AN AUTOREGRESSIVE DISTRIBUTED LAG ANALYSIS OF CASHLESS POLICY ON ECONOMIC GROWTH IN NIGERIA

Abstract

The study investigated the effect of cashless policy on economic growth in Nigeria using quarterly time series data spanning through the period of 2012 to 2021 while the research design adopted for the study was the ex-post facto research design. Diagnostic test such as serial correlation, heteroskedasticity and Cusum test were conducted.Phillip-Peron was used to carry out unit root test on the variables while the Auto-Regressive Distributed Lag (ARDL) was used for the data analysis. The findings revealed a significant relationship between Cheque (CQ) and Internet banking (IB) with the Gross Domestic Product while the relationship between the Automated Teller Machine and the Gross Domestic Product is negatively insignificant. The study concludes 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. This is expected to boost the adoption of alternative payment system which is amongst the rationale for introducing the cashless policy.

Keywords: Economic growth; Cashless policy; Cheque**;** Automated Teller Machine; Internet banking; Gross Domestic Product.

1.1 Introduction

The cashless policy is an initiative of government to minimize the quantity of physical cash in circulation by dissuading the use of cash while persuading the adoption of electronic payment system. This policy is not aimed at eliminating the use of cash in consummating transaction, rather, it is meant to reduce physical cash handling and the quantity of cash in circulation (Gbanador, 2021).

The cashless policy was initiated by the Central Bank of Nigeria in the year 2012. A test run of the cashless policy took off in Lagos state on January 1, 2012. The second stage of this policy was implemented in Abia, Anambra, Kano, Ogun, Rivers state and the Federal Capital Territory on July 1, 2013 while a nationwide implementation of the policy kick started on July 31, 2014 (CBN, 2019).The cashless policy is geared toward strengthening the adoption of electronic payment channels like the automated teller machine (ATM), point of sale (POS), mobile banking, NIBSS instant payment, NIBSS electronic fund transfer, etc or alternative payment channel such as cheques.

Ajayi (2014) is of the opinion that cashless economy depict an environment whereby monetary transactions are consummated without movement of physical cash. However, Omotunde, Sunday and John-Dewole (2013) stipulates that cashless economy does not mean the complete eradication of cash transactions in an economy rather it is an economic situation whereby electronic channels are used to pay for transactions.

It is expected that the implementation of cashless policy in Nigeria will influence economic growth in Nigeria. However, as an emerging economy the adoption of cashless policy seem to be hindered due to possibility of fraud, multiple deductions, poor power supply, high cost of internet data, illiteracy, network challengeand lack of basic technology to drive the process, etc. This is collaborated with CBN (2019) and Gbanador (2021) when they assert thatthe use of cash in consummating financial transaction in Nigeria is still high as a result of factors like poor network connections, high transaction cost, security and technical setbacks which constraints the adoption of cashless policy.

In assessing the influence of cashless policy on the performance of the Nigerian economy, there exist divergent views regarding the direction of this influence. The adoption of the CBN cashless policy contributes positively to economic growth in Nigeria (Okafor, 2020; Agu & Agu, 2020; Ignoroje and Okoroyibo, 2020). Conversely, some studies posits that the presumed contributions of cashless policy to economic growth is not enormous compared to the desired result. Thus certain actions should be taking to achieve a better result(Nwakoby, Chukwu & Oghenetega, 2020; Chukwuma, Onodugo and Eeamama, 2020). This is partly what prompted Omotunde, Sunday and John-Dewole (2013) to suggest in their study that the "*modernization of Nigeria payment system, reduction in the cost of banking services, reduction in high security and safety risks"*will help in enhancing the impact of cashless policy on economic growth?

Most of the studies conducted on cashless policy in Nigeria focused majorly on electronic payment channels like the mobile banking, ATM and POS due to their prominence amongst user. Most of these studies also x-ray the influence of cashless policy on banks' performance rather than the economy. This created a gap which this study tries to bridge by introducing cheque amongst the independent variables while the Gross Domestic Product is adopted as the dependent variable. The essence is to evaluate the link between cashless policy and the growth of Nigeria economy.

2.0 Literature Review

This subsection took a cursory look at the relevant literature from the conceptual, theoretical and empirical point of view.

2.1 Conceptual Review

A cashless economy depicts an economy whereby transactions are consummated and payments are made without the use of physical cash. Thus, payments are made via alternative payment channels such as cheques, Automated Teller Machine, Point of Sale, Web banking, mobile banking, etc. Ejiro (2012) is of the opinion that a cashless economy allows business to be carried out without using physical cash as a medium of exchange for transaction but instead, credit or debit card is adopted in paying for goods and services.

