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Impact of Cashless Policy Intensity on Economic Growth in Nigeria: 2009q1-2022q4

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Abstract

This paper is to examine the impact of cashless policy intensity on economic growth from 2009 to 2022. To achieve this, the Fully Modified Ordinary Least Squares (FMOLS) methodology was employed, given its ability for effectively handle time series data, and ensuring the explanation of both immediate and long-term dynamics. The research specifically focused on three cashless policy intensity instruments: ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI), and Internet Transaction Intensity (ITI), as core components of the policy intensity initiative. The results show that the ATM transaction intensity negative impact on economic growth in Nigeria which means that if not effectively managed the ATM transaction intensity can lead to a decrease in economic growth in Nigeria. On the other hand, the internet transaction intensity as a positive but insignificant impact on economic growth in Nigeria and this means internet transaction intensity has little of internet transaction intensity on economic growth in Nigeria. therefore, the paper recommended that the Central Bank of Nigeria should through other financial institutions educate the users to know the importance of these reforms for savings for economic growth and put incentives to increase savings amid easy access to financial resources. Also, the Central Banking of Nigeria should provide the enabling environment for the effective use of Internet transactions to improve the economic activities in Nigeria thereby increasing the economic growth.

Keywords: *ATM Transaction Intensity, POS Transaction Intensity, Internet Transaction Intensity, FMOLS, and Economic Growth*

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Background to the Study

Globally, the push towards cashless societies has been driven by the promise of enhanced efficiency, reduced transaction costs, and improved financial inclusion. Countries like Sweden and South Korea are at the forefront of this transition, showcasing significant leaps in economic efficiency and growth as a result of high cashless transaction intensities. In Sub-Saharan Africa, Kenya has emerged as a noteworthy case with the success of M-Pesa, a mobile money platform that has revolutionized financial transactions, contributing to economic growth by increasing financial inclusion and facilitating small-scale transactions. According to the World Bank, Kenya's real GDP growth has been positively correlated with the increasing prevalence of digital transactions, underscoring the potential benefits of cashless policies (World Bank, 2020).

The advent and intensification of cashless policy mechanisms in Nigeria, characterized by ATM (Automated Teller Machine), POS (Point of Sale), and Internet banking transactions, represent a transformative shift in the financial landscape of the country, aimed at enhancing economic efficiency, reducing the cost of banking services, and combating financial crimes. The cashless policy, formally introduced by the Central Bank of Nigeria in 2012, sought to decrease the volume of physical cash in circulation, thereby encouraging electronic transactions. This policy has seen a significant uptick in digital financial transactions, with ATM, POS, and Internet banking transactions growing exponentially.

Nigeria boasts a wealth of resources that signal vast potential for sustained economic growth and development. These resources span extensive oil and gas reserves, fertile agricultural lands, abundant solid minerals, and a diverse human capital base. Despite these inherent advantages, the journey towards economic prosperity has been fraught with challenges. Successive Nigerian governments have endeavoured since 1960 to leverage these assets towards catalyzing robust economic growth. However, the outcomes have frequently fallen short of expectations, often attributed to the misdirection of resources away from productive sectors critical for driving growth (Abdullahi, 2022). This misallocation has resulted in the economy operating below its potential, notwithstanding the implementation of various ambitious policy strategies aimed at economic management and growth.

In alignment with the aspirations to elevate Nigeria's economic trajectory, the Nigeria Vision 2020 set an ambitious target for the Real Gross Domestic Product (RGDP) growth rate to reach 10% by 2009. Yet, the reality has starkly deviated from these goals. World Bank data reveals that Nigeria recorded an RGDP growth rate of merely 2.21 percent in 2019, a slight improvement from 1.92 percent in 2018 but considerably below the envisioned targets. This growth rate pales in comparison to other nations such as Ghana, with RGDP growth rates of 6.26 percent and 6.48 percent in 2018 and 2019 respectively, and India, which saw growth rates of 6.12 percent in 2018 and 5.02 percent in 2019. The Nigerian economy experienced a significant contraction of -3.62 percent in Q3 2020, indicative of a recession, exacerbated by the global economic downturn triggered by the COVID-19 pandemic (CBN, 2020). Although a marginal recovery was noted with GDP growth of 0.51% year-on-year in the first quarter of 2021, the recovery pace has been slow, underscoring a need for accelerated growth to match the

population increase of 2.5% per annum and enhance living standards (NBS, 2021). This backdrop necessitates a critical examination of the impact of cashless policy intensity on economic growth in Nigeria which is the main objective of this paper while specific objectives are to:

i. Examine the impact of ATM transaction intensity on per capita income growth in Nigeria.
ii. Analyse the impact of POS transaction intensity on economic growth in Nigeria.
iii. Evaluate the impact of Internet transaction intensity on economic growth in Nigeria.

