain technology built economic system runs without people, thus making a transaction “trust-free”. This technology provides a viable alternative to eliminate middle-mans, thereby lowering operational costs and increasing the efficiency of a sharing service. Blockchain is a platform where people are allowed to carry out transactions of all sorts without the need for a central or trusted arbitrator. With blockchain technology, the world’s most fundamental commercial interactions can be re-imagined. That causes many opportunities to invent new styles of digital interactions in trust-free sharing services (Sun, Yan & Zhang, 2016).

Cryptocurrencies

According to Trautman (2014), cryptocurrencies are a subset of digital currencies, which may either have centralized institutions or are based on a decentralized network (Trautman 2014). Bryans (2014) is of the idea that, for a centralized currency scheme, the digital currency is issued by one institution, which ensures that the digital coins can be exchanged back to fiat currencies or can be used to buy and sell digital goods. One example for this centralized digital currency is

the Linden Dollar, issued by Linden Lab, which can be used in the online virtual world Second Life. It shares some characteristics with fiat currencies. Like in the traditional money system, a central institution serves as a source of trust.

However according to Karlstrom (2014), decentralized currency schemes try to avoid central institutions as much as possible and are built on a network of transaction partners As long as the transaction partners can observe each other, they can build up trust based on their behaviors. If observation of the transaction partners is not possible, other mechanisms have to be found to establish reliable transactions. One solution lies in cryptocurrencies, which are decentralized currency schemes based on cryptography.

The Status and Regulation of Cryptocurrency in Nigeria

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

Following this, the Nigerian Deposit Insurance Corporation (the NDIC) warned Nigerians that they would not be afforded consumer protection or insurance from the NDIC when trading in cryptocurrencies as virtual currencies have not been issued by the Central Bank of Nigeria. The NDIC stated further that "[n]o central bank will accept digital currency as a substitute for its national currency or part of its monetary system, when it is not able to control it." In the later part of 2017, the Deputy Director of the CBN disclosed the CBN's inability to control or regulate bitcoin and blockchain. The Central bank block chain, in spite of this comment, the Deputy Director announced that the CBN had "taken measures to create four departments in the institution that were making effort to harmonize a white paper on Crypto currency.

In January 2018, the Governor of the CBN likened the cryptocurrency or bitcoin to a gamble and asserted that the CBN was not capable of giving support to situations where people would risk their savings to gamble. The CBN Governor stated further that the CBN might later, make some very concrete pronouncements with regard to the direction of the regulation of cryptocurrency. The Nigerian Senate subsequently launched an investigation into the viability of bitcoin as a type of investment. Also, a circular was reportedly released by the CBN prohibiting the trading of cryptocurrencies by financial institutions in Nigeria. Expectedly, a violation by the financial institutions of this circular would result in sanctions by the Central Bank of Nigeria.

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

Crypto currency and Economic Growth

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

surveyed by the Law Library of Congress in 2019 have categorized cryptocurrencies differently for tax purposes, as demonstrated by the following examples:

Israel → taxed as asset

Bulgaria` → taxed as financial asset

Switzerland → taxed as foreign currency

Argentina & Spain → subject to income tax

Denmark → subject to income tax and losses are deductible

United Kingdom: → corporations pay corporate tax, unincorporated businesses pay income tax, individuals pay capital gains tax

It is mainly as a result of a 2015 decision of the European Court of Justice that gains in cryptocurrency investments started to be exempted from value added taxation in the European Union(Law Library of Congress, The United States(U.S.) Inland Revenue Service considers cryptocurrency as a virtual currency and therefore classifies it as an asset. Under U.S. financial law, such property is largely subject to capital asset taxation (Mazikana, 2019). Already there exists an entire industry which is built around cryptocurrencies. It is held by institutions dedicated to supervising all the digital coin exchanges that are taking place throughout the world. The early adopters of cryptocurrency, particularly bitcoin, that became rich overnight and found opportunities to grow financially attest to the rate at which the industry is growing and how it attracts foreign investment thereby boosting economic growth.

3.0 METHODOLOGY

This study modified the model of Ahannaya, Oshinowo, Sanni, Arogundade and Ogunwole (2021) which assessed the effect of crypto-currencies on Nigeria economy. The model of Ahannaya *et al* (2021) is stated below:

$Y = f(X)$

$CCit = \alpha_1 + \beta_1 NE_{it} + \mu_1$ ……..…….. 3.1

Where:

Y = Cryptocurrency (CC)

X = Nigeria Economy (N.E.)

