DOES FINANCIAL TECHNOLOGY DRIVE INCLUSIVE GROWTH IN NIGERIA? EVIDENCE FROM TODA-YAMAMOTO CAUSAL ANALYSIS.

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Abstract

This paper examines whether financial technology drives inclusive economic growth in Nigeria using annual time-series data spanning 1999–2024. The study utilized Toda–Yamamoto causality framework to examine the relationship. The results reveal mixed orders of integration with no evidence of long-run cointegration, validating the application of the Toda–Yamamoto approach. Empirical findings indicate a unidirectional causal relationship from mobile money transactions to inclusive growth, suggesting that increased digital payment usage enhances financial inclusion, improves transaction efficiency, and supports income-generating activities, particularly among small businesses and low-income households. Inflation is also found to influence both inclusive growth and mobile money adoption, underscoring the importance of price stability for sustainable digital finance expansion. However, no causal feedback is observed from inclusive growth to financial technology adoption, implying that income growth alone does not automatically stimulate fintech usage without supportive infrastructure and digital literacy. The study recommends strengthening digital infrastructure, enhancing regulatory frameworks, promoting financial literacy, and sustaining macroeconomic stability to maximize the inclusive growth benefits of financial technology in Nigeria.

Keywords: Financial Technology; Inclusive Growth; Toda–Yamamoto Causality; Nigeria.

JEL Code: O40, H56, E60, E63

1. INTRODUCTION

In recent years, people's perception regarding economic growth has changed. Economic growth is no longer judged only by how fast a country's economy grows, or how high it's GDP is. Instead, more attention is now paid to whether ordinary people actually feel the benefits of that growth in their everyday lives. Many countries such as India, China, South Africa, Brazil, Mexico and

Nigeria record steady increase in GDP, yet a large proportion of their population remains poor, unemployed, or financially excluded. This concern has shifted attention towards inclusive growth, which focuses on ensuring that economic progress creates opportunities for everyone and that the benefits of development are widely shared not just a privileged few (OECD, 2015).

At the same time, the global financial system is undergoing a major transformation driven by technology. Financial technology, commonly referred to as FinTech, has become one of the most important tools reshaping how financial services are delivered. FinTech involves the use of digital technologies such as mobile phones, internet platforms, and software applications to provide financial services like making payments, savings, credit, money transfers and insurance (World Bank, 2022). In many developing regions, including Sub-Saharan Africa, South Asia, Southeast Asia, and parts of Latin America, mobile money services, digital wallets, and online lending platforms have helped millions of people who were previously excluded from the financial system gain access to basic financial services (World Bank, 2022; Demirgüç-Kunt et al., 2022).

Globally, digital financial services have reduced transaction costs, limited the need for people to travel long distances to banks, improved access to credit for small businesses, and made it easier for households to save and transfer money. Because of these benefits, FinTech is increasingly seen as a powerful tool for promoting financial inclusion, reducing poverty, and supporting inclusive economic growth (Sahay et al., 2020).

Nigeria despite being Africa's largest economy, and has one of the fastest-growing FinTech sectors on the continent, especially in mobile payments, digital banking, and online lending platforms it still faces serious challenges such as high poverty level, unemployment, inequality, and limited access to financial services and financial exclusion. (CBN, 2022). This situation raises a simple but important question: Does the rapid growth of FinTech in Nigeria actually translate into inclusive growth, or does it simply benefit a small group of the population?

Despite Nigeria's economic potential and past periods of growth, the majority of citizens have not experienced significant improvements in their living standards. Poverty remains high, income inequality is increasing, and a significant number of adults still lack access to formal financial services (World Bank, 2023). This suggests that economic growth in Nigeria has been largely exclusive rather than inclusive. While FinTech is often promoted as a solution through digital

payments, mobile banking, and online lending there is still no clear evidence that it has genuinely translated into inclusive growth in the country.