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. Conversely, cashless economy tends to minimize the quantity of cash in the economy rather than eliminating the use of cash entirely (Ignoroje and Okoroyibo , 2020). As it could be observed, cashless economy does not depict the elimination of cash transactions. Rather, it presents an alternative mode of consummating transactions without the use of physical cash. Some of the channels through which payments are made in a cashless economy includes; cheques, ATM, POS, internet banking, mobile banking, etc. These payment channels are hereby discussed in turns.

(a) Cheques: This is "*a bill of exchange drawn on a banker and payable on demand*" (Bill of Exchange Act, 1990). In this case, a cheque could be seen as a bill of exchange whose drawee is a banker. Cheque is classified either as an open cheque or a crossed cheque. An open cheque is payable over the counter and it does not undergo clearing at the clearing house. Conversely, any cheque that bears two parallel transverse lines across its face is a crossed cheque. A crossed cheque is account payable, thus, cannot be cashed over the counter except it is opened. A crossed cheque is termed open if the drawer signs in the parallel line.

(b) **Automated Teller Machine:** It is a computerized telecommunication device that banks deploy to perform some basic teller services like cash withdrawal, cash deposit, fund transfer, bills payment, account balance enquiry, account opening etc. With the use of

ATM, bank customers can access the basic teller services outside the banking hall without direct interaction with a bank teller.

(c) **Point of Sale (POS) Terminal**: This is a portable device or machine that enables payment for goods and services using a bank card. In Nigeria, POS is used in supermarkets, petrol stations, boutiques, churches, etc. It is a valid means of payment amongst urban dwellers. As an electronic payment system, using the POS requires the cardholder to insert a bank card in the machine, input his personal identification number (PIN) and the amount to be debited and then press enter (OK) to effect payment. Once the transaction is completed, the machine will print two copies of receipt. One of the receipts is for the cardholder while the other is for the merchant (Gbanador, 2021).

(d) Internet banking: Thistype of electronic payment channel allows the bank customer to perform certain routine banking services via the bank's website using a personal computer that has internet access. The internet banking is otherwise known as web banking or online banking. The internet banking channel creates an avenue whereby a bank customer can consummate certain routine banking transactions via the web without physical interaction between the customer and the bank staff.

(e) Mobile banking: It is an electronic payment system that allows the bank's customer to consummate financial transactions via a mobile phone. Mobile banking is performed using a Smartphone or similar device that is installed with the bank's software. It may also require the customer to do a simple biometrics to enable its usage. The customer is usually granted access to consummate transactions via the mobile phone after signing in the username and password or PIN to authenticate the transaction (Gbanador, 2021).

2.2 Theoretical review

In 2010 Kapoor propounded the Bank focused theory. The theory is built on the foundation that banks utilized non-traditional though conventional but minimal cost delivery channels to offer financial services to its clients. These channels are online banking, point of sales, mobile pay, point of sale, etc. Thus, banks provides arrays of financial services without recourse to the customers' account domiciled branch via the electronic payment channels. This theory is pertinent to this study because it hinges on the electronic payment channels which is the hallmark of the CBN cashless policy.

2.3 Empirical review

Siyanbola (2013) assessed the influence of cashless banking on the economy on Nigeria. The research design utilized for the work was the descriptive research design while chi-square was used to analyze the data. Based on the findings, the study suggested that increased government support, steady power supply and communication nexus should be considered in order to enhance the growth of cashless banking in Nigeria.

In a similar study Taiwo, Ayo, Afieroho, and Agwu (2016) assessed the adoption of the cashless policy in the Nigerian financial system from 2012 to 2016. The survey research design was employed for the study while the descriptive statistics and one-sample t-test were adopted for the data analysis. Based on the findings, the study concluded that cashless policy will earn the needed result only if much is done to effectively implement it.

In a recent study, Agu and Agu (2020) conducted a study to assess the influence of cashless policy on the growth of Nigeria economy between the period of 2010 and 2018. The study utilizedquarterly time series data while the OLS technique was used for the data analysis. The Unit Root, Cointegration and granger causality tests were also conducted. The data were gathered from World Bank Development indicator and CBN Statistical Bulletin, Annual Report and Statement of Account for the year 2019. The Study's findings revealed that Cashless Policy influenced economic performance and thereby deduce that there is a link between cashless policy and the growth of the Nigeria economy. Most especially, transactions through the ATM and POS terminals. The study therefore, recommends that banks should allocate morefunds in information communication technology to improve the efficiency of electronic payment systems.