α_1 is the intercepts (constants)

β_1 is the coefficient

μ_1 are the stochastic variables of each model.

it represents infirm "i" in year "t"

The model Ahannaya *et al* (2021) is modified to cover the primary crypto currencies that have had used cases in the economy of most African countries. More importantly, the modified model would track the most likely country specific effect and time specific effect of crypto currency and economic growth of African countries. The modified model is shown below for simplicity:

Pooled OLS Model

GDP = f (BTC, ETH, BNC, U_t)……..……...….3.3

$GDP_{it} = \delta_0 + \delta_1 BTC_{it} + \delta_2 ETH_{it} + \delta_3 BNC_{it} + \mu_{it}$ ……..……..……..…….…..3.4

Least Square Dummy Variable (LSDV) Fixed Effect Model

$GDP_{it} = \alpha_0 + \alpha_1 D_{2(NIGERIA)} + \alpha_2 D_{3(EGYPT)} + \alpha_3 D_{4(KENYA)} + \alpha_4 D_{5(SOUTH\ AFRICA)} + \alpha_5 D_{6(CAMEROON)} + \beta_1 BTC_{it} + \beta_2 ETH_{it} + \beta_3 BNC_{it} +$
μ_{it}…..……..…..3.5

Random Effect Model

$GDP_{it} = \gamma_0 + \gamma_1 BTC_{it} + \gamma_2 ETH_{it} + \gamma_3 BNC_{it} + \epsilon_i$……..……..……..3.6

Variables Description

GDP = Gross Domestic Product

BTC = Bitcoin

ETH = Ethereum

BNC = Binance Coin

U_t = Stochastic Error Term

δ0, δ1, δ2, δ3, δ4 are parameter estimates corresponding to constants term, Binance Coin, Bitcoin and Ethereum respectively.

Sources of Data and Estimation Techniques

This study will sample five (5) African countries on the basis of relatively higher Gross Domestic Product and from each region in Africa - West Africa - Nigeria, North Africa - Egypt, East Africa - Kenya, South Africa - South Africa and Central Africa - Cameroon;. Data sets were gleaned from the World Bank Development Indicators and Binance crypto currency website over a period of six (6) years (2015-2021). Descriptive and panel estimation methods was employed; the descriptive analysis will demonstrate the measure of central location and measure of dispersion, normality status, skewness, kurtosis of all the variables included in the model of the study. However, as the study intends to adopt fixed effect analysis and random effect analysis of panel statistical estimations; it will conduct pooled ordinary least square (OLS) regression analysis (random effect, fixed time specific and firm specific effect) and other post estimation tests.

4.0 RESULTS AND DISCUSSION

Descriptive Analysis of Variables

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPgr	30	3.4896	2.2014	-1.62	6.32
BTC	30	5561.163	5015.176	430.57	14156.4
ETH	30	230.7467	262.8438	.93	756.73
BNC	30	617.5033	861.0455	8.64	2533.01

Sources: *Author's Computation, (2023)*

Descriptive statistics reported in table 4.1 revealed that the mean gross domestic product growth rate, bitcoin, Ethereum and Binance coin for 2016-2021 across five developing countries in Africa sampled in the study stood at: 3.4896, 5561.163 dollars, 230.7467 dollars and 617.5033 respectively. Reported minimum and maximum values stood at: -1.62 percent and 6.32 percent for gross domestic product growth rate, 430.57 dollars and 14156.4 dollars for Bitcoin, .93 dollars and 756.73 dollars for Ethereum, 8.64 dollars and 2533.01 for dollars for Binance coin respectively.

