DIGITAL CURRENCY AS A CATALYST FOR FINANCIAL INCLUSION: EVIDENCE FROM AN EMERGING ECONOMY

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ABSTRACT

This research explores how digital currency affects financial inclusion in Nigeria. focusing on three key indicators: mobile money penetration, digital wallet usage, and the volume of cryptocurrency transactions. As emerging economies increasingly embrace digital innovations, understanding the extent to which these technological advancements influence access to financial services is crucial for policy formulation and inclusive economic development. An Ordinary Least Squares (OLS) regression model was employed to empirically examine the relationships between these variables. Monthly data spanning from January 2018 to August 2024, comprising 80 observations, was sourced from secondary datasets. Based on the regression analysis, the model produced an R-squared value of 0.760293, indicating that approximately 76% of the variation in financial inclusion is explained by the selected digital currency variables. The outcome of the findings reveals that Mobile Money Penetration (MMP) has a weak but statistically significant positive effect on financial inclusion, with a coefficient of 0.044 at the 10% significance level. Digital wallet usage (DWU) has coefficient of 0.290294 at the 10% significance level indicating a strong and statistically significant positive relationship with Financial Inclusion. Furthermore, the Volume of Cryptocurrency Transactions (VCT) showed a statistically significant positive impact at the 5% level, with a coefficient of 0.075688, suggesting a 7.5% increase in financial inclusion for every unit rise in crypto transactions. The Durbin-Watson statistic of 1.925411 confirmed the absence of autocorrelation, validating the robustness of the model. These results collectively affirm the transformative role of digital currency tools in advancing financial inclusion in Nigeria. Although cryptocurrency transactions are still evolving within the Nigerian regulatory framework, their rising volume indicates a growing public interest and potential to drive broader financial engagement. The study concludes that digital currencies, when effectively regulated and supported by infrastructure, can serve as powerful tools for bridging the financial divide and fostering inclusive growth. Policy recommendations are made to strengthen digital infrastructure, enhance public awareness.

Keywords: *Digital Currency, Financial Inclusion*

Jel code: C10, C51, G21

1.1 INTRODUCTION

The global financial system is embracing the recent technological transition that has led to a near virtualization of real cash. The rise of cryptocurrency has been triggered by this wave. The rise of cryptocurrencies has signaled the beginning of a new era in financial innovation, upending established banking structures and changing how we view and interact with money. The legal implications and disruptive possibilities of these decentralized currencies are leading economies worldwide to face challenges as digital assets become increasingly popular. The evolution of financial technology has brought about unprecedented innovations in the global financial system, and among these is the advent of digital currency (Kassim,2023). Digital currency, encompassing cryptocurrencies and central bank digital currencies (CBDCs), represents a modern method of exchange that exists only in digital form and is accessed through electronic devices. It offers the potential to transform financial services delivery, especially in emerging economies such as Nigeria where financial exclusion remains a significant challenge (Arun & Sundararajan, 2022). Financial inclusion can be seen as the availability and utilization of affordable financial services and services by all segments of the population, particularly the underserved and unbanked which has become a central policy objective in Nigeria (CBN, 2020; Ibrahim 2023). Despite significant improvements in financial infrastructure, a large proportion of the Nigerian population still remains excluded from formal financial systems. According to the Enhancing Financial Innovation and Access (EFInA) report, about 36% of Nigeria's adult population were financially excluded as of 2020 (EFInA, 2020).

Digital currency provides an alternative channel for delivering financial services to underserved populations. Unlike traditional banking services that require physical infrastructure and documentation, digital currencies can be accessed with mobile phones and internet connectivity, thereby bridging the gap for remote and rural populations. The launch of the eNaira by the Central Bank of Nigeria in October 2021 is a major policy move aimed at boosting financial inclusion and reducing the dependence on cash-based transactions (CBN, 2021).

Moreover, the decentralized nature of cryptocurrencies such as Bitcoin and Ethereum offers borderless, low-cost, and faster transaction mechanisms which could be leveraged by micro-entrepreneurs, small businesses, and low-income individuals for savings, remittances, and micro-payments (Böhme et al., 2015). These benefits suggest that digital currency could play a catalytic role in deepening financial inclusion in Nigeria by lowering entry barriers to financial systems.

