Effect of Cashless Policy on Economic Growth in Nigeria Using Autoregressive Distributed Lag Model

Kolade Anna Onarakpoberu[1*], Adenomon Monday Osagie[2], Bilkisu Maijamaa[3], Shammah Emmanuel Chaku[4]

[1]*Ph.D. Research Student, Department of Statistics, Nasarawa State University, Keffi, Nasarawa State, Nigeria*
[2,3,4]*Lecturer, Department of Statistics, Nasarawa State University, Keffi, Nasarawa State, Nigeria*

Abstract— In a cashless economy, credit or debit cards can be used to complete transactions instead of carrying cash as the main form of paying for goods and services. The government's cashless policy discourages the usage of cash and promotes the development of electronic payment systems with an effort to reduce the amount of actual cash in-flow in the economy, though not aimed at eradicating the use of cash in completing any form of payment, but it is to help to minimize the handling of cash and excess cash in circulation in the Economy. Recent research has shown that, in comparison to the expected outcome, the supposed contributions of cashless policies to economic growth are not very significant. Other studies claim that the cashless policy will accelerate the nation's economic growth in line with international best practices. Secondary data was sourced from CBN from 2012-2023, using ARDL Model approach and error correction mechanism which aims to examine the effect of cashless policies on Nigeria's economic growth and provide a broad overview of the use of different e-payment systems in Nigeria. The findings revealed that on the long run automated teller machine value is positively related to GDP but not significant, while Cheque value is negatively related to GDP and significant, Mobile App transfer is positively related to GDP and significant. POS machine values and Online transfer values are negatively related to GDP and not significant while on short-run, Cheque and Online transfers had a positively significant effect on Gross Domestic Product while ATM values, POS machine values, and Mobile App transfer values had no evidence of a short run relationship on GDP in Nigeria. The error correction mechanism showed the presence of co-integration, meaning there exists a long-run relationship among the dependent and independent variables. The study found that cashless policy has positive effect on economic growth in Nigeria, and recommended Central Bank of Nigeria should make sure that all banks provide their clients with good and functional ATM services. This is anticipated to accelerate the use of alternative payment methods, one of the justifications for implementing the cashless policy.

Index Terms— Cashless economy, Cashless policy, Central Bank of Nigeria, Gross Domestic Product, Economic growth.

1. Introduction

In a cashless economy, transactions are expected to be carried out electronically via credit and debit cards, electronic clearing, and through payment systems like the national electronic funds transfer (NEFT) and the prompt payment service (IMPS). A cashless economy provides one the opportunity in which the purchases of goods and services can be done using credit or debit cards instead of having to carry real cash around with you as a means of trade. In an attempt to limit the quantity of cash in an economy, the government's cashless policy will help to discourage the use of cash which will boost the growth of e-payment systems. This cashless policy strategy is intended to limit the carrying of cash at hand and also reduce the amount of currency in circulation, not just completely doing away with the use of cash to complete transactions. The Central Bank of Nigeria launched the cashless policy in the year 2012. The cashless policy was tested in Lagos State beginning on January 1, 2012 and on July 1, 2013, this policy's second phase went into effect in six other states which are Anambra, Rivers, Kano, Abia, Ogun, and Abuja on July 31st, 2014, the cashless policy's full implementation began nationwide. The cashless policy, according to the Central Bank of Nigeria, was implemented for a variety of important reasons which will help to support the modernization and growth of our payment system in keeping with the vision 2020 Nigeria which is aimed at becoming one of the top 20 economies in the world by the year 2020. Despite having admirable goals, the policy's adoption was delayed soon after the Lagos pilot program came to an end due to worries about its execution at a national level. The main concern was Nigerian banks' and industry stakeholders' capability and ability to provide a reliable, effective, and conveniently accessible infrastructure across the country in order to achieve a statewide roll-out (Akeem, 2017). An effective and modern payment system is a significant contributor to economic growth and has a positive relationship with the development of an economy. The cost of banking services may reduce if various transaction alternatives are made available in reaching more customers, which will boost financial inclusion and encourage the productivity of the cashless policy to control high rate of inflation and fostering economic growth. But the Central Bank of Nigeria Act of 2007 explicitly grants the CBN the authority to supervise and control