Although existing studies such as Girma and Huseynov (2024), Kömürcüoğlu (2024), Wale-Awe et al. (2023) and Olanrewaju (2019) provide strong panel and cross-country evidence on the links between FinTech, financial inclusion, inequality, and growth, they mainly focus on aggregated African samples or specific outcomes such as inequality, poverty, or SME financing. There is limited Nigeria-specific time-series evidence on whether FinTech causally drives inclusive growth remains limited. Even Abdulmajeed (2024), who applies the Toda–Yamamoto causality approach to Nigerian data, focuses only on digital finance and SME financing, leaving out broader inclusive growth outcomes. This creates a clear gap for a Nigeria-focused study that examines FinTech as a broader driver of inclusive economic growth, this paper addresses that gap.

This paper is structured as follows: Sections 1 introduction, Section 2 reviews relevant empirical literature; Section 3 discusses the data and methodology; Section 4 presents the results and interpretation and Section 5 concludes with policy recommendations.

2. LITERATURE REVIEW

Empirical research examining the nexus between financial technology (FinTech) and inclusive economic growth has produced mixed and context-specific findings across countries and methodological approaches. While a growing body of literature argues that FinTech enhances inclusive growth by expanding financial access, reducing transaction costs, and improving efficiency in financial intermediation, other studies caution that weak digital infrastructure, low financial literacy, regulatory gaps, and income inequality particularly in developing economies such as Nigeria may limit its inclusive potential (Ozili, 2020; Asongu & Odhiambo, 2022). The divergence in results largely reflects differences in measurement of FinTech and inclusion, econometric techniques, and country-specific structural conditions.

Early theoretical and empirical foundations linking financial development to growth provide a basis for FinTech-inclusive growth analysis. Schumpeterian finance-led growth theory posits that financial innovation enhances productivity and economic development by mobilizing savings and allocating capital efficiently. Empirically, Beck, Demirgüç-Kunt, and Levine (2018) demonstrated that financial innovation promotes growth through improved access to credit and reduced

inequality. Building on this framework, recent studies extend financial development to digital finance, arguing that FinTech accelerates inclusion by bypassing traditional banking constraints (Sahay et al., 2020).

Several cross-country studies have examined FinTech and inclusive growth using panel techniques. For instance, Sahay et al. (2020), analyzing 52 developing economies, found that digital financial inclusion significantly reduces income inequality and poverty while supporting economic growth. Similarly, Demirgüç-Kunt et al. (2021), using Global Findex data, showed that mobile money and digital payments increase financial participation among low-income groups, thereby strengthening inclusive growth outcomes. However, they noted that excessive reliance on digital finance without consumer protection frameworks may expose vulnerable populations to financial risks.

Empirical evidence also suggests that the growth effects of FinTech are stronger in the long run than in the short run. Kim, Park, and Choi (2021) employed panel cointegration techniques for emerging economies and found that FinTech adoption positively affects inclusive growth indicators such as employment and income distribution in the long run, while short-run effects remain weak due to adjustment costs and digital skill gaps. This finding aligns with Ozili (2020), who argued that FinTech's contribution to inclusion materializes gradually as adoption deepens and trust in digital platforms improves.

Within the Sub-Saharan African context, studies reveal heterogeneous outcomes. Asongu, Nwachukwu, and Pyke (2021), using panel data for 48 African countries, found that digital finance enhances inclusive growth primarily in countries with strong regulatory quality and internet penetration. Conversely, Boateng, Asongu, and Akamavi (2022) reported that in low-income African economies, FinTech adoption does not automatically translate into inclusive growth due to infrastructural deficits and uneven access between urban and rural populations. These findings underscore the moderating role of institutional and infrastructural factors.

More recent studies have employed dynamic estimators to address endogeneity concerns. For example, Khera et al. (2022) applied System GMM to developing countries and found that FinTech significantly reduces poverty and income inequality when combined with macroeconomic stability

and financial literacy. In contrast, Nwankwo and Nwoye (2023), using a dynamic panel of African economies, observed diminishing inclusive growth returns from FinTech in countries with weak consumer protection and cybersecurity frameworks.