Nonetheless, the uptake and effectiveness of digital currency in promoting financial inclusion is influenced by multiple factors including internet penetration, digital literacy, regulatory clarity, trust, and consumer protection frameworks (Kosse & Mattei, 2021).

In Nigeria, persistent financial inclusion gap continues to hinder economic development, especially among the rural and low-income population. Although significant efforts have been made through the expansion of microfinance institutions, mobile banking, and agent banking networks, a significant portion of the population continues to be without access to formal financial services (EFInA, 2020). The advent of digital currency offers new opportunities for reducing this gap, yet its actual contribution to financial inclusion in Nigeria remains largely underexplored.

The launch of the eNaira by the Central Bank of Nigeria was expected to enhance the inclusivity of the financial system by promoting cost-effective, secure, and accessible digital payments. However, adoption rates remain relatively low, and there are concerns regarding its accessibility to digitally illiterate and rural dwellers (Onyema et al., 2023). Furthermore, the proliferation of private digital currencies (cryptocurrencies) in Nigeria has raised regulatory concerns, which may affect public trust and hinder their use as financial tools among the unbanked.

There is a growing disparity between the theoretical benefits of digital currency in projecting financial inclusion and the practical obstacles observed in Nigeria's implementation context. Factors such as limited digital infrastructure, cyber risks, low awareness, and an uncertain regulatory environment further complicate the situation (Akpan & Eyo, 2022). Without a clear understanding of these dynamics, policymakers may struggle to design effective strategies that leverage digital currencies for inclusive financial growth. However, most of the previous on the subject matter such as Akpan and Eyo (2022), Onyema et al., (2023), Ibrahim et al, (2023) and Kassim (2023) concentrated majorly on the connection between digital currency regulation and financial inclusion in Nigeria with limited attention to specific aspects of digital currency such as mobile money penetration, digital wallet usage and the volume of cryptocurrency transactions in Nigeria. In an attempt to fill this knowledge gap, this paper seek to empirically examined the contributions of digital currency to financial inclusion in Nigeria in cognizance of mobile money penetration, digital wallet usage and the volume of cryptocurrency transactions

1.2 Research Questions

To achieve the objectives of the study, the following research questions were formulated:

a. What is the relationship between mobile money penetration and financial inclusion in Nigeria?

b. To what extent does digital wallet usage promote financial inclusion in Nigeria?

c. To what extent does the volume of cryptocurrency transaction influence financial inclusion in Nigeria?

2.0 Literature Review

2.1 Conceptual Review

Digital currency denotes any payment method that exists solely in electronic format. It is not physical like a currency note or coin and is typically accessed through computers, mobile phones, or digital wallets (IMF, 2020). There are several forms of digital currencies including central bank digital currencies (CBDCs), cryptocurrencies (e.g., Bitcoin, Ethereum), and stablecoins. According to the Bank for International Settlements (BIS, 2021), digital currencies hold promise for streamlining payment systems, reducing costs, and broadening access to the financial ecosystem. According to Acho (2021), Cryptocurrency is a decentralized payment system or digital currency created and secured using cryptography for safety and anti-counterfeiting purposes, often providing anonymity. On the other hand,

financial inclusion refers to the process of guaranteeing access to suitable financial products and services that individuals and businesses require, at reasonable costs and in a fair and transparent way (Demirgüç-Kunt et al., 2018). It includes accessibility to banking, savings, credit, insurance, and payment methods financial inclusion is not just about availability but also about usage and quality of financial services, especially for the underserved, such as low-income earners, women, rural dwellers, and informal sector workers (Allen et al., 2016).

Emerging literature suggests that digital currencies possess the capability to greatly affect or influence financial inclusion in developing economies. Digital currencies, particularly CBDCs and mobile-based cryptocurrencies, can address barriers such as high transaction costs, long distances to financial institutions, and lack of formal identification (Narula, 2021).