Correlation Analysis

Table 4.2 Correlation Matrix

	GDPgr	**BTC**	**ETH**	**BNC**
GDPgr	1.0000			
BTC	-0.0178	1.0000		
ETH	-0.0384	0.9600	1.0000	
BNC	-0.0814	0.7932	0.9187	1.0000

Sources: *Author's Computation, (2023)*

Table 4.2 reported correlation between variables used in the study. From the table it can be observed that there is strong negative correlation between pairs of variables. Result showed strong correlation between pairs of variables with specific correlation coefficient of -0.0178 for gross domestic growth rate and Bitcoin, -0.0384 for gross domestic growth rate and Ethereum, -0.0814 for gross domestic growth rate and Binance Coin, 0.9600 for Bitcoin and Ethereum, 0.7932 for Bitcoin and Binance Coin and 0.9187 for Ethereum and Binance Coin. Observably result reflects that the correlations between pairs of variables are relatively strong.

Pooled OLS Estimation

Table 4.3: Pooled OLS Parameter Estimates

Series: *GDPgr BTC, ETH, BNC*

Variable	Coefficient	Standard Error	T-Test Values	Probability
C	3.6054	.0050	-0.22	0.000
BTC	-.0001	.0150	0.34	0.026
ETH	.0051	.0020	-0.54	0.034
BNC	-.0011	.7597	4.75	0.097

R-square=0. 7170

Adjusted R-square=0. 6964

F-statistics=0.15
Prob(F-stat) = 0.9289

Pooled OLS panel estimation presented in table 4.3 reported coefficient estimate of -.0001, .0051 and -.0011 for Bitcoin, Ethereum and Binance Coin with the probability values of 0.026, 0.034 and 0.097 respectively. The result showed that Bitcoin exert negative significant impact on gross domestic product growth rate of the sampled developing countries in Africa, Ethereum exerts positive significant impact on gross domestic product growth rate and Binance coin exerts positive insignificant impact on gross domestic product growth rate. R-square value reported in table 4.3 above revealed that about 69% of the systematic variation in the growth of the selected developing countries in Africa measured in terms of gross domestic product growth rate can be explained by dynamics of the cryptocurrency market measured with Bitcoin, Ethereum and Binance Coin. Reported f-statistics of 0.15 and the probability value of 0.9289 validate the fact that all the included explanatory variables jointly and significantly influence the growth of developing African countries sampled in the study.

Fixed Effect Panel Analysis

Table 4.4 Fixed Effects Estimates (Cross Sectional and Period Specific)

COUNTRY SPECIFIC EFFECT			TIME SPECIFIC EFFECT		
Variables	**Coefficients**	**Prob**	**Variables**	**Coefficients**	**Prob**
C	1.5874	0.004	C	3.7371	0.005
BTC	-.0001	0.011	BTC	.0004	0.029
ETH	.00051	0.034	ETH	-.0190	0.053
BNC	-.0011	0.027	BNC	.0036	0.016
Effects			**Effects**		
CAMEROON	3.1133	0.000	2017	-2.6155	0.058
KENYA	4.19	0.000	2018	-2.2278	0.057
EGYPT	3.4716	0.000	2019	.0607	0.055
SOUTH AFRICA	-.685	0.245	2020	-.1106	0.043
			2021	.2326	0.000
R-square=0.8456			R-square=0.7269		
Adjusted R-square=0.7965			Adjusted R-square=0.6759		
F-statistics=17.21			F-statistics=0.13		
Prob(F-stat)= 0.0000			Prob(F-stat)= 0.9833		

Sources: *Author's Computation, (2023)*

Table 4.4 presents results of the fixed effect estimation (cross-sectional and period specific effect). Notably result presented in table 4.4 showed that when cross sectional effect is incorporated into the model the impact of Bitcoin is positive and significant, impact of Ethereum on gross domestic product growth rate is negative and significant while the impact of Binance Coin is negative and significant. On another hand, when period specific effect was incorporated into the model, the impact of Bitcoin turned positive and significant, Ethereum turned negative and significant, and Binance Coin turned positive and significant impact on gross domestic product growth rate of developing countries in Africa.

Deviation intercept terms reported in table 4.4 stood at 3.1133 (0.000) for Cameroon, 4.19 (0.000) for Kenya, 3.4716 (0. 000) for Egypt and -.685 (0.245) for South Africa respectively with the intercept term of the reference country being Nigeria recorded to be 1.5874 (0.004). Deviation intercept terms for period effects stood at -2.6155 (0.058), -2.2278 (0.057), .0607 (0.055), -.1106 (0.043) and .2326 (0.000) for 2017, 2018, 2019, 2020 and 2021 respectively, with intercept term of reference year being 2016 recorded to be 3.7371 (0.005). Reported R-square values stood at 0.8456 for cross section specific estimation and 0.7269 for period specific estimation, reflecting that about 84% of the systematic variation in gross domestic product growth rate can be explained by the crypto currency market measured with the

values of three major coins per time - Bitcoin, Ethereum and Binance Coin when heterogeneity effect across countries is incorporated into the model, while 72% of the systematic variation can be explained when period heterogeneity effect is incorporated into the model.

