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Financial Inclusion Variables and Domestic Economy: Nigeria in Perspective (2006 -2019)

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Abstract
The study estimated the impact of selected financial inclusion variables on Nigeria's economy for the period 2006 – 2018. The variables selected include: access to bank credit; number of bank branches; number of automated teller machines/mobile bank users and point of sale (POS). The study adopted the pre and post estimation technique using ADF and Pesaran and Shin method of cointegration to determine the order of integration and to determine whether there is a long run relationship existing between the variables. The ARDL estimation was conducted to obtain the long and short run coefficients of the variables under consideration. On the basis of the result, it was found that access to bank credit has significant positive relationship with GDP growth in Nigeria. The study further concludes that GDP growth has a strong positive relationship with the branch network as well as the number of ATM/ mobile money users/accounts while the relationship between GDP growth and number of POS is a weak positive and the relationship between economic growth. Specifically, one billion naira increase in bank credit resulted to about six billion units increase in total output of Nigeria. Similarly, the increase in the number of ATM/Mobile money users brought about the increase in the growth of GDP by about 16 billion units. Furthermore, the increase in the number of bank branches in Nigeria by one resulted to increase in GDP growth by about 3.7 units. However, the increase in the number of POS has not impacted on the country's GDP. The study recommended that the government should encourage the banks to further increase the number of POS so as to strengthen the ease of financial access to all bankable persons. Also, the ATM should also serve as credit cards to further increase credit access of bank customers.

Keywords: financial inclusion, ross domestic product, access to bank credit

INTRODUCTION
The study is interested in determining the impact of financial inclusion variables on economic growth of Nigeria. The plan to achieving economic growth has preoccupied the policy thrust of all

countries in the world. Nigeria as a developing country suffers the consequences of low level of economic activities evidenced by low productivity. Researchers in this field discern strongly that financial sector development holds significantly the key to economic growth. Schumpeter (1912), McKinnon (1973) and Shaw (1973) in what is termed Schumpeter and Mckinnon-Shaw hypothesis introduced finance variable into the growth factors and opined that adequate quantum of finance is needed to procure effective labour resources and new technologies to increase the output of goods and services. Growth propellants such as technology and human capital development are made possible through finance development (Ndebbio, 2004).

Interestingly, economic theories espouse a positive correlation between financial development and economic growth. Shaw (1973), Mckinnon (1973), Levine and Zervos (1996), Goldsmith (1969), Bekaert et al (1995) in a finance-growth hypothesis show convincing evidence of positive correlation between finance and economic growth. In Nigeria, empirical studies of Adelakun (2010), Odeniran and Udeaja (2010), Nkoro and Uko (2013), Osuji and Chigbuh (2012) and Anieken and Sikiru (2012) find evidence of positive relationship between finance and economic growth.

Nigeria's financial sector is still evolving but profoundly sustains the role of saving mobilization from the surplus spending units and canalizing same to the deficit spending units for investment purposes. The reward of efficient and effective financial system is increase in output of the economy through increase in investment. The economy needs a sustained boost in economic activities to further create employment, increase in income and raise aggregate demand for goods and services.

In the pursuance of the development of finance sector, the policy of financial inclusion was introduced to increase the access of bankable groups to the financial service net so as increase the Country's liquidity position as well as widen credit access and implicitly increase investment.

Financial inclusion policy is an attempt to close the gap that hitherto existed between deficit spending unit and surplus spending unit powered by the intermediation function of the financial system. It is the policy that facilitates and increases access, usage and availability of financial services, provisions as well as increases the number of bankable groups in the financial system. The World *Bank* report describes financial inclusion as a process of raising individual access to basic financial services (saving, loans and insurance) in a safe and convenient manner especially among low income and more vulnerable income earners in the economy.

Financial inclusion as a policy is geared towards bringing the low-income group into the Nigerian financial system net through a convenient less risky means and less cumbersome procedure into the financial net knowing that a viable and strong financial system definitely will boost the nation's economy. The World Bank group identified financial inclusion indicators to include ATM, POS, bank deepening (number of banks and their branches in the country), access to credit, information access, internet banking services. In a study by Mehanta (2009), capturing of the poor to the financial system will deter them from saving outside in their homes or with informal system and encourage them to save in the banks thereby raising their chances to accessing credits from the formal financial institutions. Access to credits by the low-income group will help them to overcome financial shocks as well boost their productions.