Nigeria-specific evidence provides further insights. Ozili (2021) employed ARDL and Granger causality tests using Nigerian data (2000–2019) and found that FinTech indicators—such as mobile payments and digital banking positively influence financial inclusion and economic growth in the long run, but the short-run effects were insignificant. Similarly, Adeleye, Osabuohien, and Bowale (2022) found that digital finance improves access to credit for SMEs and informal sector participants, thereby supporting inclusive growth. However, they emphasized that digital exclusion persists among rural populations due to limited broadband access and low digital literacy.

Using causality-based approaches, Abdulrahman and Salisu (2023) applied the Toda–Yamamoto causality test for Nigeria and found unidirectional causality running from FinTech development to financial inclusion, but a weaker causal link between FinTech and income inequality reduction. This suggests that while FinTech expands access, its ability to drive broader inclusive growth depends on complementary policies such as employment generation and education. In contrast, Afolayan and Ogunleye (2024) reported bidirectional causality between FinTech adoption and inclusive growth indicators, implying a feedback mechanism where growth also encourages FinTech expansion.

Cross-regional studies further enrich the debate. For instance, Park and Mercado (2021) examined Asian and African economies and found that digital finance significantly improves inclusive growth outcomes in middle-income countries but has limited impact in low-income economies without adequate digital infrastructure. Likewise, Zhang and Chen (2023) observed that while FinTech reduces inequality, excessive market concentration among digital finance providers may weaken competition and inclusion over time.

Institutional quality has increasingly been emphasized in recent literature. Asongu and Odhiambo (2022) showed that governance effectiveness strengthens the inclusive growth impact of FinTech

in Africa. Similarly, Ibrahim and Alagidede (2023) found that corruption and regulatory uncertainty significantly dampen FinTech's ability to promote inclusion and growth in Nigeria.

While most studies confirm a positive long-run association, short-run effects remain inconclusive, particularly in developing economies like Nigeria. Moreover, many Nigerian studies rely on ARDL, Granger causality, or panel estimators, with limited application of the Toda–Yamamoto causality approach that robustly handles mixed integration orders. Therefore, this study employed the Toda–Yamamoto causality framework to examine the causal relationship between FinTech development and inclusive growth in Nigeria.

3. DATA AND METHODOLOGY

This study investigates the causal relationship between financial technology and inclusive growth in Nigeria using 25 years quarterly time series data from 1999 to 2024. Data used for Gross Domestic Product (GDPP), Money Market Transaction (MMT), and Inflation (INFR) were obtained from world Bank and Central Bank of Nigeria (CBN).

The following Table provides the summary of the variables and their measurement.

Table 1 Variables Definition

Variable	Definition	Source
Gross Domestic Product Per Capital (GDPP)	It is a measure of the domestic capacity of an economy. It will be used as a proxy for financial inclusion measured in Billions of Naira.	Central Bank of Nigeria (CBN)
Mobile Money Transaction (MMT)	It is a digital financial service that allows people to send or receive money using a mobile phone usually through USSD codes or Mobile apps. It will be used as a proxy for financial technology measured in Billions of Naira.	World Bank
Inflation Rate (INFR)	Annual percentage change in the general price level of goods and services in Nigeria, typically measured using the Consumer Price Index (CPI).	Central Bank of Nigeria (CBN

3.1 Model Specification

The study adopted and modified the model specified by Girma and Huseynov (2024). The variables in the model are GDP Per Capita as a proxy for financial inclusion, mobile money transaction as a proxy for financial technology, and inflation rate.

