Where; $\beta_{0,}$ is the intercept; $\beta_1 - \beta 4_,$ are the coefficients of independent variables while μ_1 is the error term and RGDP, POS, LRB, CRB and LSE are as earlier defined.

3.2 Data Required/Sources

The data for this study is mainly be quarterly time series collected from secondary sources covering a period of ten years, from 2009Q1 to 2020Q4. Some of these sources include publications of the Central Bank of Nigeria (CBN) statistical bulletin and annual report and statement of accounts and world development indicators (WDI).

3.3 Estimation Techniques and Procedures

This study employed descriptive statistics, unit root test, and Toda Yamamoto modeling technique

3.3.1 Descriptive Statistics

One of the methods economists normally use to investigate the cause-effect relationship between variables is through descriptive statistics. Descriptive statistics is that type of statistics that involves organizing, summarizing and presenting data in a meaningful form or usable format. Thus, in this research, simple averages (i. e. mean), histogram, kurtosis, Jarque-Bera, and more were employed to analyze the trends on some of the variables used in this study between 2009Q1 and 2020Q4. The descriptive statistics was used to see the behavior of the variables or the time series properties of the variables.

3.3.2Unit Root Test

The unit root test that was considered is the conventional unit root test by Augmented Dickey-Fuller (ADF) (1979). The null hypotheses for ADF are that an observable time series is not stationary (i. e. has unit root). The tests method was well established in the literature. The major limitation to this unit root test method (ADF) is that it did not include any structural breaks in the series.

3.3.3 Toda Yamamoto Modeling Technique

The dynamic granger causality can be captured from the vector error correction model derived from the long-run cointegrating relationship Granger (1988). The granger causality proposed by Granger (1969) has probable shortcomings of specification bias and spurious regression. Engel and Granger (1987) have defined X and Y as being cointegrated if the linear combination of X and Y is stationary but each variable is not stationary. Engel and Granger (1987) pointed out that while these two variables are non-stationary and cointegrated, the standard Granger -causal inference will be invalid.

To mitigate these problems, Toda and Yamamoto (1995) is a causality test that is based on augmented VAR modeling. It introduced a modified Wald test statistic (MWALD). This procedure has been found to be superior to ordinary Granger - causality tests since it does not require pre-testing for the cointegrating properties of the system and thus avoids the potential bias associated with unit roots and cointegration tests as it can be applied regardless of whether a series is I(0), I(1) or I(2), non-cointegrated or cointegrated of an arbitrary order.

The Toda Yamamoto approach, first involves finding the maximum order of integration d_{max} of the series that are to be incorporated in the model. For this conventional ADF unit root test is applied in each series and the maximal order of integration is identified. Say, with ADF unit root test, three variable are found to be I(0), I(1) and I(1) respectively, then the maximal order of integration is 1. TYDL approach, secondly, specifies a well behaved kth optimal lag order vector autoregressive model in levels (not in the difference series).

The number of optimal lags is usually determined by a selection criterion such as the

Akaike Information criterion (AIC), Bayesian information criterion (BIC), or Schwarz Info Criterion (SIC) or the democracy of these criterion which ever makes the VAR well behaved in term of AR unit root graph, VAR residual serial correlation LM-stat, VAR residual normality tests. TYDL approach, thirdly, intentionally over-fits the underlying model is with additional d_{max} order of integration. The d_{max} is the maximal order of integration of the series in the model.