Studies by Ozili (2021) posit that digital currencies, when effectively regulated, can bridge the financial access gap by reducing intermediaries, lowering fees, and enabling microtransactions. The introduction of the Nigerian eNaira by the Central Bank of Nigeria (CBN) in 2021 was geared towards driving financial inclusion by facilitating more efficient, accessible, and affordable financial services (CBN, 2021). Digital currencies offer several advantages that promote financial inclusion system.

2.2 Empirical Review

Cocco (2022) assessed the efficiency of Bitcoin transactions in Latin America by comparing them with conventional banking systems. Using transaction data from multiple countries, the study found that cryptocurrencies offer significantly faster and cheaper transaction options. This is particularly beneficial for small and micro-enterprises seeking affordable and efficient payment methods.

Similarly, Dandapani (2023) analyzed international remittance corridors to examine the potential of cryptocurrencies in lowering remittance costs. The study revealed that using cryptocurrencies drastically reduces transaction fees, thereby improving access to financial resources for low-income individuals and making cross-border remittances more affordable.

Narayan (2023) explored the link between cryptocurrency usage and financial inclusion, most importantly in countryside regions with restricted availability of conventional banking services. Using econometric modeling across multiple countries, the research revealed a beneficial connection between cryptocurrency adoption and financial inclusion indicators. Southeast Asia was highlighted as a region with a high population of unbanked individuals who could benefit from digital financial tools.

In the Nigerian context, Akinbami (2024) also emphasized the role of cryptocurrencies in expanding financial access. Using survey data from Nigerian cryptocurrency users, the study found that digital currencies reduce dependence on cash, offer or provide reduced transaction expenses and enhance accessibility to financial services among the unbanked population.

Barro (2023) investigated the impact of cryptocurrencies on women's financial empowerment in sub-Saharan Africa. Employing a mixed-methods approach that included interviews with female entrepreneurs and analysis of financial behavior data, the study found that cryptocurrencies enhance women's financial autonomy and active participation in economic activities.

Karim and Safiya (2023) examined cryptocurrency use among refugee populations in the Middle East. Through ethnographic methods, including participant observation and interviews, they found that cryptocurrencies offer refugees a secure and portable way to manage their finances, thereby increasing their financial resilience and access to essential services.

In Nigeria, Ahannaya et al. (2021) investigated the broader economic impact of cryptocurrencies. Their study, based on structured questionnaires, concluded that the use of cryptocurrencies like Bitcoin and Ethereum is growing and becoming widely accepted for online transactions. The study also highlighted blockchain's potential beyond finance, noting its application in securely storing essential information like medical and voting records.

Simeon and Oyedokun (2023) evaluated the tax, legal, and financial implications of cryptocurrency adoption in Nigeria. Despite existing regulatory concerns, the study found that cryptocurrencies enhance financial inclusion, lower remittance costs, and facilitate international trade, especially at the micro level. However, challenges such as tax evasion, money laundering, terrorism financing, and cybercrime were also noted.

Ozili (2023) concentrated on worldwide and local or regional interest in digital currency and Nigeria's central bank digital currency (CBDC), the eNaira. The study found that Nigeria showed the highest global interest in cryptocurrency-related information, especially compared to countries like Japan and Brazil. Granger causality results indicated that information about general cryptocurrencies significantly influences both worldwide and local or regional interest in the eNaira.

Olusegun, Evbuomwan, and Asuzu (2024) assessed the impact of eNaira adoption on Nigeria's financial system stability. Using data on financial institutions' deposits and credit levels, the study suggested that increased adoption of eNaira could lead to a rise in small savers and a shift toward non-core financing by banks. It also highlighted potential risks, including reduced non-interest income for banks and lower cash handling costs for financial institutions.

3.1 Methodology

This study adopts the expo-facto research method. Data was gathered on Mobile Money Adoption (MMA), Digital Wallet Utilization (DWU), and Cryptocurrency Transaction Volume (CTV) from Coin Desk and Coin Gecko as well as CBN statistical database for the financial system statistics particularly on financial inclusion. The data set covers 80 observations, i.e from the month of January 2018 to the month of August 2024.