the payment networks. The Nigeria Deposit Insurance Corporation and the Nigerian Stock Exchange both supplement this function. The new cashless policy was implemented for a variety of important reasons, such as: i. To aid the growth and transformation of Nigeria's payment system. Economic development and economic growth are both dependent on an effective and contemporary payment system. ii. To help boost financial inclusion by providing different e-payment transaction choices reaching out to a larger crowd and reducing the running cost of banking operations. iii. To tell how well the cashless policy helps to control inflation and improve economic growth. The use of mobile phones and Internet services are the two key elements that have contributed to this historic growth. Even though we still use cash and cheques to make payments today, many other forms of payment, including credit and debit cards, are widely and frequently utilized. The use of paper money is wearing away gradually and slowly. The Automated Teller Machine and the Point-of-Sale Machine, which are utilized by customers primarily as cash dispensers and whose usage has continued to expand, are today's success stories of electronic payment in Nigeria. Within the last decade, our world has become rapidly more digitalize making use of internet platforms for purchases, financial transfers are made via USSD codes, POS transactions and the likes. According to Kumari & Khanna (2017), "adopting a cashless economy strategy improves the country's financial stability and supports the developing economy while also reducing illegally obtained income that is not declared for tax purpose" "The increase in cashless payments has the potential to cause an increase in Gross Domestic Product by using cards and reduced social cost (Choudhary, 2018)". Furthermore, cashless and digitalization have positive externalities on an economy. It will stimulate other sectors like telecom sector and e-commerce to thrive (Maurya P., 2019). (Ulfi, 2020), "Transactions that provide this convenience can also trigger a reduction in administrative costs and reduce the risk of crime which in turn for the government can increase the level of tax collection, financial inclusion and will stimulate economic growth". Because physical cash is essentially untraceable and thus becomes a useful tool in the hands of criminals, this cashless policy will assist people in handling less cash, reduce bank robberies, burglaries, and theft, as well as reduce corruption. In contrast, digital currency is less easy to exploit and is extremely traceable even when it goes to the wrong account thanks to the use of a single Bank verification number. The introduction of the cashless policy in Nigeria is anticipated to have positive impact on the country's economy but however, being a developing country, the introduction of a cashless policy appears to be hampered by the risk of fraud, numerous deductions, lack of basic technologies, insufficient power supplies, high internet data costs, illiteracy, network issues, and other factors.

A. Problem Statement

The 21st century has seen tremendous technological advancements in almost every aspect of human life, with the emergence of information and communication technology, which is transforming the world into a global village and improving communication and interaction between people and businesses. Examining the justification for the emergence of Nigeria's cashless policy reveals that it is an ICT component designed to reduce the flow of illicit or illegal currency into the economy, improve transaction tracking, and make it easier to conduct financial transactions anywhere and at any time. Divergent opinions exist regarding the direction of the effect of cashless policy on the performance of the Nigerian economy because it is expected that the CBN cashless policy will positively contribute to economic growth in Nigeria, but given the recent challenges faced by Nigerians due to the Naira redesign at the beginning of 2023 and the hardship it posed to the lives of many, it is doubtful if truly these cashless policies are actually intended to strengthen Nigeria's economy given the pain and the inconveniences they caused to so many people's lives. The Nigerian government's cashless policy, which refers to a situation in which the volume of cash-based transactions is limited to an absolute minimum, aims to promote electronic payment systems rather than an outright ban on cash transactions. Although policymakers have successfully and consistently raised public awareness about the use of electronic payment platforms and some literature has shown that there is lack of data on adoption levels and patterns as well as the factors that affect the deployment of technology for efficient service delivery. Recent research has shown that, in comparison to the expected outcome, the supposed contributions of cashless policies to economic growth are not very significant. No matter how much has been written about the benefits that is associated with the adoption of epayment and a cashless society, the general public is still not convinced that the goal is for the benefit of all. The implementation of the cashless policy has been a subject of heated discussions. Other studies claim that the cashless policy will accelerate the nation's economic growth in line with international best practices, while some view it as just another piece of economic jargon that may not be practical or may not achieve its expected aim. Many people have expressed concerns about Nigeria's crumbling infrastructure, in addition to the shortage of financial institutions in the nation. We must assess how infrastructure will affect the implementation of the "cashless economy" rather than assuming that the infrastructure platform required for the cashless economy to function will essentially come with the cashless economy. As a result, we must critically assess the cashless policy's operations to determine whether it is feasible and workable in Nigeria. In order to decide whether the cashless policy is practical and implementable in Nigeria, we must critically evaluate its operations. The Nigerian government's cashless policy refers to a system in which the least amount of transactions are conducted in cash, which aims to promote electronic payment systems rather than an economy completely dependable on cash transactions. The lack of information on adoption levels and patterns as well as the factors influencing the deployment of technology for efficient service delivery was revealed in the literature, which is why this study was conducted despite the public awareness that policymakers have raised about the use of electronic payment platforms. This research will help to find out the effect of cashless policy on