Ewa and Inah (2016) did a study to examine the Nigeria Cashless Policy Implementation. The study used the survey research design while Simple percentages and Relative Important Index (R.I.I) were employed in analyzing the collated data. The study's findings revealed that social infrastructures in power and telecommunications requires improvement and thereby create the need for more awareness to encourage the unbanked to access banking services.

Okafor (2020) carried out a study to assess the influence of cashless policy on Deposit Money Banks'performance in Nigeria (2009-2019). Internet banking, ATM, mobile banking and POS were used as proxies for the independent variablewhile return on assets was adopted to represent the dependent variable. The econometric techniques used for the study were descriptive statistics, augmented dickey fuller tests for unit roots, and the regression analysis. The study's findings

revealed that Internet Banking, POS, MB, and ATM have a significant and positive influence on the return on assets. The study therefore, concludes that cashless policy has a positive influence on the performance of Deposit Money Banks in Nigeria.

In a related study, Nwakoby, Chukwu and Oghenetega (2020) conducted a study to examine the impact of cashless policy on the profitability of Deposit Money Banks in Nigeria within the periods of 2009 and 2019. Secondary data research design was utilized for the study while the Auto-regressive Distributed lag model was employed as a technique for data analysis. The POS Terminal, ATM, Mobile Banking, and Online Payment platform were adopted as the independent variables while the Profit before Tax was used as proxy for the dependent variable. The outcome of the study shows that cashless policy has an inverseand insignificant impact on profit before tax of Deposit Money Banks in Nigeria. Based on the findings, the study suggests the sensitization of bank customers regarding the relevance of cashless policy.

In an attempt to assess the effect of cashless policy on the performance of Deposit Money Banks in Nigeria, Ignoroje and Okoroyibo (2020) conducted a study spanning from 2009-2018. The study adopted the ex-post facto research design. The econometric techniques used in analyzing the data were descriptive statistics, augmented dicker fuller, and Philip Perron tests for unit roots and the autoregressive distributed lags (ARDL) for cointegration and coefficient analysis. Based on the findings, the study concludes that the performanceof a bank is positively influenced by the CBN cashless policy.

3.0 Methodology

The study adopted the ex-post facto research design. This research design was adopted to establish a cause and effect relationship amongst the variables. A quarterly time series data spanning through the period of 2012 to 2021 were obtained from the CBN Statistical Bulletin. The Gross domestic product was used to represent economic growthwhile Cheques (CQ), Automated teller machine (ATM) and Internet banking (IB) were used as proxy for cashless policy.

3.1 Model Specification

The functional specification of the model is given as;

GDP= f (CQ, ATM, IB) (1)

Where;

GDP = Gross Domestic product

CQ = Cheque transactions

ATM= Automated teller machine

IB = Internet banking

$GDP = \beta_0 + \beta_1 CQ + \beta_2 ATM + \beta_3 IB + U_t$ (2)

GDP, CQ, ATM and IB are as defined in equation (1) while;

β_0=Regression Constant

$\beta_1, \beta_2$and β_3= Regression coefficient.

U_t =Stochastic Error Term

3.2 Pre-estimation Tests

The researcher conducted some pre-estimation tests such as tests of stationarity using the Phillip-Peron method and bounds test for cointegration. The essence of conducting these tests were to determine whether the data adopted for the study were suitable. The stationarity tests were carried out to check the appropriate cointegration test to be employed. Recall, the cointegration tests are utilized to examine the presence of long run relationship amongst the time series variables in the study.

4.1 Results and Data Analysis

Table 1 Unit Root (Stationarity) Test

Variables	**Phillip-Peron Test Statistic**	**Mackinnon's Critical Values at 1%, 5% & 10% respectively**			**Order of Integration**	**Prob.**
GDP	-3.836266	-3.610453	-2.938987	-2.607932	(0)	0.0055
CQ	-10.37006	-3615588	-2.941145	-2.609066	(1)	0.0000
ATM	-9.916327	-3.615588	-2.941145	-2.609066	(1)	0.0000
IB	-8.058364	-3.615588	-2.941145	-2.609066	(1)	0.0000

Source: Authors computation using Eviews 10

Employing Phillip-Peron to conduct the unit root test as depicted in Table 1, the result shows that the variables are stationary at order (1) except for GDP which is stationary at level. Thus, CQ, ATM, and IB is stationary at order (1) while GDP is stationary at level. This result creates the need to employ the Auto-Regressive Distributed Lag for the analysis.