The Toda Yamamoto equation is stated in general form as follows:

$$Yt = \alpha_0 + \sum_{t=1}^{k} \alpha_{1i}\, Yt-1 + \sum_{j=k+1}^{k+dmax} \alpha_{2j}\, Yt-j + \sum_{t=1}^{k} \beta_{1i}\ \ X1t-1 + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, X1t-j + \sum_{t=1}^{k} \Omega_{1i}\, X2t-1 + \sum_{j=k+1}^{k+dmax} \Omega_{2j}\, X2t-j + \sum_{t=1}^{k} \Omega_{1i}\, X3t-1 + \sum_{j=k+1}^{k+dmax} \Omega_{2j}\, X3t-j + \sum_{t=1}^{k} ¥_{1i}\, X4t-1 + \sum_{j=k+1}^{k+dmax} ¥_{2j}\, X4t-j + \varepsilon 1t \qquad (5)$$

Where;

Y_i = Dependent variables (RGDP); X_1 - X_8 = the independent variables (POS, LRB, CRB and LSE, ATM); K = the optimal lag length. This is determined by the usual information criteria such as AIC and SIC and d_{max} = the maximum order of integration

4. Results and Discussions

The analyses of the data started with the descriptive statistics to ascertain the behavior or stationarity of the variables. Secondly, the unit root test and the Toda Yamamoto modeling techniques were thereafter used for the analysis.

4.1 Descriptive Statistics

Table 1 presents the result of the descriptive statistics of the variables employed in the estimations in this study.

Table 1: Descriptive Statistics Test Results

	RGDP	POS	LRB	CRB	LSE
Mean	64708.06	1.38E+08	257313.9	4.416667	30997.45
Median	68079.76	32107994	201549.0	6.000000	15231.98

Maximum	71387.83	4.94E+08	988587.9	8.000000	96597.48
Minimum	49856.10	918256.0	15590.50	0.000000	10747.89
Std. Dev.	6281.677	1.78E+08	271947.9	3.545049	29860.88
Skewness	-0.892518	0.972182	1.223992	-0.320850	1.334179
Kurtosis	2.455490	2.264176	3.565155	1.292366	3.012007
Jarque-Bera	6.965687	8.643981	12.62405	6.655587	14.24055
Probability	0.030720	0.013273	0.001814	0.035872	0.000809
Sum	3105987.	6.65E+09	12351066	212.0000	1487877.
Sum Sq. Dev.	1.85E+09	1.50E+18	3.48E+12	590.6667	4.19E+10
Observations	48	48	48	48	48

Source: Authors' Computation (2021)

The result of the descriptive statistics in Tables 1 shows that the mean values of the variables – RGDP, POS, LRB, CRB and LSE are 64708.06, 1.38E+08, 257313.9, 4.416667 and 30997.45,respectively. From Table 1, the standard deviation showed that LRB (271947.9) was the most volatile variable in the series while CRB (3.545049) was the least volatile variable.The skewness statistic showed that RGDP and CRB were negatively skewed; suggesting that their distribution has a long-left tail while POS, LRB and LSE were positively skewed, meaning that their distribution has a long right tail. Also, the kurtosis statistic showed that the variables - RGDP, POS, and CRB were platykurtic suggesting that their distribution were flat relative to normal distribution; LSE was mesokurtic suggesting that its distribution is normally distributed while LRB were leptokurtic suggesting that its distribution is peaked relative to normal distribution. Based on these observations, it indicates that the series are non-stationary. However, this indication is not surprising, since the data are time series in nature. In sum, there is unit root (non-stationarity) in the series.

Based on these observations, it is therefore necessary to test for the stationarity of the variables and the long run relationship. The unit root test is conducted so as to make the variables stationary. The study utilized the Augmented Dickey Fuller (ADF) unit root test procedure.

4.2 Unit Root Test Results

Tables 2 and 3 present results of stationarity test for each of variables using Augmented Dickey Fuller (ADF) and KPSS tests.