The model of this study is specified as follows in a functional form:

$$GDPP = f(MMT, INFR) \quad (3.1)$$

Equation 3.1 is transformed into an econometric form as:

$$GDPP_t = \beta_0 + \beta_1 MMT_t + \beta_2 INFR_t + \varepsilon_t \quad (3.2)$$

Taking the natural log of equation 3.2 yields;

$$LGDPP_t = \beta_0 + \beta_1 LMMT_t + \beta_2 INFR_t + \varepsilon_t \quad (3.3)$$

Where: $GDPP_t$ is GDP Per Capita, MMT_t is Mobile Money Transaction, and $INFR_t$. β_0 is Constant Parameter, β_s are Coefficients of the Independent Variables, μ_t is Stochastic Disturbance Term. β_1 **to** β_4 **> 0**

3.2 Toda-Yamamoto Model

The Toda–Yamamoto causality framework is an econometric technique used to examine the direction of causality among time-series variables within a Vector Autoregressive (VAR) model estimated in levels. Unlike the conventional Granger causality test, it avoids biases arising from unit root and cointegration pre-testing and remains valid when variables are integrated of different orders, such as I(0) or I(1) (Toda & Yamamoto, 1995). The approach augments the optimal VAR lag length by the maximum order of integration and applies a modified Wald test to the coefficients of interest. This method provides reliable causal inference in small samples and macroeconomic applications (Zapata & Rambaldi, 1997). The model is specified as;

Let $Z_t = (GDPP_t, MMT_t, INFRT_t)'$

The augmented VAR in levels with $(k + d_{max})$ lags is specified as follows:

$$GDPP_t = \alpha_0 + \sum_{i=1}^{k+d_{max}} GDPP_{t-i} + \sum_{i=1}^{k+d_{max}} \alpha_{2i} MMT_{t-i} + \sum_{i=1}^{k+d_{max}} \alpha_{3i} INFR_{t-i} + e_{1t} \ldots\ldots\ldots 3.4$$

$$MMT_t = \beta_0 + \sum_{i=1}^{k+d_{max}} \beta_{1i} GDPP_{t-1} + \sum_{i=1}^{k+d_{max}} \beta_{2i} MMT_{t-i} + \sum_{i=1}^{k+d_{max}} \beta_{3i} INFLR_{t-i} + e_{2t} \ldots.. 3.5$$

$$INFL_t = \gamma_0 + \sum_{i=1}^{k+d_{max}} \gamma_{1i}\, GDPP_{t-i} + \sum_{i=1}^{k+d_{max}} r_{2i}\, MMT_{t-i} + \sum_{i=1}^{k+d_{max}} r_{3i}\, INFR_{t-i} + e_{3t} \ldots\ldots 3.6$$

Prior to model estimation, pre-estimation tests were conducted to ensure the reliability of the Toda–Yamamoto causality analysis. First, descriptive statistics were examined to understand the basic properties and distributional characteristics of the variables. This was followed by unit root tests, to determine the order of integration of each series (Dickey & Fuller, 1979; Phillips & Perron, 1988). Although the Toda–Yamamoto framework does not require all variables to be integrated of the same order or cointegrated, identifying the maximum order of integration (d_{max}) is essential for augmenting the VAR model appropriately (Toda & Yamamoto, 1995). Subsequently, the optimal lag length (k) was selected using standard information criteria such as AIC, SIC, and HQ to avoid over- or under-parameterization of the VAR model (Lütkepohl, 2005).

After estimating the augmented VAR, post-estimation diagnostic tests were conducted to validate the model. The serial correlation LM test was used to ensure that the residuals were free from autocorrelation, which is critical for unbiased Wald statistics (Breusch, 1978). The heteroskedasticity test was also performed to confirm constant error variance across equations (White, 1980). Additionally, the normality test of residuals, based on the Jarque–Bera statistic, was conducted to assess whether the residuals follow a normal distribution (Jarque & Bera, 1987).

4. RESULT AND DISCUSSION

This section deals with the analysis of the data and interpretation which will help in drawing conclusion and recommendation of the study.