Table 2: ARDL Bounds Test for Cointegration

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	17.92780	10%	3.47	4.45
k	3	5%	4.01	5.07
		2.5%	4.52	5.62
		1%	5.17	6.36

Source: Authors computation from Eviews 10

The ARDL bound cointegration test is utilized to check a possible long run equilibrium relationship between the dependent and independent variables using the F-statistic as a measure of comparison between the lower and upper bound of cointegration result. From Table 2, the F-statistic of 17.92780 is higher than the lower bound of 4.01 and higher bound of 5.07 at 5% level of significance. Thus, indicating that there exist a long run equilibrium relationship between the variables under study.

Table 3: ARDL Short run Error Correction Model

ARDL Error Correction Regression
Dependent Variable: D(GDP)
Selected Model: ARDL(4, 4, 4, 4)
Case 5: Unrestricted Constant and Unrestricted Trend
Date: 12/13/22 Time: 15:55
Sample: 2012Q1 2021Q4
Included observations: 36

ECM Regression
Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4372460.	391594.9	11.16577	0.0000
@TREND	130388.4	16905.14	7.712944	0.0000
D(GDP(-1))	-0.577561	0.056201	-10.27673	0.0000
D(GDP(-2))	-0.717175	0.043318	-16.55610	0.0000
D(GDP(-3))	-0.931622	0.050755	-18.35522	0.0000
D(CQ)	-0.872253	0.351581	-2.480947	0.0254
D(CQ(-1))	-1.960285	0.408812	-4.795082	0.0002
D(CQ(-2))	-1.938264	0.363101	-5.338091	0.0001

D(CQ(-3))	-1.023784	0.357707	-2.862074	0.0119
D(ATM)	-1.123632	0.272862	-4.117948	0.0009
D(ATM(-1))	-0.471310	0.238292	-1.977869	0.0666
D(ATM(-2))	-1.049979	0.242634	-4.327424	0.0006
D(ATM(-3))	-1.351092	0.400744	-3.371456	0.0042
D(IB)	0.075580	0.019211	3.934117	0.0013
D(IB(-1))	0.017210	0.014701	1.170669	0.2600
D(IB(-2))	0.068699	0.017402	3.947656	0.0013
D(IB(-3))	0.038667	0.015517	2.491940	0.0249
CointEq(-1)*	-0.690122	0.074395	-9.276499	0.0000

R-squared	0.993464	Mean dependent var	118976.6
Adjusted R-squared	0.987291	S.D. dependent var	1554089.
S.E. of regression	175197.3	Akaike info criterion	27.29207
Sum squared resid	5.52E+11	Schwarz criterion	28.08383
Log likelihood	-473.2572	Hannan-Quinn criter.	27.56841
F-statistic	160.9415	Durbin-Watson stat	1.643713
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

Source: Authors computation from Eviews 10

The ARDL-ECM result as depicted in Table 3indicates an error correction term or the speed of adjustment coefficient of -0.690122 and a p-value of 0.0000. This means that there is 69.01% speed of adjustment if there is any disequilibrium in this model from the short run back to the long run quarterly. The R^2 result of 99.34% represent the combined correlation of the independent variables while the adj. R^2 indicates that 98.79% of the variations in the Gross Domestic Product can be explained by the variation the independent variables (CQ,ATM and IB). This leaves 1.21% unexplained.

Table 4: ARDL Long run Results

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GDP)
Selected Model: ARDL(4, 4, 4, 4)
Case 5: Unrestricted Constant and Unrestricted Trend
Date: 12/13/22 Time: 16:30
Sample: 2012Q1 2021Q4
Included observations: 36