Gross Domestic product in Nigeria and the impact of the introduction to electronic means of cash payments for Cheque verification, credit authorization, withdrawal and deposit of cash through cashless mediums such as the Automated Teller Machine, Point of Sales, Internet banking and the use of Banking Apps with the help of using an econometric model called the autoregresssive distributed lag model, where the variable of interest is assumed to be a function of the past values of itself (auto-regressive) and the current and past values of other variables (distributed lag), as this model can accommodate a variety of lag structures to help separate the long-run and short-run effects and to test for cointegration or the existence of a long-run relationship among variables used, this Model seems to be the best suitable Model for this study because it is an Ordinary least square model which is applicable for both non-stationary time series as well as for time series with mixed order of integration and its approach is used irrespective of whether the series are 1(0) or 1(1) and secondly the dynamic error correction model (ECM) can be derived from the ARDL bounds testing through a simple linear transformation that will show the short-run coefficients alongside the long-run equilibrium and not losing any valid coefficient on the long-run eventually

B. Aim and Objectives

The primary aim of this study is to use an econometric model with two statistical tools in examining the effect of cashless policies on Nigeria's economic growth and to provide a broad overview of the use of different electronic payment systems in Nigeria with the following broad objectives:

1. To study the various electronic platforms set up by the CBN to provide e-payment services and their impact on the Nigerian economy.
2. Using an autoregressive distributed lag model to analyze how Nigeria's cashless policy has affected the use of cheques, automated teller machines, point of sales, online transfers pay and Mobile Pay on the Gross Domestic Product in Nigeria.
3. Using ECM (error correction mechanism) to determine the long- run relationship and short-run coefficient of all the dependents variables used on the Gross Domestic Product in Nigeria.
4. Examine the variables that affect the use of cashless payment technologies in the Nigerian economy.

2. Literature Review

This section briefly reviewed the suitable literature that has been in existence showing the conceptual, theoretical, and empirical view of a cashless economy.

A. Conceptual Review

A cashless economy is an economy where payments and transactions are done without the usage of physical cash. As a result, payments are made through alternative payment methods such as cheques, ATMs, POS systems, Web and mobile banking, etc. According to Ejiro (2012), "a cashless economy enables businesses to be carried out without the need of actual currency as a means of exchange for transactions; instead, purchasing goods and services is done through a credit or debit card''. (Gbanador 2021), "The aim of Cashless Policy is not to do away with cash transactions entirely from the economic system. However, the rationale behind its introduction is to reduce the adoption of physical cash by offering alternative means of payment to consummate transactions". It is worthy to note that, a cashless economy does not define the total removal of the use of cash in doing transactions in totality, but, it serves as a substitute means of making payment transactions without necessarily using cash.