As a fellow up to the specific objectives the paper formulated the following hypotheses as:

H_{01}: ATM transaction intensity has no significant impact on economic growth in Nigeria
H_{02}: POS transaction intensity has not significantly enhanced Nigeria's economic growth
H_{03}: Internet transaction intensity has no significant impact on Nigeria's economic growth

Literature Review

Conceptual Review

Cashless Policy Intensity

Adebisi and Gbegi (2013) defined cashless policy as a situation where the volume of the physical cash in circulation is reduced, thereby encouraging the use of electronic banking services. Similarly, Chibba (2012) discusses the transition to cashless economies as an essential step towards enhancing financial inclusion, reducing transaction costs, and improving economic efficiency. While Odior and Banuso (2012) defined cashless policy as a policy that aims to reduce the amount of physical cash circulating in the economy while encouraging more electronic-based transactions. Therefore, the cashless policy initiative encompasses a broad spectrum of electronic payment mechanisms, including but not limited to transactions through Automated Teller Machines (ATM), Point of Sale (POS) systems, and Internet banking platforms. The intensity of these policies is often measured by the volume and value of transactions conducted through these channels relative to the overall economic activities, as indicated by the Gross Domestic Product (GDP).

ATM Transaction Intensity, as a concept within the broader discourse of cashless policy and digital finance, focuses specifically on the extent and depth of Automated Teller Machine (ATM) usage for financial transactions in an economy. Adeoti (2013) defines ATM Transaction Intensity as the ratio of the value of transactions conducted through Automated Teller Machines (ATMs) to the Gross Domestic Product (GDP) of a country. On the other hand, POS (Point of Sale) Transaction Intensity captures the extent to which POS systems are utilized for conducting financial transactions within an economy, providing a measure of the penetration and effectiveness of these systems relative to overall economic activities, often against benchmarks such as the Gross Domestic Product (GDP). Thus, Okoye and Ezejiofor (2013) described POS Transaction Intensity as a measure of the volume and value of financial transactions conducted through POS terminals relative to the overall economic activity in a country. Finally, internet transaction intensity refers to the degree and volume of financial transactions conducted online relative to the overall economic activity, typically measured against indicators like Gross Domestic Product (GDP) (Agboola *et al.,* 2018). Onyeji and

Nwoke (2017) defined internet transaction intensity as the level of acceptance and usage of online payment systems in an economy.

Economic Growth

Economic growth, often quantified by Real Gross Domestic Product (RGDP) rates, serves as a fundamental indicator of a country's economic health and its capacity for generating wealth over time. Molem and Ndifor (2016) defined economic growth as more output without a change in technical and institutional arrangement. Olanrele and Awode (2022) explained that economic growth occurs when there is an outward shift of the production possibility frontier of a nation denoting that there is an increase in the productive capacity of such a nation. Therefore, economic growth can be measured by Real Gross Domestic Product (RGDP) rates which have adjusted for inflation, providing a more accurate depiction of an economy's size and growth by measuring the value of all goods and services produced within a country in real terms.

Empirical Review

The paper reviewed related empirical studies on the impact of cashless policy intensity on economic growth among is the work of Ogbonna and Appah (2023) who conducted a focused study on Nigeria, analysing data spanning from 2013 to 2022. This study utilized the Fully Modified Ordinary Least Squares (FMOLS) technique to explore the influence of specific cashless policy metrics number of electronic payment transactions, internet banking penetration, and mobile payment adoption on Nigeria's economic growth, represented by changes in Real GDP. The study found a robust and positive correlation between increased adoption of cashless payment methods and economic growth, highlighting the pivotal role of digital financial services in promoting a more dynamic and inclusive economic environment. West African region Nkoro and Uko (2023) examined the effects of cashless banking initiatives on economic growth across Nigeria, Ghana, and Ivory Coast from 2008 to 2021. Leveraging a Panel Vector Autoregression (PVAR) model, their study intricately maps out the positive correlation between the adoption of cashless banking mechanisms such as mobile banking penetration and ATM transaction volumes and the economic growth indicators of the countries in question. The findings underscore the transformative potential of cashless banking in fostering a more efficient, inclusive, and dynamic economic landscape across West Africa.

Using Structural Vector Autoregression (SVAR), Olayemi *et al.,* (2022) examine the impact of cashless policy instruments on Nigeria's economic growth. The study presents evidence of a substantial positive relationship between the proliferation of digital financial services and the enhancement of economic growth metrics, notably highlighting the crucial role of electronic wallets in promoting financial inclusion and, consequently, stimulating economic activity. Additionally, Chukwu and Okoye (2022) provided a comparative perspective by examining the impact of cashless economic policies on economic growth in selected African countries, including Nigeria, Kenya, and Egypt, from 2007 to 2020. Utilizing the Dynamic System Generalized Method of Moments (Sys-GMM) to analyze the data, this study highlights the significant role of digital financial inclusion measured through indicators like mobile money

subscriptions, internet banking usage, and ATM accessibility in propelling the economic growth of these nations. The research underscores the effectiveness of cashless policies in stimulating economic activities by providing more accessible and efficient financial services.