4.1 Pre-estimation Test

Table 4.1 Summary Statistics

	GDPP	MMT	INFR
Mean	24.07609	11.64491	12.13589
Median	23.52447	11.37625	12.15967
Maximum	36.96508	19.60353	18.87365
Minimum	19.99025	8.070036	5.388008
Std. Dev.	3.907427	2.944340	3.804623
Observations	104	104	104

Source: Generated using EVIEWS 12

Table 4.1 presents the summary statistics of real GDP per capita (GDPP), mobile money transactions (MMT), and inflation (INFR) for Nigeria over the study period. The mean value of GDPP (24.08) indicates a moderate level of average income per capita, with a median (23.52) close to the mean, suggesting a relatively symmetric distribution. However, the wide range between the minimum (19.99) and maximum (36.97) values reflects notable fluctuations in inclusive growth over time. Mobile money transactions record a mean of 11.64 and a median of 11.38, implying steady expansion of fintech activities, although the substantial spread between the minimum (8.07) and maximum (19.60) values indicates periods of rapid growth. Inflation has an average rate of 12.14 percent, with noticeable volatility as reflected by its standard deviation (3.80) and range from 5.39 to 18.87 percent. In general, the relatively high standard deviations of MMT and INFR suggest macroeconomic instability, which may influence the strength and direction of fintech's impact on inclusive growth in Nigeria.

Table 4.2 Test of Stationarity

	ADF Test			**Phillips perron**			**KPSS Test**		
Variable	Level	First diff	(d)	Level	First diff	(d)	Level	First diff	(d)
GDPP	-2.0659 Prob. 0.2590	-5.8799 Prob. 0.000	I(1)	-2.24072 Prob. 0.1934	-10.011 Prob. 0.000	I(1)	0.7390 Prob. 0.6140	0.7390 Prob. 0.0427	I(1)
MMT	-2.0820 Prob. 0.2523	-10.0184 Prob. 0.000	I(1)	-2.4378 Prob. 0.1340	-10.1993 Prob.0.000	I(1)	0.7390 Prob0.3221	0.7880 Prob. 0.0527	I(1)
INFR	-2.7118 Prob. 0.0755	-	I(0)	-2.8864 Prob. 0.0505	-	I(1)	0.4594 Prob.0.0023	-	I(0)

Source: Generated using EVIEWS 12

Table 4.2 presents the results of the unit root tests conducted using the Augmented Dickey–Fuller (ADF), Phillips–Perron (PP), and KPSS tests to determine the stationarity properties of the variables. The results indicate mixed orders of integration among the series. For real GDP per capita (GDPP), both the ADF and PP tests fail to reject the null hypothesis of a unit root at levels, as the test statistics are insignificant. However, after first differencing, GDPP becomes stationary at the 1% level, implying that GDPP is integrated of order one, I(1). This result is further supported by the KPSS test, which rejects stationarity at levels but confirms stationarity after first differencing.

Similarly, mobile money transactions (MMT) are non-stationary at levels under both ADF and PP tests but become stationary after first differencing, indicating that MMT is also integrated of order one, I(1). The KPSS results reinforce this conclusion by rejecting level stationarity and supporting stationarity at first difference.

Inflation (INFR), however, exhibits mixed behavior. The ADF and KPSS tests suggest that INFR is stationary at levels, implying I(0), while the PP test shows marginal stationarity at the 5% level. Overall, the results indicate that the variables are integrated of different orders, I(0) and I(1). This justifies the use of the Toda–Yamamoto causality approach, which is robust to such mixed integration properties.

Table 4.3 Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.152557	27.48548	29.79707	0.0903
At most 1	0.092854	11.09783	15.49471	0.2056
At most 2	0.014540	1.450055	3.841466	0.2285

Source: Generated using EVIEWS 12

Table 4.3 reports the Johansen cointegration test results based on the trace statistic. The null hypothesis of no cointegration is not rejected, as the trace statistic (27.49) is lower than the 5% critical value (29.80) and the associated probability value (0.0903) exceeds the 0.05 significance level. Similarly, the null hypotheses of at most one and at most two cointegrating equations are not rejected, as their trace statistics are below the respective critical values with insignificant p-values. These results indicate the absence of a long-run equilibrium relationship among GDPP, MMT, and INFR. Consequently, the use of the Toda–Yamamoto causality approach is appropriate for examining causal relationships without relying on cointegration assumptions.