B. Concepts of Cashless Policy Instruments

The channels used to make payments in a cashless economy include automated teller machines (ATM), checkbooks, Point-of-Sale Machines, Internet/Web banking, Mobile banking, bank drafts, etc. Cashless policy instruments used are discussed as follows: I. Automated Teller Machines: These are computerized telecommunication device used by banks to carry out standard teller tasks like cash deposit, money transfer, cash withdrawal, bill payments, opening of bank account, balance inquiry, etc. Using an ATM has allowed bank customers resolve their basic teller services outside the banking facility without using bank tellers. II. Cheques: A cheque book is a financial document provided to customers by their various banks which serves as an instrument which one can fill an expected amount within the reach of the customers bank account balance and given it back to the bank requesting to pay the stated amount written on the cheque to the individual whose name appears on the cheque. The amount is usually written in words and figures and duly signed. All cheques written in favour of an intermediary of not more than ₦10 million has to go through the Central Bank of Nigeria clearing house for approval. A cheque is viewed as a bill of exchange with a banker as the drawee and is payable on demand. A crossing cheque or an open cheque are the two types of cheques that we have. A crossed check can only be collected through a banker to whom the money written on it is transferred, as opposed to an open check, which is payable over the counter. III. Point of Sale (POS) Terminal: It is a mobile device which allows credit card payments for goods and services. By inserting a bank card, entering a personal identification number (PIN), and completing the necessary transaction, this electronic gadget also enables one to make cash transfers, withdrawals, or payments. IV. Internet banking: This is another form of an e-payment channel which enables bank customers to complete specific banking tasks through the website of the banks with the use of a desktop/Laptop or an Android phone enabled by a strong internet. Online banking, ebanking, virtual banking, or web banking are additional terms for internet banking. V. Mobile banking: This electronic payment method enables bank customers to access and manage their accounts as well as help in carrying out a variety of payment transactions using a Mobile/Android phone that has the bank's software or App loaded. After entering a login, password, or PIN to confirm the transaction, the customer is given permission to conduct transactions using a mobile phone. VI. Bank drafts and other

financial instruments: A bank draft carries a guarantee of funds from the issuing financial institution. Personal cheques would often not be used by consumers who handle large transactions under ₦10 million. Instead, they would use bank drafts. Even if bank drafts are paid in cash, the CBN still has a three-day clearing requirement.

C. Theoretical Review

1) The Technology Acceptance Theory

Ajayi (2014) reported that Fred Davis who attended the MIT Sloan School of Management in the year 1985 was the one brought the idea and the use of TAM while he was doing his PhD thesis. Technology Acceptance Model (TAM) adoption in enterprises is suggested by the technology acceptance theory in order to boost economic growth (Ajayi, 2014). One of the ideas created was to propose a good understanding on the use of information technology which brought about the technology acceptance theory. It is currently a well-known hypothesis used in information systems research to model technology acceptance and adoption.

2) Diffusion of Innovations (DOI) or Innovation Diffusion Theory (IDT)

The DOI theory which is also known as the innovation diffusion theory seeks to give details on why the need for new innovations, how important are the innovations and at what rate these new innovative technologies and ideas can spread through diverse cultures (Ajayi, 2014). According to the diffusion of innovation theory, new concepts, habits, methods, or products spread gradually among people as opposed to all at once. Everrett Rogers publicized this idea in his book titled "Diffusion of Innovations", in the year 1962. According to him, he mentioned that Diffusion is an innovation that spreads over time among the people in a social system. According to Rogers, he further explained that the five major factors to which a new idea or new concepts spreads is first through innovation itself, then followed by the adopters, social strata, communication routes, and time.

D. Empirical Review

Although there aren't many empirical studies on cashless policy before now but, central banks and academic scholars have recently begun to pay more attention to the issue (Elechi & Rufus, 2016). Initiating various policies and programs that will encourage the adoption of Nigeria's cashless policy has been a priority for CBN. However, so many worries has been raised over this current move in achieving a cashless economy because there aren't enough concrete and reliable data that will help support the move now. Taiwo, Ayo, Afieroho, and Agwu (2016), collected primary data with the use of a data instrument called a questionnaire which was administered to 120 respondents randomly who are customers from UBA, First Bank of Nigeria and Zenith Bank. They came to a conclusion that even if the current Nigerian economy is dominated by the necessity to conduct cashless transactions, it will only be possible if sufficient effort is made to help fast track the utilization of an effective cashless system that will bring about the desired effect on the economy.

Acha, Kanu, and Agu (2017), "The mechanics, advantages,

and drawbacks of Nigeria's cashless policy", this was evaluated by them with use of descriptive statistics to carry out their analysis. In spite of the benefits that have been found, their findings revealed that Nigerians are increasingly adopting cashless solutions. One such factor is the state of the country's electricity infrastructure. In view of the above, they concluded and suggested that a healthy power supply system should be put in place to foster the cashless policy in Nigeria.