In another study, Onaolapo (2022) presents a novel study within the Nigerian economic framework, scrutinizing the period from 2010 to 2020. This research sets itself apart by employing the Autoregressive Distributed Lag (ARDL) model to investigate the long-term and short-term impacts of cashless policy indicators specifically focusing on electronic cheque clearing, mobile money services, and internet banking on Nigeria's GDP growth. The findings underscore a significant and positive long-term relationship between the broad adoption of cashless payment systems and economic growth, with a particularly strong emphasis on the burgeoning role of mobile money services in propelling financial inclusion and, by extension, economic development. Employing the Dynamic Ordinary Least Squares (DOLS) model Ndegwa and Kariuki (2022) conducted an in-depth examination of the Kenyan economy from 2011 to 2021, to assess the impact of cashless policy implementation. Their study uniquely focuses on the volume of transactions conducted via POS terminals and the growth in the number of mobile banking users, alongside traditional indicators of economic growth such as GDP. The findings underscore a significant and enduring positive impact of cashless transactions on Kenya's economic growth, suggesting that the convenience, security, and efficiency offered by digital payment solutions are key drivers of this positive outcome.

In another study done in Nigeria, Kenya, and South Africa Kariuki and Moronge (2022) examined the effects of cashless policy adoption on economic growth in countries such as from 2008 to 2021. Employing a Panel Co-integration analysis, their research delineates a significant positive relationship between the adoption of cashless policy instruments measured through the usage of digital payments, ATM transaction volumes, and POS terminal availability and economic growth across the region. This underscores the transformative potential of digital financial inclusion in enhancing economic productivity and efficiency. Using Vector Error Correction Model (VECM) Ajao and Ani (2021) captured the short-term dynamics between cashless policy variables such as the number of POS transactions, volume of mobile payments, and the extent of internet banking and Nigeria's economic growth, operationalized through Real GDP. Their findings reveal a pronounced positive impact of these digital financial services on Nigeria's economic development, suggesting that cashless policies significantly contribute to economic efficiency and inclusivity.

In another study done in Nigeria, Kenya, and South Africa between 2010 and 2020 Falana *et al.,* (2021) Utilized Dynamic Panel Data (DPD) analysis to assessed the effect of cashless policy implementation measured through digital payment adoption rates and financial inclusion indices on the economic performance of these countries. Their research underscores a significant positive impact of cashless policy on economic growth, attributing this effect to enhanced financial inclusion and transactional efficiency. While, Kaberia and Mutua (2021) utilized the Johansen Cointegration approach to explore how the depth of mobile money penetration exemplified by services like M-Pesa, Airtel Money, and Equitel Money and the increasing use of internet banking platforms have influenced Kenya's economic trajectory.

Their study finds a robust and positive association between these cashless payment systems and the growth of Kenya's economy, highlighting the instrumental role of mobile money services in enhancing financial inclusion and stimulating economic activities.

Also, employing the Granger causality test and ARDL bounds testing approach Idris *et al.,* (2020) probed the causal relationship and long-term equilibrium between cashless policy indicators such as the volume of mobile payments, ATM transactions, and internet banking activities and Nigeria's economic growth, as indicated by Real GDP. The findings reveal a bidirectional causality between cashless policy adoption and economic growth, suggesting that while cashless policy initiatives foster economic development, economic growth also encourages the further adoption of cashless transactions. In another study, Kasongo and Ngepah (2020) utilized Dynamic Panel Data (DPD) techniques to examine the impact of cashless banking on economic growth across several African countries, including Nigeria, Ghana, and Kenya, over the period from 2008 to 2017., this study measures cashless policy intensity using the number of ATMs, POS devices, and the extent of credit card usage as proxies. Their findings indicate a consistent positive relationship between the adoption of cashless banking technologies and economic growth across the sampled countries, underscoring the crucial role of digital financial services in driving development.

In South Asian context Acharjee and Bose (2020) used the mixed-methods approach, combining quantitative analysis through Co-integration and Error Correction Model (ECM) techniques with qualitative insights from stakeholder interviews to assess the impact of digital financial services on economic growth. By considering variables such as electronic fund transfers, mobile banking transactions, and Internet banking penetration rates as proxies for cashless policy intensity, the study unveils a nuanced yet positive relationship between digital finance adoption and economic growth. The findings emphasize the role of digital financial inclusion in catalyzing economic development by enhancing financial accessibility and reducing transactional inefficiencies. Adopting the Vector Error Correction Model (VECM) Aminu and Emeka (2019) scrutinized the relationship between cashless policy implementation measured through indicators such as the volume of electronic fund transfers, mobile payment adoption rates, and internet banking utilization and the country's economic growth, specifically looking at Real GDP growth rates. The study unveils that while mobile payments and Internet banking positively affect economic growth, the magnitude and significance of these effects vary, with mobile payments showing a stronger positive correlation and the work contributes to the literature by highlighting the transformative potential of mobile payment systems in enhancing Nigeria's economic landscape. Utilizing the Autoregressive Distributed Lag (ARDL) model Adebayo and Olukotun (2019) examined the relationship between cashless policy instruments namely ATM transactions, POS transactions, and mobile banking transactions as independent variables and Nigeria's economic growth, measured by Real GDP, as the dependent variable. Their findings suggest a robust positive impact of cashless policy instruments on Nigeria's economic growth, highlighting the crucial role of digital financial services in enhancing economic efficiency and fostering a more inclusive financial ecosystem.