Table 2: ADF Unit Root Test Results

Variables	**ADF at Level**	**ADF at 1st Difference**	**ADF at 2nd Difference**	**Status**	**Remarks**
RGDP	-2.227225	-2.132442	-6.585048	I(2)	Stationary
POS	-1.578054	-3.034904	-	I(1)	Stationary
LRB	-2.249702	-4.668336	-	I(1)	Stationary
CRB	-1.308695	-2.733889	-6.557439	I(2)	Stationary
LSE	-1.103363	-2.708619	-8.016973	I(2)	Stationary

Critical Values					
1% level	-3.581152	-3.581152	-3.584743		
5% level	-2.926622	-2.926622	-2.928142		
10% level	-2.601424	-2.601424	-2.602225		

Source: Authors' Computation (2021)

The outcomes of ADF unit root test in Table 2 reveals that POS and LRB were stationary at first difference, i.e. I (1), while RGDP, CRB and LSE were stationary at second difference, i.e. I(2). Hence, this study concludes that the variables used in model were integrated of different order integration, that is, I (1) and I(2).

Table 3: KPSS Unit Root Test Results

Variables	KPSS at Level	KPSS at 1st Difference	KPSS at 2nd Difference	Status	Remarks
RGDP	0.806340	0.712310	0.105823	I(2)	Stationary
POS	0.887920	0.288411	-	I(1)	Stationary
LRB	0.378160	-	-	I(0)	Stationary
CRB	0.815950	0.119110	-	I(1)	Stationary
LSE	0.562872	0.228261	-	I(1)	Stationary
Critical Values					
1% level	0.739000	0.739000	0.739000		
5% level	0.463000	0.463000	0.463000		
10% level	0.347000	0.347000	0.347000		

Source: Authors' Computation (2021)

The result of the KPSS presented in Table 3 reveals that LRB was stationary at levels, i.e. I(0);POS, CRB and LSE were stationary at first difference, i.e. I(1) while RGDP was stationary at second difference, i.e. I(2). Hence, this study concludes that the variables used in model were integrated of different order integration, that is, I I(0), I(1) and I(2).Since the ADF results indicate that the series are of the different order of integration, we proceed to conduct the Toda Yamamoto modeling technique.

4.3 Lag Order Selection

An important preliminary step in model building and estimating the Toda Yamamoto model is the selection of the lag order. In this study we use some commonly used lag-order selection criteria to choose the lag order, such as the "Akaike information criterion (AIC)", "Schwartz criterion (SC)", "Hannam-Quinn criterion (HQC)" and "final prediction error (FPE)" to determine the optimum lag and then analyze the residuals.

Table 4: Optimum Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-161.1671	NA	0.000945	7.224655	7.423421	7.299114
1	278.3059	764.3009	1.42e-11	-10.79591	-9.603318	-10.34916
2	326.9237	73.98350*	5.29e-12*	-11.82277*	-9.636349*	-11.00372*

Source: Authors' Computation (2021)

Table 4 shows that lag 2 is chosen as the optimum lag in the specification of Toda Yamamoto model on the relationship between the variables in this study for the period between 2009Q1 and 2020Q4. Thus, we now estimate and analyze the Toda Yamamoto model.

4.4 Toda Yamamoto Test Results

The results of the Toda Yamamoto estimation results are offered in Table 5. The result of the Toda Yamamoto causality test in Table 5 reveals that there is no causality running from Number of Point of Sale (POS) to Economic Growth (RGDP) in Nigeria within period of study. This is shown by the chi-sq value of 1.025618 and probability value of 0.5988 which is greater than the 0.05 percent. This implies that the Number of Point of Sale (POS) do not have a causal impact in the short-run on Economic Growth (RGDP) in Nigeria. The implication of this finding is that Number of Point of Sale (POS) does not cause an increase in Economic Growth (RGDP) in Nigeria.