Akara and Asekome (2018), "The effect of the implementation of cashless policy on the profitability performance of commercial banks in Nigeria". The use of automated teller machine and point of sales machine as proxies for the implementation of cashless policy, return on assets (ROA) and return on equity (ROE) as proxies for profit making, with the use of the ordinary least squares method. According to the study's multiple regression analysis, there is a strong positive relationship between Nigeria's commercial banks' profitability and the adoption of cashless policies. The adoption of the use of ATM and POS has helped to boosts bank's ROA and ROE, according to their multiple regression results. They advised strengthening the cashless policy and strategically closing any loopholes and issues with the power supply that could expose fraud.

Ignoroje & Okoroyibo (2019), "The impact of cashless policy on the performance of Deposit Money Banks in Nigeria". Data from 2009–2018 was used to carry out the study. The research design used in the study is the ex-post facto design. A descriptive analysis was done, ADF test was carried out and Philip Perron unit root tests was done, the autoregressive distributed lags (ARDL) test for cointegration among time- related series, and analysis of coefficient were the econometric methods utilized to analyze the data used. The study draws the conclusion that the CBN cashless policy has great benefits on bank's performance based on its findings.

Nwakoby C, Chukwu K.O, and Oghenetega, E.O (2019), "The impact of cashless policy on deposit money banks' profitability". The study used secondary data from 2009 - 2019, and the auto-regressive distributed lag model approach was used. The dependent variable is Profit before Tax, while Mobile Banking, POS, ATM, and Online Payment values were the independent variables. The study's findings demonstrate that Nigeria's Deposit Money Banks' profit before tax is adversely and insignificantly impacted by the country's cashless policy. The study proposes that bank clients be made aware of the importance of the cashless policy from their findings.

Bilkisu M. and Anna K. (2020), "The Effect of Monetary Policy on the Nigerian Banking Sector using the autoregressive distributed lag model approach", the study used time series data spanning from 2004 to 2019. The error correction model was used to determine the existence of a long-run relationship and the short-run coefficient among the variables used. From the study, it showed that MPR and LQR do not have any significant relationship on bank loans and advances, but there is a significant relationship between credit reserve ratio, and money supply on bank loans and advances. Co-integration exist with the use of the error correction mechanism. The research will help monetary authorities and policy makers to implement

fiscal policies that will help boost banking industries in Nigeria.

Teslim A and Moses E, (2022), "The impact of automated teller machines, point of sale terminals, and internet banking transactions on economic growth in Nigeria". The study used primary data that was gathered utilizing tables and descriptive statistics. This study's goals are to determine how automated teller machines, point-of-sale devices, and finally the value of online banking transactions has effect on Nigeria's economic growth. Furthermore, the study came to the conclusion that the cashless policy is crucial to the Nigerian economy and that stakeholders need to continue to push the POS and ATM platforms. The report suggests that the CBN should implement further laws to improve the rules governing point-of-sale terminal activity.

Henry, Anyanwu, and Amakor (2024) investigated the effects of Nigeria's cashless policy on economic growth. Employing an ex-post facto research design, they analyzed time series data from the CBN statistical bulletin (2021), including ATM, POS, mobile banking, web pay transactions, and nominal GDP. Their analysis utilized multiple linear regression and the Granger Causality Test, with the Augmented Dickey Fuller (ADF) Unit Root Test ensuring data stationarity. Findings revealed a positive yet insignificant relationship between ATM transactions and economic growth, a negative but significant impact of POS transactions, a negative yet insignificant impact of Web pay transactions, and a negative yet insignificant impact of mobile pay transactions on economic growth in Nigeria.

3. Methodology

The research design used in the study is the "ex-post facto" research design. This study approach was chosen to prove a causal effect between variables used. The CBN Statistical Bulletin's quarterly time series data for the years 2012 to 2022 were acquired. The Gross Domestic Product (GDP) represents economic growth, while the cashless policy variable is represented by automated teller machines values (ATMV), Point of Sale Values (POSV), Online Transfer Values (OTRV), Cheque values (CHQV), and Mobile App transfer values (MATV).