Theoretical Framework

The Endogenous Growth Theory, particularly as articulated by Paul Romer (1990), serves as a compelling theoretical framework for analysing the impact of cashless policy intensity on economic growth in Nigeria. At its core, this theory posits that economic growth is driven by internal factors such as technological innovation, knowledge accumulation, and human capital, all of which are influenced by policy decisions and investment. A key mathematical specification from Romer's model can be represented as:

$$Y = A \cdot K^{\alpha} \cdot L^{\beta} \cdot T^{\gamma} \quad (1)$$

In this extended model:

Y represents the real GDP or output of the economy, A stand for the level of technology, reflecting general productivity factors outside of capital, labour, and specific technological innovations; K is the capital stock, including both physical and financial capital; L denotes labour, encompassing both the quantity and quality (human capital) of the workforce and T represents technology in the financial sector, specifically innovations related to cashless transactions. T further signifies research and development efforts, capturing the essence of innovation within the economy. The parameters and reflect the output elasticities of capital, labour, and technology, respectively, showing their contribution to growth, and indicating how changes in the volume or intensity of these transactions influence economic output.

Applying the Endogenous Growth Theory's framework and its mathematical specification to the context of cashless policy intensity and economic growth in Nigeria allows for a dynamic understanding of how digital financial technologies (as part of technology in the broader sense) can stimulate economic development. Cashless policy instruments such as ATM Transaction Intensity, POS Transaction Intensity, and Internet Transaction Intensity can be conceptualized as modern innovations within the financial sector, enhancing the efficiency of capital and labour, and potentially leading to a higher level of 'A', or technological advancement, in the economic model.

By incorporating these cashless transaction modalities into the economy, the theory suggests that Nigeria can achieve a higher rate of economic growth, as these innovations make transactions more efficient, reduce transaction costs, and potentially increase the overall productivity of both capital and labour. For instance, ATM Transaction Intensity reduces the need for physical banking, POS transaction intensity facilitates smoother retail transactions, and internet transaction intensity enables broader access to financial services. These factors can collectively enhance the technology component in the Endogenous Growth Theory equation, leading to a higher Y or Real GDP growth rate. Therefore, the Endogenous Growth Theory, with its emphasis on innovation and knowledge as key drivers of growth, provides a theoretical basis for understanding how investments in cashless policy infrastructure and technology can significantly contribute to economic growth. This model underscores the potential of cashless policy intensity to act as a catalyst for enhancing the productive capacity of the Nigerian economy, thereby accelerating its growth in real GDP terms.

Methodology

Research Design, Sources, and Nature of Data

This study utilized a quantitative research design, focusing on statistical analysis and numerical data to understand phenomena. By collecting substantial data and using statistical techniques, the research investigated the impact of cashless policy on economic growth in Nigeria. The data used for this paper consist mainly of annual secondary data that is relevant to the study and were obtained from published sources such as Central Bank of Nigeria (CBN) publications and the National Bureau of Statistics (NBS). The data collected in annual forms are ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI), Internet Transaction Intensity (ITI) and economic growth.

Model Specification

The study adopts and modifies the model framework of Mieseigha and Ogbodo (2013) who examined the relationship between cashless policy and liquidity of banks represented as:

$$BL_t = \phi_o + \phi_1 ATM_t + \phi_2 POS_t + \phi_3 WBT_t + \mu_t \quad (2)$$

Where; BL is Bank Liquidity, ATM is the Volume of ATM transactions, POS is the Volume of Point-of-Sale Transactions and WBT is the Volume of web-based Transactions. In alignment with the focal theme of this study on the impact of cashless policy intensity on economic growth in Nigeria, the mathematical specification of the model is tailored to explain the relationship between the principal indicators of cashless policy intensity and economic growth. Thus, the model that outlines the connection between ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI), Internet Transaction Intensity (ITI), and RGDP growth is expressed as follows:

This adapted approach enables a unique examination of how cashless policy ATM transactions, POS transactions, and internet-based transactions, measured in terms of their intensity relative to the overall economy play a pivotal role in influencing Nigeria's economic growth trajectory. Through this, the model aims to capture the direct contributions of these cashless transaction mechanisms to the enhancement of economic efficiency and growth, reflecting the broader shift towards a digital economy and it is mathematically captured as:

$$RGDP = f(ATI, PTI, ITI) \quad (3)$$

Setting up the equation (3) in a linear stochastic form (or econometric form) we have:

$$RGDP_t = \alpha_o + \alpha_1 ATI_t + \alpha_2 PTI_t + \alpha_3 ITI_t + u_t \quad (4)$$