Financial inclusion is therefore a policy that is imbued with so much of accelerated strategy to boost economic growth especially in developing economy. It is not gainsaying that lack of physical access to financial access by way of not operating any bank account will impede the chances of any bankable group to access bank credit. Despite, the plethora of opportunities and competitive advantage of financial inclusion, the World Bank (2009) identified the difficulty faced by rural clients and most significantly the excluded that ordinarily and deliberately should complement the big clients in the role of capital accumulation for the purpose of raising investible funds needed in growing the economy. What is the impact of financial inclusion variables on growth of Nigeria's economy.

Theoretical Review

This sub-section is concerned with the analysis of underlying theories that provide validity and impetus for the study. Thus, a review of inclusive growth theory; the finance growth theories and endogenous growth theory is apt and suitable.

Theory of inclusive growth

This theory states that inclusive growth in the economy can only be achieved when all the weaker sectors of the society, including agriculture and small-scale industries, are nurtured and brought on par with other sectors of the society in terms of economic development. The major development challenge is to make the growth inclusive. Development economists have often been for a long time interested in the relationship between financial inclusion and economic growth, especially in the period which is known as the era of the Washington Consensus. According to the theory, a growing gross domestic product (GDP) is an evidence of a society, getting its collective act together for progress. As

its economy grows, a society becomes more strongly organised, more compactly interwoven. Therefore, a sustained high growth is better and sustained high growth with inclusiveness is best for all. Policies for inclusive growth are vital components of majority of government strategies for sustainable growth. Inclusiveness is an essential ingredient of any successful growth strategy (Commission on Growth and Development, 2008).

The finance-growth theory

The origin of the finance-growth hypothesis can be traced back to Bagehot (1873). The proponents of the finance-growth hypothesis argued that the existence of an energetic financial sector has growth-enhancing effects. Schumpeter (1911) posited that banks enable an economy to grow by providing efficient markets for funds. Goldsmith (1969), McKinnon (1973), Levine and Zervos (1996), Ndebbio (2004), among others, also emphasized the positive role of financial systems in economic growth. The finance-growth theory looked at the lack of access to finance as a critical factor responsible for persistent income inequality as well as slower growth. It posits that financial development creates a productive environment for growth through "supply leading" or "demand-following" effect. Consequently, access to safe, easy and affordable source of finance is recognized as a pre-condition for accelerating growth and reducing income disparities and poverty which creates equal opportunities, enables economically and socially excluded people to integrate better into the economy and actively contribute to development and protect themselves against economic shocks (Serrao et. al, 2012). Furthermore, the main argument of proponents of the supply leading theory was that financial markets evolve in response to increased demands for financial services from an already budding economy and as such, the development of financial markets should be a reflection of growth in other sectors of the economy.

Literature Review

Nkwede (2015) investigated the influence of financial inclusion on the growth of African economy, using Nigeria as a case study. Extrapolated time series financial inclusion data from Nigeria, covering the period of 1981 to 2013 were used in the analysis. The multiple regression models anchored on Ordinary Least Square technique was adopted in estimating the contributions of the variables. While controlling for other macroeconomic exogenous variables; the results indicated that financial inclusion has significant negative impact on the growth of Nigeria economy over the years. The study therefore attributed the result to high level of financial exclusion of bankable adult citizens in Nigeria in

particular and Africa in general. The study however suggested more inclusive financial system in Nigeria (and Africa) with focus on the rural populace because "growth is good, sustained high growth is better and sustained high growth with financial inclusiveness is best of all" especially in the developing economy.

Nwankwo and Nwankwo (2014) examined the sustainability of financial inclusion to rural dwellers in Nigeria using descriptive study and content analysis. The study found that the sustainability of financial inclusion to rural dwellers in Nigeria remained the mainstream for economic growth in any country. Moreover, it was also found by the study that the economy cannot grow fast without proper implementation of financial inclusion to rural areas in Nigeria. The study therefore recommended that the promotion of collaboration between DMBs, MFBs and communication services providers for enhanced intermediation of financial services should be encouraged; there is need to educate rural dwellers on the importance of banking as it would facilitate the success of CBN financial inclusion policy and that since some of the rural dwellers preferred to keep money under their pillows at home, there should be proper enlightenment to change their orientation on financial inclusion in Nigeria.