A. Model Specification

The econometric model is given as:

$$GDP = f (ATMV, POSV, OTRV, CHQV, MATV) \qquad (1)$$

Represented in the model below is the relationship that exists between variables used and can be expressed as:

$$GDP_t = \beta_0 + \beta_1 LATMV_t + \beta_2 LPOSV_t + \beta_3 LOTRV + \beta_4 LCHQV_t + \beta_5 MATV_t + \mu_t \qquad (2)$$

Where:
GDP = Gross Domestic Product.
LATMV = Log of ATM values.
LPOSV = Log of POS values.
LOTRV = Log of online transfer values.
LCHQV = Log of Cheque values.

β_1, β_2, β_3, β_4 and β_5 = coefficients.
β_0 = Intercept.
μt = Error Term.

The ARDL model of equation (2) is specified below

$$\Delta GDP_t = \beta 0 + \sum_{i=1}^{m} + \beta_1 \Delta GDP_{t-i}$$
$$+ \sum_{i=1}^{m} +\beta_2 \Delta ATMV_{t-i}$$
$$+ \sum_{i=1}^{m} +\beta_3 \Delta POSV_{t-i}$$
$$+ \sum_{i=1}^{m} +\beta_4 \Delta LOTRV_{t-i} + \sum_{i=1}^{m} +\beta_5 \Delta CHQV_{t-i}$$
$$+ \sum_{i=1}^{m} +\beta_6 \Delta MATV_{t-i} + \alpha_1 GDP_{t-i}$$
$$+\alpha_2 ATMV_{t-i} + \alpha_3 POSV_{t-i} + \alpha_4 OTRV_{t-i} + \alpha_5 CHQV_{t-i} + \alpha_6 MATV_{t-i}$$
$$+\mu_t \qquad (3)$$

The ARDL specification of the ECM model of equation (3) above can be written as:

$$\Delta GDP_t = \beta 0 + \sum_{i=1}^{m} + \beta_1 \Delta GDP_{t-i}$$
$$+ \sum_{i=1}^{m} + \beta_2 \Delta ATMV_{t-i}$$
$$+ \sum_{i=1}^{m} + \beta_3 \Delta POSV_{t-i}$$
$$+ \sum_{i=1}^{m} + \beta_4 \Delta LOTRV_{t-i} + \sum_{i=1}^{m} + \beta_5 \Delta CHQV_{t-i}$$
$$+ \sum_{i=1}^{m} + \beta_6 \Delta MATV_{t-i}$$
$$+\Delta ECM_{t-i}\mu_t \qquad (4)$$

B. Justification of Methods

The study used the autoregressive distributed lag model approach which was developed by Pesaran. To estimate equation (2), this approach was used based on the facts that the model can be used not minding if the series of study are

stationary at I (0) or I(1) or having both mixtures. Also, it will help to give a robust and high-quality result even though the sample size that is used is either large or small. Lastly, it takes the Error Correction Model into consideration. The ARDL model approach and the error correction mechanism analysis covers for both the existence of a long- run relationship and the shortrun coefficients on variables used.

4. Analysis/Discussion of Findings

A. ARDL Long-run Regression Estimates

The ARDL cointegration technique is used to determine the long-run relationship between series with different integration orders. Table 1 below, from the standard ARDL model to ARDL long-run form and bounds test, helps relate each variable to GDP at long run. If P < 0.05 it is significant but if P > 0.05 it is not significant. LNATMV is positively related to LNGDPV but not significant (P > 0.05). LNCHQV is negatively related to LNGDPV and significant (P < 0.05). LNMATV is positively related to LNGDPV and significant (P <0.05). LNPOSV and LNOTRV are negatively related to LNGDPV and not significant (P > 0.05).