Random Effect Analysis

Table 4.5 Random Effect Estimation

Series: *GDPgr BTC, ETH, BNC*

Variable	Coefficient	Standard Error	Z-Test Values	Probability
C	3.6054	.0002	-0.52	0.006
BTC	-.0001	.0065	0.80	0.025
ETH	.0051	.0008	-1.24	0.013
BNC	-.0011	1.0221	3.53	0.000

R-square=0.6170

Wald $chi^2(4)= 2.42$

Prob> $chi^2 = 0.4900$

Table 4.5 presents the random effect estimates. Result showed that the effect of Bitcoin, Ethereum and Binance Coin on the gross domestic product growth rate of developing African countries is positive and insignificant when heterogeneity effect is incorporated into the error term of the model. Meanwhile, Bitcoin exerts negative and significant impact on gross domestic product growth rate. Also, the impact of Etheeum on the gross domestic product growth rate when heterogeneity is incorporated into the error term is positive and significant. Furthermore, Binance Coin exert negative significant impact on the gross domestic product growth rate of developing countries in Africa when heterogeneity effect is integrated into the error term. Specifically, coefficient estimates reported for Bitcoin, Ethereum and Binance Coin stood at -.0001, .0051 and -.0011 with probability values of 0.025, 0.013 and 0.000 respectively. R-square statistics reported in table 4.5 stood at about 0.6170 which connote that about 61% of the systematic change in gross domestic product growth rate of developing African countries sampled in the study can be explained jointly by variation in the cryptocurrency market incorporating heterogeneity effect across developing African countries over time into the error term.

Post Estimation Test

Table 4.6 Restricted F Test of Heterogeneity (Cross-Sectional and Time Specific)

	F-statistics	Probability
Cross sectional	29.51	0.000
Time specific	0.12	0.885

Source: *Author's Computation, (2023)*

Table 4.6 reveals result of the heterogeneity test conducted with respects to both cross-sectional and period specific effect. Reported in table 4.6 are f-statistics values of 29.51 and 0.000 with probability values of 0.12 and 0.885 for cross sectional and period specific effect respectively. Hence the table shows that there is enough evidence to reject the null hypothesis that all differential intercept corresponding to the cross-sectional specific units are equal to zero, but otherwise for the period specific intercepts. Therefore, it can be concluded that there is only cross-sectional heterogeneity/uniqueness effect among the selected developing African countries.

Hausman Test

Table 4.7 Hausman Test

Null hypothesis	Chi-square stat	Probability
Difference in coefficient not systematic	23.21	0.0437

Source: *Author's Computation, (2023)*

Table 4.7 reveals a chi-square value of 23.21 alongside a probability value of 0.0437. The result shows that there is enough evidence to reject the null hypothesis that differences in coefficients of fixed effect estimator and random effect estimation is not systematic; that is the fixed effect estimates is efficient and effective to be adopted as a basis of discussion for this study. Therefore, given the fact the difference between fixed effect estimates and random effect estimates is significant, the most consistent and efficient estimation for the investigation conducted in the study is the fixed effect country specific estimate presented in table 4.4 above.

Table 4.8 Other Post Estimation Test

Wald test		
Null hypothesis	**Statistics**	**Probability**
Panel homoscedasticity	2.42	0.4900
Pesaran test		
Null hypothesis	**Statistics**	**Probability**
No cross-sectional dependence	1.493	0.1355
Breusch-Pagan Lagrange Multiplier test		
Null hypothesis	**Statistics**	**Probability**
Panel Normality	0.69	0.4055

Source: *Author's Computation (2023)*

Table 4.8 reported result of post estimation test conducted to confirm if the specified model is in turn with basic assumptions underlining the panel estimation conducted in the study. The result showed that there is no evidence to reject the null hypothesis on panel homoscedasticity and null hypothesis of no cross-sectional dependence and accept the hypothesis of panel normality. Hence, the established result of post estimation test reported in table 4.8 validates assumptions of equal variance of residual terms, cross sectional independence and normality of the model. Which reflect that the model is fit for inferential analysis.