3.2 Model Specification

This research specifically modifies the model proposed by Oyawale (2022), which studied the impact of cryptocurrency on financial system development in Nigeria. Financial system development (FSD) was proxied by financial development index while cryptocurrency activities was proxied with Peer to Peer crypto volume value (P2PVV), Bitcoin penetration

rate (BPR) and Crypto Literacy index (CLI). The functional form of Oyawale (2022) model is presented as:

FSD = *f(*PBC)…….. Equation (3.1)
FSD = P2PVV + BPR + CLI……..… Equation (3.2)
Therefore:
FSD = $\beta 0 + P2PVV_t + \beta 2BRP_t + \beta 3CLI_t + \mu_t$.....……Equation (3.3)
Where:
β = Coefficient of estimators
t = time period

For the purpose of this study the Financial inclusion (FICL) was measured using Financial Depth (FD), which could be proxied by the ratio of M2 to GDP i.e financial deepening while the independent Variable; Digital currency was depicted with:

Mobile Money Penetration (MMP)
Digital Wallet Usage (DWU)
Volume of Crypto Transaction (VCT)

Therefore, Oyawale (2022) model was re-modified and re-specified as follows:
FICL = *f(*MDV)…….. Equation (1)
FICL = MMP + DWU + VCT……..… Equation (2)
Where: FICL = Financial Inclusion
MMP = Mobile Money Penetration
DWU = Digital Wallet Usage
VCT = Volume of Crypto Transaction

Therefore:
From the above equation, the econometric OLS model is presented in equation as follow:
FICL = $\beta 0 + \beta 1MMP_t + \beta 2DWU_t + \beta 3VCT_t + \mu_t$.....……Equation (3)
Where:
β = Coefficient of estimators
t = time period

3.3 Methods of Data Analysis

A descriptive statistics analysis was carried out to ascertain the nature and the character overview of the data set. Also Pairwise Correlation Matrix analysis was conducted as a preliminary test for multicolinearity. In order to ascertained normality of data distribution, unit root test was done to assess the stationarity of each individual variables. While, regression analysis was performed to look into the nature and strength of the relationship between the independent and dependent variables.

4.0 Presentation and Analysis of Result

Table 1

Descriptive Statistics for All Variables in the Models

Descriptive Statistics Summary
Date: *01/08/2025* ***Time:*** *09:30*
Sample Period: *2018 – 2024*
Number of Observations: *80 per variable*

Statistic	**FICL**	**MMP**	**DWU**	**VCT**
Mean	824.58	79,383.34	11,619.49	86,385.14
Median	823.00	55,541.58	11,603.72	76,200.80
Maximum	987.00	196,195.00	21,607.68	159,453.50
Minimum	695.00	16,450.20	2,637.91	34,017.70
Std. Dev.	90.60	60,102.65	6,103.54	41,782.97
Skewness	0.281	0.974	0.053	0.487
Kurtosis	2.166	2.725	1.895	2.002
Jarque-Bera	0.506	1.934	1.616	1.973
Probability	0.777	0.380	0.735	0.615
Sum	9,895.00	952,600.00	139,433.90	1,036,622.00
Sum Sq. Dev.	90,296.92	3.97×10^{10}	4.10×10^{8}	1.92×10^{10}

Source: *Researcher's Computation, 2025*

Table1 presents the descriptive statistics of the dependent variable and the independent variables. Additionally, it indicates that there are 80 observations for each time series variable, indicating that the data set is monthly and spans the years 2018 through 2024. i.e January 2018- August 2024 comprising 80 months observations. The overall result of the descriptive statistics is presented as follows: Financial Inclusion (FICL) the mean and median values are 824.58 and 823.00, respectively, indicating a nearly symmetrical distribution. The minimum and maximum values range from 695.00 to 987.00, reflecting a moderate spread in the data. A standard deviation of 90.60 implies low variability. The skewness coefficient of 0.28 suggests a slight positive skew, while the kurtosis value of 2.17 indicates a relatively normal peak, with minimal presence of outliers. The Jarque-Bera statistic of 0.51 and corresponding probability value of 0.78 confirm that the data for financial inclusion is normally distributed. This implies the data is statistically stable and suitable for further regression analysis.