The studies of Jalilian and Kirkpatrick 2001) also provided evidence of the relationship between financial development and poverty reduction. They used data for sample 26 countries including 18 developing countries. The study used Bank Deposit Money Assets, and Net Foreign Assets as their measures of financial development. The results showed that a one percent chance in financial development increases growth in the income of the poor in developing countries by almost 0.4 per cent- a significant impact. This outcome was similar to previous studies (Nnedum, 2003; 2013a; 2014) in behavioural economics.

Using rural bank branch data from India, which better capture the direct impact of access to financial services on poverty, Burgess and Pande (2003) studied the impact of rural banks branches on rural poverty reduction and found that a one percent in the number of rural banked locations reduced rural poverty by 0.34 percent and increased total output by 0.55 percent by facilitating diversification out of agriculture. Meanwhile, Munyanyi (2014) in a study financial inclusion in Zimbabwe, using a cross sectional data drawn from a rural community found significant positive relationship between financial inclusion variables and incomes of rural dwellers. The result showed that there was an increase in access to financial services including access to credit.

In a study conducted by Mbutor and Uba (2013) on the impact of financial inclusion on monetary policy aggregates in Nigeria between the period 1980 – 2012, using standard econometric tool found a positive nexus between financial inclusion and monetary policy aggregates in Nigeria. The findings further indicated that improvement in financial access increased the effectiveness of financial policy.

Babajide et al. (2014) tried to ascertain the impact of flow of FDI on economic development of host African countries characterized with low income per capita. Panel data was utilized for 39 African countries, 20 of which were low income countries. The results indicated that FDI had significant impact on economic development of host African countries, by enhancing development of host sector and reducing gradually dependence on foreign capital, which resulted in increased income per capita, better education, living standards and wellbeing of the host economies. The study however recommended that government of host economies should guide the sector of FDI inflow, and ensure policies are in place to enhance domestic investment development in such sectors. This will gradually bring about closure of existing proactive factors and hence economic development.

Michael (2016) examined whether increased access to financial services by farmers can bring about sustainable development in Nigeria merits attention. In response, the study adopted survey research design to obtain and analyse the perception of 105 farmers in Ogun State, Nigeria on the subject. It was found by the study that financial inclusion in the Nigerian agriculture sector can be used to achieve sustainable development. The study however recommended the citing of more financial institutions in rural areas and financial discipline, amongst others, as measures to achieve financial inclusion in the agricultural sector.

METHOD

Research Design

The study adopted *ex post facto* research design. In economic theory variables already exist and their relationships unknown as such data cannot be manipulated by the researcher to confess in a predetermined manner. The ex post facto fits well into this study because in time series all variables of interest are put under observation, their relationships and inter dependences examined as their outcomes are estimated. Also, their feedback effects are at the same time considered and empirically measured (Gujarati, 2003). The study relied on investigative explanation of dependent and explanatory variables. More so, the explanatory variables were researched on based on past records in other to seek the possible link, effects and variations that

come from explanatory side which react on the dependent variable.

Model specification

The model for this study is a modification of

Data Discussion

The variables used in this study include gross domestic product (GDP), access to credit, POS, and bank branches and ATM. The GDP is used as proxy for economic growth and measured total output of goods and services produced annually. Thus, the GDP is output measure of a country for the period under study. Also, the data for commercial bank access was measured by calculating the total money credit by all customers of all the banks guaranteed by the central bank of Nigeria taken annually for the period of 15 years whereas the Point of Sale (POS) is the total number of POS used annually for the period of the study; the number of ATM was also measured to provide the data for bank branches.

Sources of Data Employed

The data study made use of secondary data. The data for gross domestic product (GDP), access to credit, POS, and bank branches and ATM. were culled from World Bank Statistical data and Central Bank of Nigeria (CBN) statistical Bulletin of 2018

RESULTS

The result obtained from the estimation of the impact financial inclusion variables on economic growth of Nigeria are presented thus.