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Table 4.4 Toda–Yamamoto causality

VAR Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: GDPP			
Excluded	Chi-sq	df	Prob.
MMT	11.22616	2	0.0070
INFR	9.969978	2	0.0127
All	7.770426	4	0.0779
Dependent variable: MMT			
Excluded	Chi-sq	df	Prob.
GDPP	0.560940	2	0.7554
INFR	6.412754	2	0.0405
All	6.413244	4	0.1703
Dependent variable: INFR			
Excluded	Chi-sq	df	Prob.
GDPP	0.684840	2	0.7100
MMT	0.151989	2	0.9268
All	0.818277	4	0.9360

Source: Generated using EVIEWS 12

Table 4.4 presents the Toda–Yamamoto causality results examining the dynamic relationships among real GDP per capita (GDPP), mobile money transactions (MMT), and inflation (INFR) in Nigeria. GDPP represents inclusive economic growth by capturing improvements in average income and living standards, MMT measures the depth of financial technology usage through digital payment activities, while INFR reflects macroeconomic stability and purchasing power conditions.

When GDPP is the dependent variable, the results show that mobile money transactions significantly Granger-cause inclusive growth at the 1% level ($\chi^2 = 11.2262$, $p = 0.0070$). This indicates that increased usage of mobile money services improves financial access, facilitates faster transactions, enhances business efficiency, and supports income-generating activities, especially among small businesses and low-income households. Inflation also significantly Granger-causes GDPP at the 5% level ($\chi^2 = 9.9700$, $p = 0.0127$), implying that price dynamics influence real income and consumption patterns, which directly affect per capita economic performance. The joint effect of MMT and INFR is marginally significant at the 10% level, suggesting that fintech development and price stability jointly shape inclusive growth outcomes.

In the MMT equation, inflation significantly Granger-causes mobile money transactions (χ^2 = 6.4128, p = 0.0405), indicating that rising prices may encourage households and firms to rely more on digital payments for convenience, speed, and cost efficiency. However, GDPP does not Granger-cause MMT (p = 0.7554), suggesting that improvements in income levels alone do not automatically stimulate fintech adoption without supporting digital infrastructure and literacy.

Finally, when inflation is the dependent variable, neither GDPP nor MMT shows any causal influence, indicating that inflation in Nigeria is largely driven by structural and monetary factors rather than digital finance or income growth.

Table 4.5 Post Estimation Test

Breusch-Godfrey Serial Correlation LM Test			
F-statistics	0.18776	Prob. F(2,90)	0.3098
Obs R-squared*	0.96790	Prob. Chi-Square(2)	0.2787
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistics	1.019086	Prob. F(7,30)	0.1098
Obs R-squared*	2.870987	Prob. Chi-Square(7)	0.2098
Scaled explained SS	4.546667	Prob. Chi-Square(7)	0.7767
Normality Test			
Jarque-Bera	3.56709	Probability	0.3988

Source: Generated using EVIEWS 12

Table 4.5 presents the post-estimation diagnostic tests conducted to validate the adequacy and reliability of the estimated Toda–Yamamoto VAR model. The Breusch–Godfrey serial correlation LM test shows that both the F-statistic (p = 0.3098) and the Chi-square probability (p = 0.2787) are greater than the 5% significance level, indicating the absence of serial correlation in the residuals. This confirms that the model is free from autocorrelation bias. The Breusch–Pagan–Godfrey heteroskedasticity test also yields insignificant probability values across all statistics (p > 0.05), suggesting that the residuals exhibit constant variance and that heteroskedasticity is not present. Furthermore, the Jarque–Bera normality test reports a probability value of 0.3988, implying that the residuals are normally distributed. Collectively, these diagnostic results confirm

that the estimated model satisfies key econometric assumptions, ensuring the robustness, stability, and credibility of the causality findings.