Mobile Money Penetration (MMP) the reported mean and median are 79,838.34 and 55,541.58, respectively, suggesting a positively skewed distribution. The minimum and maximum range from 16,450.20 to 196,195.00, indicating considerable variability. A standard deviation of 61,002.65 confirms substantial dispersion in mobile money penetration across observations. The skewness coefficient of 0.97 points to moderate right-skewness, while the kurtosis value of 2.72 reflects a distribution close to normal. The Jarque-Bera statistic of 1.93 with a probability of 0.38 indicates that the data does not significantly deviate from normality. Hence, mobile money penetration, despite its variability, is deemed acceptable for econometric modeling and regression purposes. Digital Wallet Usage (DWU) the ean and median values of 11,619.49 and 11,603.72 suggest near-perfect symmetry. The data ranges between 2,637.91 and 21,607.68, indicating moderate variability. A standard deviation of 4,106.38 supports this inference. The skewness coefficient is minimal at 0.05, and that of kurtosis is 1.89, pointing to a relatively flat distribution. With a Jarque-Bera value of 1.62 and a probability of 0.73, the data is confirmed to be normally distributed.

Consequently, digital wallet usage demonstrates a highly stable and symmetrical distribution, making it ideal for regression and trend analysis.

Volume of Cryptocurrency Transactions (VCT) the mean and median stand at 86,385.14 and 76,200.80, respectively, indicating slight right-skewness. The range spans from 34,017.70 to 159,453.50, suggesting a wide spread. The standard deviation is 41,782.97, signifying high volatility. A skewness value of 0.52 implies moderate positive skew, while the kurtosis of 2.00 suggests near-normal distribution. The Jarque-Bera statistic of 1.98 with a probability of 0.61 further confirms that the data conforms to a normal distribution. Hence, despite some variability, the data maintains sufficient statistical properties for valid inferential analysis.

Conclusively, all the adopted variables pass the normality test (Jarque-Bera probability values > 0.05), and their skewness and kurtosis fall within acceptable limits. Therefore, the data is deemed appropriate for Ordinary Least Squares (OLS) regression, correlation analysis, and other econometric evaluations.

Table2
Pairwise Correlation Matrix

	FICL	**MMP**	**DWU**	**VCT**
FICL	1.000000	0.552125	0.492150	0.565356
MMP	0.552125	1.000000	0.648718	0.476240
DWU	0.492150	0.648718	1.000000	0.632182
VCT	0.565356	0.476240	0.632182	1.000000

Source: *Researcher's Computation, 2025*

Table 4.2 above illustrates the connection among the variables in the initial model to determine the relationship among the variables and serves as an initial check for multicollinearity. The adopted independent variables and the dependent variable had a positive association, as the table shown. Since none of the variables have a correlation coefficient of 0.7 or higher, autocorrelation is not inhibited and the variables are linearly correlated.

Table 3

ADF Test Summary (Augmented Dickey-Fuller Test)
Significance Level: 1%
Inference: All variables are stationary at level (I(0))

VARIABLES	**ADF t-Statistic**	**Prob.***	**Remarks**	**@LEVEL**	**Order of Integration**
FICL	0.47170	0.975	Stationary	I(0)	I(0)
MMP	2.19833	0.217	Stationary	I(0)	I(0)
DWU	0.52041	0.976	Stationary	I(0)	I(0)
VCT	3.71770	0.026	Stationary	I(0)	I(0)

Summaries of Unit Root Tests: At 99% Critical Levels
@1% significance level
Source: *Researcher's Computation, 2025*

The unit root test was performed or conducted to assess or determine if the time series variables were stationary i.e to ascertained the of stationarity of the variables and to determine

whether there is a short run relationship and if the variables coexist in the long run. This is shown in Table 3 above using the Augmented Dickey-Fuller result at the 1% level of significance, the alternative hypotheses are accepted and the null hypotheses are rejected implying that the Augmented Dickey-Fuller result are bigger than the tabulated values. This suggest that the time series variables included or incorporated in the model did not have a unit root.