Where; RGDP is the Real Gross Domestic Product, ATI is the ATM Transaction Intensity, PTI is the POS Transaction Intensity, ITI is the Internet Transaction Intensity, α_0 is the Intercept or autonomous parameter estimates for cashless policy intensity, $\alpha_1, \alpha_2, \alpha_3$ = Coefficients of ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI), and Internet Transaction Intensity (ITI) and u_t is the Stochastic term. Thus, equation (5) is the specification of the Autoregressive Distributed Lagged (ARDL) model that was used to examine the impact of cashless policy intensity on economic growth in Nigeria and as specified as follows:

$$\Delta rgdp_t = \alpha_0 + \sum_{i=1}^{q} \alpha_1 rgdp_{t-1} + \sum_{i=1}^{q} \alpha_2 ati_{t-1} + \sum_{i=1}^{q} \alpha_3 pti_{t-1} + \sum_{i=1}^{q} \alpha_4 iti_{t-1} + \alpha_5 \Delta rgdp_{t-i} + \alpha_6 \Delta ati_{t-i} + \alpha_7 \Delta pti_{t-i} + \alpha_8 \Delta iti_{t-i} + \mu_t \quad (5)$$

Where: Δ is First difference operator, α_0 is Constant parameter, $\alpha_1, \alpha_2, \alpha_3, to \alpha_4$ are Parameter Co-efficient in the long-run dynamics and μ_t is the Error term.

Variable Description, Measurements and A-priori Expectation

Table 1 presents the variable description and measurements used in the study:

Table 1: Variables Description and Measurements

Variable	Acronym	Description	Measurement	Source
Real GDP Growth	RGDP	Real GDP Growth, measured in percent, is the dependent variable of interest, representing the annual percentage change in the value of all goods and services produced by an economy, adjusted for inflation.	Quarterly Percentage (Quarterly %)	CBN Statistical Bulletin (2022)
ATM Transaction Intensity	ATI	ATM Transaction Intensity (ATI) is a pivotal variable in understanding the depth and impact of cashless policy on an economy. It is measured as the ratio of total ATM transactions to the Gross Domestic Product (GDP) within a specific period, typically a year.	Measured as ATM Transactions ratio to GDP (Quarterly ₦' Billion)	CBN Statistical Bulletin (2022)
POS Transaction Intensity	PTI	POS Transaction Intensity (PTI) captures the extent to which Point of Sale (POS) devices are utilized for financial transactions in the overall economy. This is quantified as the ratio of the value of transactions processed through POS terminals to the GDP.	Measured as POS Transactions ratio to GDP (Quarterly ₦' Billion)	CBN Statistical Bulletin (2022)
Internet Transaction Intensity	ITI	Internet Transaction Intensity (ITI) reflects the volume of financial transactions conducted over the Internet, including online banking and e-commerce activities, as a proportion of GDP. This ratio highlights the role of the Internet in facilitating financial transactions and the degree to which an economy has embraced digital finance solutions.	Measured as Internet Transactions ratio to GDP (Quarterly ₦' Billion)	CBN Statistical Bulletin (2022)

Source: Researcher's Computation, 2024

The a priori expectation is that $\beta_1, \beta_2 and \beta_3 > 0$ indicating a positive or negative relationship between the dependent and independent variables, that is, increase in cashless policy intensity variables like ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI), Internet Transaction Intensity (ITI) will lead to increase in Real GDP Growth in Nigeria.

Method of Analysis

This paper employed the Autoregressive Distributed Lagged (ARDL) for the analysis and the estimation of economic variables used in this paper. Also, the choice of the method is particularly appropriate given the study's focus on establishing a robust long-term and short-term relationship between variables such as ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI), Internet Transaction Intensity (ITI), and Real GDP Growth which was developed by Pesaran & Shin (1999) and further expanded by Pesaran *et al.,* (2001) the procedure allows the researcher to use variables that are not integrated in the same order.

Presentation and Interpretation of Results

Descriptive Analysis

The results from Table 1 provide descriptive statistics for Real GDP (RGDP) and three key indicators of cashless policy: as ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI) and Internet Transaction Intensity (ITI). By analyzing these statistics, we can derive some insightful observations regarding the distribution and behaviour of these variables in the context of our previous discussions.

Table 2: Descriptive Statistics Results

	RGDP	ATI	PTI	ITI
Mean	3.420871	1081.450	321.4582	68.58643
Std. Dev.	2.914187	621.3759	337.3208	71.61215
Skewness	0.281747	-0.22423	0.577949	0.845020
Kurtosis	2.411854	1.648086	1.736692	2.071148
Jarque-Bera	1.548032	4.733847	6.841440	8.677675
Probability	0.461157	0.093769	0.032689	0.013052
Observations	56	56	56	56

Source: Researcher's Computation Using EViews-12 (2024)

The mean result shows that RGDP has an average of 3.420871%. This suggests moderate economic growth, indicating that the country's production of goods and services, when adjusted for inflation, has seen an uptick. The ATM transaction intensity has a significantly higher mean value of ₦1081.450 billion, indicating a substantial volume of transactions being processed through this medium. The POS transaction intensity has an average transaction value of ₦321.4582 billion, while internet transaction intensity stands at ₦68.58643 billion. These figures emphasize the popularity of the ATI as a transaction method, with POS coming in second, and internet payments still catching up.