Table 1
ARDL Long-run regression estimates

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNGDP)
Selected Model: ARDL(2, 0, 1, 0, 0, 0)
Case 3: Unrestricted Constant and No Trend
Sample: 2009M01 2023M12
Included observations: 178

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.871183	0.113091	-7.703382	0.0000
LNGDP(-1)*	0.073681	0.010505	7.014171	0.0000
LNATMV**	-0.000562	0.001766	-0.318192	0.7507
LNCHQV(-1)	0.005964	0.002108	2.829000	0.0052
LNMATV**	-0.003190	0.001095	-2.913501	0.0041
LNPOSV**	0.001009	0.001158	0.871120	0.3849
LNOTRV**	0.000607	0.000543	1.116104	0.2660
D(LNGDP(-1))	-0.190433	0.082672	-2.303476	0.0225
D(LNCHQV)	0.002814	0.002083	1.350640	0.1786

 * p-value incompatible with t-Bounds distribution
 ** Variable interpreted as Z = Z(-1) + D(Z)

Table 2 shows that there is no evidence of short-run form for LNATMV. LNPOSV and LNMATV but LNGDPV is negative and significant while LNCHQV is positive but not significant. The error correction mechanism is the speed with which the system comes back to equilibrium stage The speed is positive and at the rate of 7.4 percent and is significant.

B. Evaluation of Estimation Results of the Long-Run Model

This section evaluates the result of the model in signs and magnitudes. By signs, the model checks the nature of the relationship existing between the two variables; that is, whether the result corresponds to economic theory or expectations. Hence, below is a table that evaluates the result of the model based on economic theoretical expectations.

C. Interpretation of Coefficients (By Magnitudes)

1) LATMV

From table 2, the long run coefficient of the log of automated teller machine values is -0.000562. This indicates that the cross elasticity between automated teller machine and real gross domestic product is -0.05%. Hence, holding other variables constant, a percentage increase in the number of automated teller machines will cause a fall in the real gross domestic product by 0.05%. Though this does not conform to economic reality as though by rational expectation, as more automated teller machines are being increased or added to existing ones, more transactions are bound to increase, hence, boosting economic growth

2) LCHQV

The coefficient of the log of cheque values is 0.005964. This indicates that the cross elasticity between cheque values and real gross domestic product is 0.59%. Hence, as the number of cleared cheques increases by one percent and all things being equal, real gross domestic product increases by 0.59%. This conforms with economic reality; it is statistically significant and can be obtainable given that most cleared cheques are not strictly channeled to business activities.

3) LMATV

The log of mobile App transfer has a coefficient of -0.003190. It shows that real gross domestic product has a cross

Table 2
ARDL Short-run & ECM regression estimates

ARDL Error Correction Regression
Dependent Variable: D(LNGDP)
Selected Model: ARDL(2, 0, 1, 0, 0, 0)
Sample: 2009M01 2023M12
Included observations: 178

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.871183	0.086485	-10.07320	0.0000
D(LNGDP(-1))	-0.190433	0.080660	-2.360927	0.0194
D(LNCHQV)	0.002814	0.001725	1.631377	0.1047
CointEq(-1)*	0.073681	0.007287	10.11077	0.0000
R-squared	0.468136	Mean dependent var		0.005315
Adjusted R-squared	0.458966	S.D. dependent var		0.009443
S.E. of regression	0.006946	Akaike info criterion		-7.079075
Sum squared resid	0.008395	Schwarz criterion		-7.007574
Log likelihood	634.0377	Hannan-Quinn criter.		-7.050080
F-statistic	51.05047	Durbin-Watson stat		2.011397
Prob(F-statistic)	0.000000			

 * p-value incompatible with t-Bounds distribution

elasticity of -0.31% which shows a negative relationship between the variables**.**

4) LPOSV

In the long run result table above, log of point-on-sale values has a coefficient of 0.001009 which is about 0.10% degree of responsiveness (cross-elasticity) between point-on-sale and real gross domestic product. Hence, a percentage increase in point-on-sale activities will cause a positive increase in real gross domestic product by 0.10%.

5) LOTRV

With a long run coefficient of 0.000607 /online transfer values and real gross domestic product are about 0.06% cross elastic. Therefore, as the former increases by a percentage, the latter will grow by 0.06%.