Discussion of Findings

Estimation conducted in the bid to assess the impact of crypto currency on economic growth of developing African counties demonstrates that Bitcoin exerts negative and significant impact on economic growth of African countries which suggests that as Bitcoin falls, economic growth of African countries are most likely to increase. Bitcoin as the leading crypto currency and a decentralized digital currency has existed in the economy of most African countries over the years and has been adopted to successfully carryout several transactions including the sale of properties, items and settlement of debts between two or more parties without any hitch; in fact, the adoption of bitcoin as a legal tender in selected transactions in countries around the globe caused the avoidance of unnecessary charges that are unavoidable if local currencies were used to facilitate these transactions. However, the currency served more as store of wealth for individuals which constrained the flow of economic resources in African economy particularly when the crypto currency remained on the low. Recently, the value of the currency increased uncontrollably, households and business units of economies in Africa experienced massive financial boost which occasioned increased acceptance of the coin

and prosperity for individuals and business corporations but yet did not culminate into significant growth of country's economy in Africa.

Again, Ethereum was ascertained to exert positive significant impact on the growth of African countries thereby implying that as the stock of Ethereum increases in Africa, economic growth of African countries also increases. Crypto currencies especially Ethereum has been harnessed per time by individuals and internet fraudsters for money laundering considering the relatively low involvement and regulatory role of the government in most African economies; shockingly, the coin has been severally used to smuggle drugs through an online marketplace called Silk Road. Again, the Ethereum block chain was hacked and over 50 million dollars was lost, this attempt was particularly targeted at people that possesses large stock of crypto currency; even though the accumulation of wealth on a digital currency that has not been accepted in the country limits the flow of economic resources and cause the circular flow of income to be ineffective, the risk involved in saving this coin is also on the increase and poses critical and adverse effect on the liquidity of businesses and households and ultimately drags down the growth of the economy.

Lastly, Binance Coin was determined to exert negative and significant impact on economic growth of African countries thereby implying that as the stock of Binance Coin reduces in Africa, economic growth tends to shoot up. The economy of most countries in Africa has remained highly volatile hence requiring physical investments that would cause the gross domestic product to increase on an ongoing basis instead of business, individuals and households stocking economic resources on crypto currencies that could remain static for a long while e.g., Binance Coin. Such investment if adopted would not cause the productiveness of several sectors especially manufacturing sector in African economies thereby constraining exports; rather when such currency increases massively in value, money supply in the economy of African countries increases thereby causing increased inflation which consequently drags down the economic growth of African countries.

5.0 CONCLUSION AND RECOMMENDATIONS

Crypto currency across nations of the world have pulled various events that spelt economic prosperity and otherwise for African economies, hence its adoption by African countries have not been total considering its adversities that is particularly evidenced in developing economies. Howbeit, its significance and potency in occasioning economic growth still remains bleak; in fact, from analytical results carried out in the study, it is evident that the crypto currency has no significant relationship with economic growth in Africa. This study specifically established that Bitcoin exert negative significant impact on economic growth of developing African countries proxied with gross domestic product growth rate; Ethereum exert positive and significant impact on economic growth of developing African counties and Binance coin exert significant negative significant impact on economic growth of African countries. Hence, this study concludes that crypto currency does not noticeably improve the economic growth of African countries. Premise on the findings drawn from the analysis alongside the conclusions the study therefore outlined some compatible recommendations:

(i) Government across African countries in conjunction with regulatory agencies in the country should regulate the adoption of cryptocurrency as it has not proved leverage-able for sustainable growth in Africa.

(ii) Government of African countries in considering the regulation of Bitcoin should deploy measures to protect its users from the high volatility and vulnerability of the currency to criminal activities in Africa; this is towards averting unexpected reduction in investors wealth which adversely affects the growth of African economy.

(iii) Government through its parastatals in African countries should continuously disclaim and prevent individuals and businesses from adopting crypto currencies especially alternative coins that have not been consistently used hence exposing users to massive risk; this would reduce the risk exposure of investors and save economic resources for productive use which would encourage economic growth.

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