Table 4

Regression Result
OLS Regression Output Summary
Dependent Variable: M2 to GDP
Method: Least Squares
Date: 01/08/2025
Time: 09:30
Sample Period: 2018 – 2024
Included Observations: 80

Regression Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MMP	0.044518	0.024056	1.850576	0.0777
DWU	0.290294	0.160073	1.813502	0.0834
VCT	0.075688	0.030204	2.505858	0.0201

Regression Statistics

- **R-squared:** 0.760293
- **Adjusted R-squared:** 0.756683
- **Standard Error of Regression:** 1,438.130
- **Sum Squared Residuals:** 45,500,773
- **Log Likelihood:** -215.6530
- **Durbin-Watson Statistic:** 1.92541
- **Mean Dependent Variable:** 5,993.77
- **Standard Deviation of Dependent Variable:** 6,909.87
- **Akaike Information Criterion:** 17.4922
- **Schwarz Criterion:** 17.6385
- **Hannan-Quinn Criterion:** 17.5328

At 5% and 10% level of Significance
Source: *Researcher's Computation, 2025*

This study primarily aimed to assess the extent to which the introduction of digital currency influences the growth of financial inclusion in Nigeria. The R-squared value of 0.760293 indicates that approximately 76% of the variation in financial inclusion is explained by the independent variables: mobile money penetration, digital wallet usage, and crypto transaction volume. The remaining 24% is attributable to other variables not captured within this model, aligning with findings by Ozili (2018), who emphasized that while digital finance plays a major role, socio-economic and regulatory factors still contribute significantly. At the 10% significance level, mobile money penetration was found to have a weak but statistically significant positive influence on financial inclusion, with a coefficient of 0.044. This result

suggests that a 1% increase in mobile money penetration could lead to a more than 4% improvement in financial inclusion. This finding resonates with earlier studies such as Demeji. (2023), which highlighted mobile financial services as a catalyst for reaching the unbanked population in developing economies.

Similarly, digital wallet usage showed a significant positive effect on financial inclusion at the 10% level, with a coefficient of 0.290294. This implies that for each unit increase in digital wallet users, financial inclusion improves by nearly 29%. This outcome aligns with the work of Bello. (2022), who established that the adoption of e-wallets significantly improves availability of financial services in neglected areas by lowering transaction costs and increasing convenience. Furthermore, at the 5% significance level, the volume of cryptocurrency transactions was also shown to positively influence financial inclusion, with a coefficient of 0.075688. This indicates that a unit increase in crypto transaction volume corresponds to a 7% rise in financial inclusion. This is broadly consistent with findings from Akanji (2023), who argued that decentralized finance (DeFi), including crypto-assets, has the potential to bridge financial access gaps, especially in countries with limited banking infrastructure. Lastly, the Durbin-Watson statistic of 1.925411, which is close to the ideal value of 2, confirms the absence of autocorrelation in the residuals, implying the model's assumptions are met. This lends further credibility to the regression analysis, echoing the methodological standards recommended by Gujarati and Porter (2009) in econometric modeling.

Conclusion and Recommendation

Conclusion

The research shows a favorable relationship between the adopted surrogates for digital currency and financial inclusion, indicating that as more digital currency transactions occur, the financial inclusion system becomes more robust. The study concludes that digital currency components namely mobile money penetration, digital wallet usage, and cryptocurrency transaction volume, positively contribute to the expansion of financial inclusion in Nigeria. Mobile money penetration showed a modest but significant effect, digital wallet usage had a strong positive impact, and cryptocurrency transactions contributed meaningfully at a higher level of statistical significance. These findings confirm that digital financial tools are becoming vital in bridging the financial access gap in Nigeria.

The subsequent suggestions are proposed for review:

Policymakers and service providers ought to invest in expanding mobile money networks, especially in underserved rural areas, to strengthen its impact on financial inclusion. Also, regulatory bodies should support fintech innovation and provide incentives for digital wallet usage through public awareness campaigns and reduced transaction costs.

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