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4372460.	2074663.	0.000000	0.0000
@TREND	130388.4	42466.80	3.070360	0.0078
GDP(-1)*	-0.690122	0.127983	-5.392310	0.0001
CQ(-1)	3.542940	0.635926	5.571305	0.0001
ATM(-1)	-0.013069	0.566678	-0.023062	0.9819
IB(-1)	-0.089794	0.020237	-4.437242	0.0005
D(GDP(-1))	-0.577561	0.107747	-5.360341	0.0001
D(GDP(-2))	-0.717175	0.068064	-10.53671	0.0000
D(GDP(-3))	-0.931622	0.069475	-13.40952	0.0000
D(CQ)	-0.872253	0.454061	-1.921005	0.0739
D(CQ(-1))	-1.960285	0.549579	-3.566888	0.0028
D(CQ(-2))	-1.938264	0.506434	-3.827281	0.0016
D(CQ(-3))	-1.023784	0.484776	-2.111868	0.0519
D(ATM)	-1.123632	0.386454	-2.907546	0.0108
D(ATM(-1))	-0.471310	0.553475	-0.851547	0.4079
D(ATM(-2))	-1.049979	0.496862	-2.113218	0.0518
D(ATM(-3))	-1.351092	0.510797	-2.645066	0.0184
D(IB)	0.075580	0.022898	3.300696	0.0049
D(IB(-1))	0.017210	0.018104	0.950634	0.3569
D(IB(-2))	0.068699	0.020718	3.315930	0.0047
D(IB(-3))	0.038667	0.022614	1.709855	0.1079

* p-value incompatible with t-Bounds distribution.

Levels Equation

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CQ	5.133790	1.117896	4.592369	0.0004
ATM	-0.018937	0.819800	-0.023099	0.9819
IB	-0.130114	0.037052	-3.511669	0.0031

EC = GDP - (5.1338*CQ -0.0189*ATM -0.1301*IB)

Source: Author's computation from Eviews 10

Table 4 displays the long run result of the ARDL Model. Reckoning with the result, Cheque (CQ) with a P-value of 0.0004 and coefficient of 5.133790is positively significant to the Gross Domestic Product at 5% level of significance.Thus, every 1 unit increase in the value of CQ will

lead to a 513.38% rise in the value of the GDP. The Automated Teller Machine (ATM) has a coefficient of -0.018937 indicating that every 1 unit increase in the performance of the ATM will lead to a 1.89% decrease in the performance of the GDP. However, the P-value of 0.9819 reveals that the ATM is negatively insignificant to the Gross Domestic Product. Furthermore, Internet banking (IB) has a coefficient of -0.130114. This coefficientimplies that every1 unit increase in the performance of internet banking will lead to a 13.01% decrease in the performance of the GDP. Meanwhile, the P-value of 0.0031 shows that internet banking is negatively significant to the GDP.

Serial Autocorrelation Test

F-statistic	0.220674	Prob. F(2,13)
Obs*R-squared	1.182061	Prob. Chi-Square(2)

Table 5:Breusch-Godfrey Serial Correlation LM Test:

Source: Author's computation from Eviews 12

The Breusche-Godfrey Serial Correlation LM test was further used to re-examine the presence of serial correlation. The result also confirmed the absenceof serial correlation amongst the variables as the F-statistic p-value of 0.8049 is higher than 0.05.

Table 6: Correlogram of Residuals Squared

Date: 12/13/22 Time: 16:52
Sample: 2012Q1 2021Q4
Included observations: 36

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. | . |	. | . |	1	-0.017	-0.017	0.0114	0.915
. |*. |	. |*. |	2	0.092	0.092	0.3522	0.839
. |*. |	. |*. |	3	0.122	0.126	0.9678	0.809
. | . |	.*| . |	4	-0.061	-0.066	1.1276	0.890
.*| . |	**| . |	5	-0.180	-0.212	2.5610	0.767
. | . |	. | . |	6	0.000	-0.014	2.5610	0.862
.*| . |	.*| . |	7	-0.139	-0.086	3.4690	0.838
. | . |	. | . |	8	-0.061	-0.021	3.6525	0.887
. |*. |	. |*. |	9	0.130	0.140	4.5031	0.875
.*| . |	.*| . |	10	-0.081	-0.077	4.8462	0.901
. |*. |	. |*. |	11	0.207	0.187	7.1824	0.784

. |*. |	. | . |	12	0.094	0.042	7.6872	0.809
. | . |	. | . |	13	0.038	0.017	7.7731	0.858
. |*. |	. | . |	14	0.078	0.053	8.1507	0.881
.*| . |	.*| . |	15	-0.085	-0.151	8.6244	0.896
.*| . |	. | . |	16	-0.078	0.002	9.0409	0.912

*Probabilities may not be valid for this equation specification.

Source: Author's computation from Eviews 10

The Correlogram Residuals test was conducted to check the presence of serial correlation. The result obtained from Table 6 reveals no evidence of serial correlation amongst the variables used in building the model as the various probability values are greater than 0.05 (P>0.05).