In terms of volatility, as gauged by the standard deviation, all the cashless policy indicators show substantial variation. ATM transactions, while high on average, also display considerable fluctuation with a standard deviation of ₦621.3759 billion. The POS transaction and internet payments have standard deviations of ₦337.3208 billion and ₦71.61215 billion respectively, showcasing inherent variability in these transaction methods over the observed period. The skewness values provide insight into the asymmetry of the data distributions. A positive skewness indicates a distribution with a tail on the right, and a negative skewness

points to a distribution with a tail on the left. The RGDP, PTI, and ITI display positive skewness, suggesting that the distribution of these variables leans towards the right, with a few exceptionally high values. In contrast, ATM transactions have a slight negative skewness, suggesting at a few notably low transaction values. The kurtosis values shed light on the "tailedness" of the distribution. RGDP, PTI, and ITI all have kurtosis values closer to 2, implying a distribution more flat-topped than a normal distribution. ATM's kurtosis is notably lower, suggesting a relatively more peaked distribution with lighter tails.

Lastly, the Jarque-Bera statistic tests the hypothesis that the data is normally distributed. The higher the value, the further the data is from a normal distribution. In our table, ITI has the highest Jarque-Bera value, indicating the most significant deviation from normality. The corresponding probability values for each variable indicate the significance of the Jarque-Bera test. For our data, ITI and PTI have probabilities of 0.013052 and 0.032689 respectively, both below the common 0.05 significance level, suggesting that their distributions deviate from normality.

Stationary Tests (Unit Root Tests)

Unit root tests are quintessential in time series econometrics, determining the stationarity of a dataset. The Augmented Dickey-Fuller (ADF) test, which is highlighted in Table 4, offers insights into the presence or absence of unit roots in the series, effectively highlighting their stationarity levels. This is essential, as non-stationary data can lead to spurious regressions, thus giving misleading conclusions. This paper thus discusses the results of the ADF test as presented in Table 3.

Table 3: Summary of Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	P-value	Order of Integration
RGDP	-2.773813	-2.596116	0.0688	I(0)
ATI	-2.843257	-2.597905	0.0594	I(1)
PTI	-4.099823	-3.557472	0.0021	I(1)
ITI	-8.634477	-3.560019	0.0000	I(1)

Source: Researcher's Computation Using EViews-12 (2024)

For RGDP, the ADF test statistic stands at -2.773813. This value is more negative than the critical threshold of -2.596116 at the 10% significance level. This implies that the RGDP series may not be stationary at the conventional 5% threshold, but it exhibits stationarity at the 10% level. As such, RGDP is represented as integrated of order zero, 1(0), meaning it's stationary without any differencing requirement. However, for ATM, its ADF test statistic is -2.843257, showing that it is stationary at the 10% significance threshold given by -2.597905. It showed that the ATM series requires first differencing to achieve stationarity and is integrated of order one, 1(1). With an ADF value of -4.099823 for PTI and -8.634477 for ITI, they both significantly exceed their respective 5% critical thresholds. This indicates that both series are non-stationary in their original forms but achieve stationarity after a first differencing, and hence, they're represented as 1(1) in their order of integration.

Co-integration of ARDL-Bounds Test

Table 4 shows the ARDL bounds test for co-integration that was carried out for the economic variables used in this paper which are ATM Transaction Intensity (ATI), POS Transaction Intensity (PTI) and Internet Transaction Intensity (ITI).

Table 4: ARDL-Bound Testing

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	5.897358	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

Source: Researcher's Computation Using EViews-12 (2024)

The result in Table 4 revealed that the F-statistic value from the ARDL bounds test is 5.897 and when compared with the critical values obtained from the Pesaran Table at a 5% level of significance, its value exceeded both 4.01 and 5.07 for 1(0) and 1(1) respectively. This implies that the dependent variable and the independent variables are co-integrated at a 5% significance level and the paper proceeded to use the Autoregressive Distributed Lagged (ARDL) for the analysis.

Table 5: ARDL Regression Results
Dependent Variable: RGDP

Co-integrating Estimates (ECM Estimates)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(RGDP(-1))	0.752647	0.085353	8.818094	0.0000
D(PTI)	-0.005898	0.001491	-3.955075	0.0003
D(PTI(-1))	0.003227	0.001608	2.006567	0.0507
CointEq(-1)*	-0.131559	0.032290	-4.074350	0.0002
R-squared	0.980676			
Adjusted R-squared	0.977736			
F-statistic	333.4900			
Prob. (F-statistic)	0.000000			
Durbin-Watson stat	2.215193			
Long Run				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
ATI	-0.003220	0.001507	-2.136755	0.0380
PTI	-0.004119	0.003665	-1.123947	0.2669
ITI	0.026219	0.014830	1.767958	0.0837
C	6.423381	1.137898	5.644955	0.0000

Source: Researcher's Computation Using EViews-12 (2024)

Table 5 shows the ARDL long-run and short-run results of the impact of cashless policy intensity on economic growth in Nigeria. Thus, the short-run result and the ECT show the 1-

period lag Error Correction Term and its value of -0.131559 revealed that it is negative and statistically significant with a probability value of 0.0002 at a 5 percent significant level. This means that the average speed of adjustment from the short run to the long run should there be any disequilibrium is 5%. The result also revealed that that ATI, which represents ATM Transaction Intensity in Nigeria shows a negative coefficient value of -0.00322. This suggests that as ATM Transaction Intensity increase, economic growth also tends to decrease. In addition, the t-Statistic value of -2.1305, which yields a probability value of 0.038 indicates that the negative relationship between ATI and economic growth is statistically significant, and we can confidently assert that an increase in ATM Transaction Intensity will lead to a reduction in economic growth in Nigeria.