D. Short-Run Model & Error Correction Estimate (ECM)

The model result as shown in table 4.6 above gives the coefficients of the variables in the short-run. In the result, most proxies for cashless policy variables are positive in line with *a priori*. This simply shows that even in the short run, cashless policy instruments can still impact economic growth. With a positive sign which is significant, the parameter of the error correction term which co-integrates the long and short run effects show conformity with economic expectation such that it suggests a possibility of adjusting the lags or disequilibrium in the long run. The Error correction model has a coefficient of 0.073681. This means that the disequilibrium in the model will be corrected or adjusted quickly within 0.07 percent.
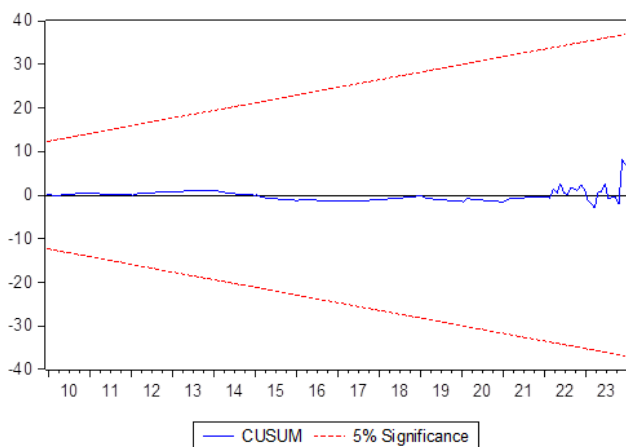

Fig. 1. CUSUM plot output

The straight lines are critical bounds at 5% level of significance. Figure 1 indicates stability in the coefficients over the sample period as the plot of the CUSUM statistic fall inside the critical bound of the 5% confidence interval of parameter stability. Hence, the model appears to be correctly specified and generally stable because the blue lines fall in-between the red lines, thus stating parameters used are stable.

5. Conclusion

From the empirical analysis, the findings of this research revealed that on the long run automated teller machine value is positively related to GDP but not significant. It also showed that Cheque value is negatively related to GDP and significant.

Mobile app transfer value is positively related to GDP and significant. Point of sales machine values and Online transfer values are negatively related to GDP and not significant. The cashless policy had a positively significant effect on Nigeria economy on the short run with Cheque values and Online transfer values while Automated teller machine values, Point of sales machine values, and Mobile app transfer values had no evidence of a short run relationship on economic growth in Nigeria. This study carried out a unit root test to test for stationarity using Augmented dickey fuller's unit root test and all variable used are stationary at first difference. T-test was carried out to test for statistical significance on each of the predictor variables used in the model estimation and it was observed that only two explanatory variables are statistically significant and they are Cheques values and Mobile App transfer values. The study carried out Wald's bound test which is the F-bound test for cointegration and it revealed that F-statistics is 16.5484 which is greater than I(0) = 2.62 and I(1) = 3.79, it suggests that there is cointegration among variables which means there exists a long run relationship among variables used. From the ARDL short- run estimates, the F-test helps to check the joint significance of all the independent variables used and Prob(F-statistics) is 0.000000 which is < 0.05 at 5% level of significance, which shows that the variables of the model are jointly significant. Jacque-bera test for normality helps to check if the model follows the normal distribution with P-value of 0.000000 which is < 0.05 at 5% level of significance showed that the residual term of the model is not normally distributed. Using Breusch-godfrey serial correlation test to test for autocorrelation with a chi-square (χ^2) probability value of 0.5599 which is > 0.05 at 5% level of significance, shows there is no serial correlation in the model since P > 0.05. This means that the residual term is not serially correlated across observations. The Breusch-pagan-godfrey test for heteroscedasticity helps to check if there exists correlation between the regressors and the error term, with a chi-square (χ^2) probability value of 0.000 which is lesser than 0.05 at 5% level of significance, this study rejects H_0 and conclude that there is presence of heteroscedasticity in the error term. A CUSUM Stability test was used to check if coefficients in the regression are changing either systematically or suddenly as the case may be and it indicates stability in the coefficients over the sample period as the plot of the CUSUM statistic fall inside the critical bound of the 5% confidence interval of parameter stability. Hence, the model appears to be correctly specified and generally stable. The study saw a gap and concluded that cashless policy influences economic growth in Nigeria and therefore suggests that the Central Bank of Nigeria should encourage Banks to offer quality ATM services to their customers just like the Mobile App.

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