Heteroskedasticity Test

Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.606745	Prob. F(20,15)	0.8531
Obs*R-squared	16.09943	Prob. Chi-Square(20)	0.7104
Scaled explained SS	3.544740	Prob. Chi-Square(20)	1.0000

Source: Author's computation from Eviews 10

The result of this test based on the F-statistic and the Observed R-Squared shows that this model is Homoskedastic as their values are both greater than the P-value of 0.05. The implication of this result is that there is no problem of heteroskedasticity in the ARDL result.

Table 8: Heteroskedasticity Test: ARCH

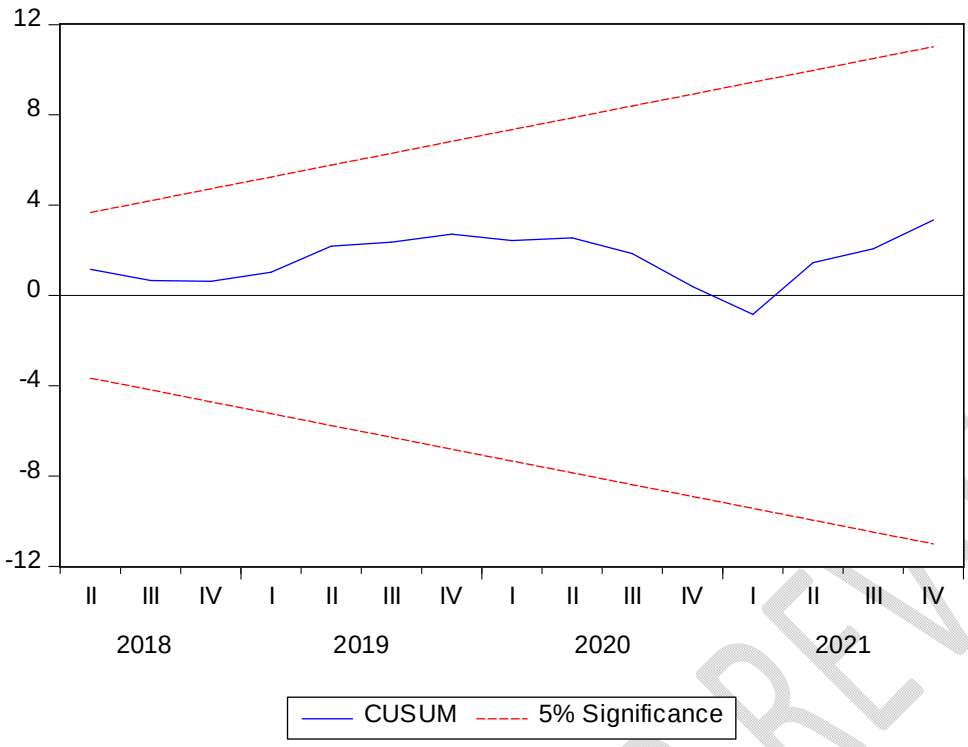
F-statistic	0.009507	Prob. F(1,33)	0.9229
Obs*R-squared	0.010080	Prob. Chi-Square(1)	0.9200

Source: Author's computation from Eviews 10

The ARCH test for heteroskedasticity also confirmed the absence of the problem of heteroskedasticity in the ARDL result.

CUSUM Test

Fig1 : CUSUM Test of Stability



Source: Author's computation from Eviews 10

The CUSUM test was conducted to check the stability of the model and the result revealed that the model is well specified.

5.1 Conclusion and Recommendations

The foundation upon which this study is built is to examine the influence of cashless policy on the growth of Nigeria economy. The outcome of the analysis revealed that cashless policy has effect on the economy as the result from CQ and IB were all significant except the ATM that was insignificant. Therefore, the study concludes that Cashless policy has significant influence on economic growth in Nigeria. Based on the findings, the study therefore recommends as follows:

(a) The Central Bank of Nigeria should encourage Banks to offer quality ATM services to their customers. This is expected to boost the adoption of ATM as an alternative payment system.

(b) The Bank should educate the customers as well as create awareness regarding the benefit of adopting the Automated Teller Machine and Internet banking platforms as alternative payment channels in order to enhance the adoption of cashless policy in Nigeria.

(c) The Central bank should subsidize the cost of acquiring electronic banking infrastructure as this will encourage the adoption of Cashless policy as alternative payment systems.

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