Similarly, the variable PTI which is the POS transaction intensity has a negative coefficient of -0.004119 which suggests an inverse relationship between POS transaction intensity and economic growth in Nigeria. Also, its t-statistic of -1.123949 aligns with a probability value of 0.2669, indicating that this inverse relationship is statistically insignificant at the 5% level and this implies that an increase in POS transaction intensity will lead to a little or no decrease in economic growth. On the other hand, the variable ITI stands for internet transaction intensity which exhibits a positive coefficient of 0.026219. With a t-statistic value of 1.7679 and a probability value of 0.0837, it shows that the relationship is statistically insignificant at the 5% level. This suggests that an increase in internet transaction intensity is likely associated with a boost in economic growth if well implemented.

Furthermore, the R-squared value of 0.98, shows that approximately 98 percent of the variability in the dependent variable (RGDP) is explained by the independent variables (cashless policy indicators) included in the model. This suggests a reasonably strong explanatory power of the model. However, a more conservative measure of fit is the Adjusted R-squared, which accounts for the number of predictors in the model. While the value is 0.977, or 97.7 percent. This indicates that after adjusting for the number of predictors which does not significantly contribute to the model, about 97.7 percent of the variance in the dependent variable is still explained by the independent variables (cashless policy variables). The F-statistic value of 333.49 and its associated probability (Prob(F-statistic)) of 0.0000 are vital in determining the overall significance of the regression model and the very low probability value, significantly below the typical 0.05 threshold, suggests that the regression model is statistically significant. In other words, the independent variables, as a set, do have a significant effect on the dependent variable.

Lastly, the Durbin-Watson statistic, which is 2.215 in this case, is a test for the presence of autocorrelation in the residuals from a regression analysis. Given that the value is close to 2, it implies that there is no significant autocorrelation among the residuals. This is a desirable property, as the presence of autocorrelation could violate the assumptions of ordinary least squares regression and potentially render the results unreliable. Furthermore, **H_{01}:** stated that ATM transaction intensity has no significant impact on economic growth in Nigeria and based on the ARDL regression, the determined t-value for the association between ATM transactions and Nigeria's economic growth is -2.1305. This has a related p-value of 0.0380 at

a 95% confidence interval and the null hypothesis (H_{01}) was rejected inferring that transaction intensity significantly influences Nigeria's economic growth which means ATM transaction intensity can reduce the level of economic growth in Nigeria. While **H_{02}:** stated that POS transaction intensity has no significant impact on economic growth in Nigeria. However, given the t-value of -1.123947 and the corresponding p-value of 0.2669 which is greater than 5% the paper accepts the null hypothesis and this implies that POS transaction intensity has no significant impact on economic growth in Nigeria. Finally, **H_{03}:** stated that internet transaction intensity has no significant impact on economic growth in Nigeria. However, given the t-value of 1.767955 and the corresponding p-value of 0.0837 which is greater than 5% the paper accepts the null hypothesis and this implies that internet transaction intensity has no significant impact on economic growth in Nigeria despite its positive relationship with economic growth in Nigeria.

Post Estimation Results

The paper carried out post estimations which are the Breusch-Godfrey serial-correlation test, heteroscedasticity Breusch-Pagan-Godfrey test, the Jarque–Bera testing the normality, and the Ramsey RESET testing the linearity which are presented in Table 6.

Table 6: Post-estimation Test

Tests		Outcomes	
		Coefficient	Probability
Breusch-Godfrey-Serial-Correlation Test	F-stat.	0.519886	0.5982
Heteroscedasticity- Breusch-Pagan-Godfrey Test	F-stat.	2.357240	0.0382
Normality Test	Jarque-Bera	2.698631	0.2594
Ramsey RESET Linearity Test	F-stat.	0.887700	0.3511

Source: Researcher's Computation Using EViews-12 (2024)

The Breusch-Godfrey Serial Correlation Test is employed to detect any autocorrelation in the residuals of a regression. An F-statistic value of 0.519886 with an associated probability of 0.5982 suggests that there isn't any significant evidence of autocorrelation in the model. Thus, the model's residuals do not seem to exhibit patterns that would indicate problems related to autocorrelation. Also, the Heteroscedasticity- Breusch-Pagan-Godfrey Test, which tests for changing variances in the residuals (heteroscedasticity), the results show an F-statistic value of 2.357240 and a probability of 0.0382. These numbers indicate that there's no significant evidence of heteroscedasticity in the model. This means that the variance of the residuals remains constant across observations, which is a fundamental assumption in regression analysis.