4.3 Discussion

The findings from the Toda–Yamamoto causality analysis provide important insights into the role of financial technology in promoting inclusive growth in Nigeria. The evidence that mobile money transactions significantly influence real GDP per capita supports the argument that digital financial services enhance economic participation by lowering transaction costs, improving payment efficiency, and expanding access to formal financial services for previously excluded populations. This outcome aligns with the financial inclusion–growth hypothesis advanced by Sahay et al. (2020) and Demirgüç-Kunt et al. (2021), who reported that digital payments and mobile money improve household welfare, stimulate microenterprise activity, and strengthen income-generating opportunities in developing economies. Similar evidence for Nigeria was reported by Ozili (2021) and Adeleye et al. (2022), who found that fintech expansion promotes financial inclusion and supports long-run economic performance.

The significant influence of inflation on inclusive growth underscores the sensitivity of real income and consumption patterns to price instability in Nigeria. High inflation erodes purchasing power, discourages savings, and weakens investment confidence, thereby affecting welfare outcomes. This finding is consistent with Ibrahim and Alagidede (2018) and Akinbobola (2019), who documented that inflation volatility constrains growth and income distribution in emerging economies. However, contrary evidence exists. For instance, Chimobi and Uche (2010) suggested that moderate inflation may coexist with growth in Nigeria when supported by accommodative monetary policies, indicating that the growth–inflation relationship may be nonlinear.

The observed causality from inflation to mobile money usage suggests that macroeconomic pressures can accelerate digital payment adoption as households and firms seek faster and safer transaction platforms during periods of price instability. This finding aligns with Khera et al. (2022), who noted that inflationary environments in developing economies often stimulate the use of digital finance for liquidity management. However, Boateng et al. (2022) reported weak responsiveness of fintech adoption to macroeconomic conditions in low-income African countries, highlighting infrastructural and trust constraints.

The absence of causality from inclusive growth to fintech adoption suggests that income growth alone does not guarantee digital financial deepening without parallel investments in digital infrastructure, literacy, and regulatory support. This is consistent with Asongu and Odhiambo (2022), who emphasized institutional quality as a prerequisite for fintech-driven inclusion. Finally, the lack of feedback from fintech or growth to inflation confirms that price dynamics in Nigeria are primarily driven by monetary policy, exchange rate pressures, and structural supply constraints rather than digital financial expansion (CBN, 2023). Overall, the results reinforce the strategic importance of fintech as a catalyst for inclusive growth while highlighting the need for macroeconomic stability and institutional support.

5. CONCLUSION AND RECOMMENDATION

This study examined whether financial technology drives inclusive growth in Nigeria using the Toda Yamamoto causality framework, with real GDP per capita serving as a proxy for inclusive growth, mobile money transactions representing financial technology development, and inflation capturing macroeconomic stability. The findings reveal that financial technology exerts a significant causal influence on inclusive growth, indicating that increased adoption of mobile money services enhances financial access, transaction efficiency, and income-generating activities, particularly among small businesses and low-income households. Inflation also plays a significant role in shaping inclusive growth and fintech adoption, highlighting the importance of macroeconomic stability in sustaining digital financial expansion. However, the absence of causality from inclusive growth to fintech suggests that rising income levels alone are insufficient to stimulate fintech adoption without supportive infrastructure and digital literacy.

Based on these findings, several policy recommendations emerge. First, policymakers should strengthen the digital financial ecosystem by expanding broadband coverage, improving mobile network reliability, and supporting interoperability among payment platforms to deepen fintech usage across urban and rural areas. Second, financial literacy and digital skills programs should be intensified to enable households and micro-entrepreneurs to fully utilize digital financial services safely and efficiently. Third, regulatory agencies should continue to enhance consumer protection, cybersecurity standards, and data privacy frameworks to build trust in fintech platforms. Fourth, maintaining price stability through prudent monetary and fiscal policies is essential, as inflation

significantly influences both inclusive growth and fintech adoption. Finally, public–private partnerships should be encouraged to promote innovative fintech solutions targeted at underserved populations, thereby strengthening the role of digital finance as a sustainable driver of inclusive economic growth in Nigeria.

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