Table 5: Toda Yamamoto Causality Test Results

Dependent variable: LOG(RGDP)			
Excluded	Chi-sq	Df	Prob.
LOG(POS)	1.025618	2	0.5988
LOG(LRB)	3.788793	2	0.1504
CRB	5.144721	2	0.0764
LOG(LSE)	0.048008	2	0.9763
All	10.81451	8	0.2124
Dependent variable: LOG(POS)			
Excluded	Chi-sq	Df	Prob.
LOG(RGDP)	1.955805	2	0.3761
LOG(LRB)	0.408742	2	0.8152
CRB	4.170494	2	0.1243
LOG(LSE)	0.777788	2	0.6778
All	8.324084	8	0.4025
Dependent variable: LOG(LRB)			
Excluded	Chi-sq	df	Prob.
LOG(RGDP)	1.679296	2	0.4319
LOG(POS)	4.042833	2	0.1325
CRB	4.819713	2	0.0898
LOG(LSE)	4.659599	2	0.0973
All	14.67358	8	0.0658
Dependent variable: CRB			
Excluded	Chi-sq	df	Prob.
LOG(RGDP)	3.098741	2	0.2124
LOG(POS)	2.017779	2	0.3646
LOG(LRB)	1.307671	2	0.5200
LOG(LSE)	7.523422	2	0.0232

All	9.385960	8	0.3108
Dependent variable: LOG(LSE)			
Excluded	Chi-sq	df	Prob.
LOG(RGDP)	4.685411	2	0.0961
LOG(POS)	0.090101	2	0.9559
LOG(LRB)	0.116043	2	0.9436
CRB	0.803137	2	0.6693
All	7.114870	8	0.5243

Source: Authors' Computation (2021)

The result of the Toda Yamamoto causality test in Table 5 also reveals that there is no causality running from Loans of Rural Branches of deposit money Banks (LRB) to Economic Growth (RGDP)in Nigeria within period of study.This is shown by the chi-sq value of 3.788793 and probability value of 0.1504 which is greater than the 0.05 percent. This implies that increase Loans of Rural Branches of deposit money Banks (LRB) do not have a causal effect on Economic Growth (RGDP)in the short-run in Nigeria within period of study. The implication of this finding is that increase in Loans of Rural Branches of deposit money Banks (LRB) do not increases Economic Growth (RGDP in Nigeria.

The results in Table 5 on Toda Yamamoto causality test further reveals that there is no causality fromcredit barriers (CRB) to Economic growth (RGDP)in Nigeria within period of study.This is shown by the chi-sq value of 5.144721 and probability value of 0.0764 which is greater than the 0.05 percent. This implies that credit barriers (CRB) do not have a causal effect in the short-run on Economic growth (RGDP) in Nigeria within period of study.The implication of this finding is that credit barriers CRB) is not the major cause of Economic growth (RGDP) in Nigeria.

Furthermore, Table 5 also shows that there is no causality running from deposit money Banks Loans to Small Scale Enterprises (LSE) to Economic Growth (RGDP) in Nigeria within period of study.This is shown by the chi-sq value of 0.048008 and probability value of 0.9763 which is greater than the 0.05 percent. This implies that deposit money Banks Loans to Small Scale Enterprises (LSE) do not have a causal effect in the short-run on Economic Growth (RGDP) in Nigeria within period of study. The implication of this finding is that an increase in deposit money Banks' Loans to Small Scale Enterprises (LSE) does not increase Economic Growth (RGDP) in Nigeria.

5. Conclusion and Policy Recommendations

This paper investigates empirically the effect of financial inclusion on Economic Growthin Nigeria using quarterly time series covering the period 2009Q1 and 2020Q4. To accomplish this objective the study used descriptive statistics, unit root test and Toda Yamamoto causality modeling techniques for the analysis. The study shows that POS, LRB, CRB and LSE do not have a causal effect on RGDP both jointly and individually at 5 percent level. The study therefore concludes that financial inclusion has not enhancedeconomic growth in Nigeria within the period of study.The study t recommends that government should create enabling environment for effective financial inclusion.The structures and platforms such as bank branches and POS terminals of conventional banks should be adequately equipped in order to enhance and sustain financial inclusion by bringing those in the informal sector into the formal financial sector. Deposit money banks' role in creating affordable services such as credit should attract further attention from CBN to reduce interest rate to SMEs and the rural populace. The monetary authorities should deepen financial inclusion efforts through enhanced credit delivery to the private sector as well as strengthen the regulatory framework in order to ensure efficient and effective resource allocation and utilization.

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