The Normality Test, specifically the Jarque-Bera test in this context, checks the assumption that the residuals are normally distributed. With a Jarque-Bera statistic of 2.698631 and a probability of 0.259418, the paper therefore infer that the residuals followed a normal distribution. This is an essential consideration, especially when making inferences about coefficients or conducting hypothesis tests. The Ramsey RESET Linearity Test is utilized to

detect any specification errors in the model. An F-statistic of 0.887700 with a probability of 0.3511 suggests that the model has no significant non-linearities or omitted variables. This implies that the functional form of the model is appropriately specified.

Discussion of Findings

This paper reveals that ATM transaction intensity has a negative and significant impact on economic growth in Nigeria which means that ATM transaction intensity technological advancements and electronic banking have the potential to increase the productivity and economic activities in Nigeria. However, the negative and significant impact of ATM transaction intensity on economic growth in Nigeria as shown by results means that ATM transaction intensity activities has not helped in increasing the economic growth despite the potential of the banking reform this may be due to the fact ATM transaction intensity can reduce the level of savings for high capital accumulations for high level of investment that can increase the economic productivity and growth in Nigeria because ATM transaction intensity encourage easy access to fund which will increase the consumption behaviour of household and on the other hand reduce their savings which is the long-run lead to higher interest rate for investors and thereby reducing the level of investment in the economy. This finding disagreed with the work of Ndegwa and Kariuki (2022) whose findings underscore a significant and enduring positive impact of cashless transactions on Kenya's economic growth, suggesting that the convenience, security, and efficiency offered by digital payment solutions are key drivers of this positive outcome.

Similarly, the result shows that POS transaction intensity has a negative but significant impact on economic growth in Nigeria. Though the POS transaction intensity has a great in increasing the level of financial inclusion and economic activities in Nigeria, the intensity of the banking reform can have negative influence on the consumption and saving pattern of any industrializing and financial growing economy like Nigeria thereby increasing the consumption spending and reducing investment spending due to easy access to financial resources. Supporting this outcome, a study done by Aminu and Emeka (2019) who highlighted the challenges developing countries face when transitioning rapidly to electronic payment systems. Though electronic payment is important for economic growth, they observed that while electronic systems, like POS can lead to increase high level of spending thereby reducing savings for investment activities which can increase economic growth in Nigeria.

Finally, the paper revealed that internet transaction intensity has a positive and insignificant impact on economic growth in Nigeria. The positive relationship between internet transaction intensity and economic growth in Nigeria that internet banking reform is a most for industrial growing economy like Nigeria because it has the potential to boost economic activities by opening up new avenues for trade, simplifying cross-border transactions, and fostering a culture of entrepreneurship. The internet transaction intensity, enabled by web-based payment platforms, provides businesses, especially small and medium enterprises (SMEs), the capability to transcend local markets and tap into a global customer base. This paper's findings align more with the work of Adebayo and Olukotun (2019) who's their findings suggest a

robust positive impact of cashless policy instruments on Nigeria's economic growth, highlighting the crucial role of digital financial services in enhancing economic efficiency and fostering a more inclusive financial ecosystem.

Conclusion and Recommendations

The paper focused on the impact of cashless policy intensity on economic growth in Nigeria and the general expectation is that cashless policy intensity indicators like ATM transaction intensity, POS transaction intensity and internet transaction intensity have great impact on economic growth due to the fact cashless policy intensity is targeted at financial inclusion for economic growth and development. However, the results showed that while cashless policy indicators like ATM transaction intensity and POS transaction intensity have proven to have negative relationship with Nigeria's economic growth but the result shows that the ATM transaction intensity negative impact on economic growth in Nigeria which means that if not effectively managed the ATM transaction intensity can lead to decrease in the economic growth in Nigeria. On the other hand, the internet transaction intensity as positive but insignificant impact on economic growth in Nigeria and this means internet transaction intensity as little of internet transaction intensity on economic growth in Nigeria.

Based on the findings, the following recommendations were raised:

i. The negative and significant impact of ATM transactions intensity on economic growth in Nigeria highlights the crucial role of automated banking services in driving economic activities and this means that ATM transaction intensity activities has not helped in increasing the economic growth despite the potential of the banking reform. Therefore, the paper recommended that the Central bank of Nigeria should through other financial institutions educate the users to know the important of these reforms for savings for economic growth and put incentive to increase more savings in the midst of easy access to financial resources.
ii. On the other hand, the negative and insignificant impact of POS transaction intensity on the economic growth indicates underlying challenges, possibly stemming from the fact that increased POS transaction intensity increase more access to the households which will reduce the level of savings and in the long-run will reduce investment through interest rate as we are facing Nigeria currently, therefore, the paper recommended that Central Banking of Nigeria should increase savings rate to encourage households to increase their for investment and thereby increasing the economic growth in Nigeria.
iii. Finally, the positive and insignificant impact of internet transaction intensity and economic growth emphasizes the burgeoning importance of the internet transaction intensity in the economy. Therefore, the Central Banking of Nigeria should provide the enabling environment for effective use of internet transaction to improve the economic activities in Nigeria thereby increasing the economic growth.

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