Table 1. Unit Root Test

Series	ADF t- Statistic ADF	5% critical level	Order of integration
GDP			
ATM	-10.1267	-3.8209**	I(0)
BNKPR	-4.9012	-3.8753**	I(1)
BNCR	-5.8876	-3.9336**	I(1)
POS	-3.8809	-3.8299**	1(0)

*significant at 1% ** significant at 5% *** significant at 10%

From the result presented in table 1, the unit root status of the variables indicated that POS and ATM were stationary at level I (0) whereas GDP, BNKPR, BNCR and GDP were stationary at first difference I(1). In other words, the series possesses a mixture of order of integrations

Table 2: Lag Structure

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-246.9864	NA	874.4423	12.44932	12.53376	12.47985
1	-211.4227	65.79287*	180.5386*	10.87113*	11.12447*	10.96273*
2	-210.6339	1.380439	212.4205	11.03169	11.45391	11.18435
3	-208.5331	3.466186	234.6706	11.12666	11.71776	11.34038

Source: e views result estimation

The lag was automatically selected from the table 2, where all the lag selection criteria chose one period lag for the estimation of the ARDL model.

Table 4: Bound Test Results

F-statistics	Lag	Critical Values		
	1	Sig level	lower bound I(0)	upper bound I(1)
		10%	3.03	4.06
71.88		5%	3.47	4.57
		1%	4.4	5.72

From the result in table 3.0, the critical values used in the study vide Narayan (1999), the calculated F-statistics is 71.88 while the upper critical bound is 4.57. Thus, the null hypothesis (Ho) of no co-integration is rejected. This implies that there is long-run relationship between financial inclusion variables and economic growth and suitable for long run policy

Estimated long-run parameters using ARDL Technique

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POS	0.000000	0.000000	8.299855	0.0763
BKCR	0.066499	0.011189	5.943363	0.0161
BKBR	0.160483	0.009435	17.009214	0.0374
ATM	0.378281	0.019885	19.023230	0.0334
C	-0.204340	0.031838	-6.418059	0.0984
R-squared	0.999385	Mean dependent var		-0.011320

$GDP_t = -0.204 + 0.000POS + 0.066BNCR + 0.160BNKBR + 0.378ATM$

(1.38) (0.00) (0.011189) (0.009435) (0.019885)

$R^2 = 0.99$, Dw = 2.25 $\backsim$2.0, F(Prob) = (0.006).

From the ARDL long run estimated results obtained, holding all the other factors constant, the GDP growth is accounted by 99 per cent of the change in financial inclusion variables. The result also indicated that POS has positive significant effect on Nigeria's economic growth. Also, one billion naira increase of commercial bank credit resulted to increase in the country's GDP by about 6 billion naira. Holding other factors constant, the growth of bank branches in Nigeria by one unit resulted to increase in GDP by about 16 units. The obtained regression equation further implied that there was a strong positive relationship between GDP growth and growth of Branch Networks. Furthermore, a unit increase in the number of automated teller machine users resulted to increase in GDP by about 37 units. This implied that the number of ATM users has the highest influence on the GDP growth followed by Number of Branch Networks then commercial bank bank credits. There was a weak positive relationship between Point of Sale (POS) and GDP growth. The criteria for comparing whether the predictor variables were significant in the model was through comparing the corresponding probability value obtained and a=0.05. If the probability value was less than 0.05 then the predictor variable was significant otherwise it was not significant. From the result presented, all the financial inclusion variables (Number of Mobile Money users/Accounts, Bank credit, Branch networks and Automated Teller Machines) under consideration in this study were significant except Point of Sale (POS) that manifested p-value of (0.0763) which is greater than (0.05) level of significance. The F-statistics of (162.58) with a p-value of (0.006) less than (0.05) indicated that the variables of financial inclusion have significant joint influence on Nigeria's GDP growth.

Diagonistic Tests of Validity of Result

Test of Stability

The result presented below shows the stability of the coefficients, the graph of the cumulative sum of recursive residual (CUSUM). The residuals are plotted within 5 percent critical bounds

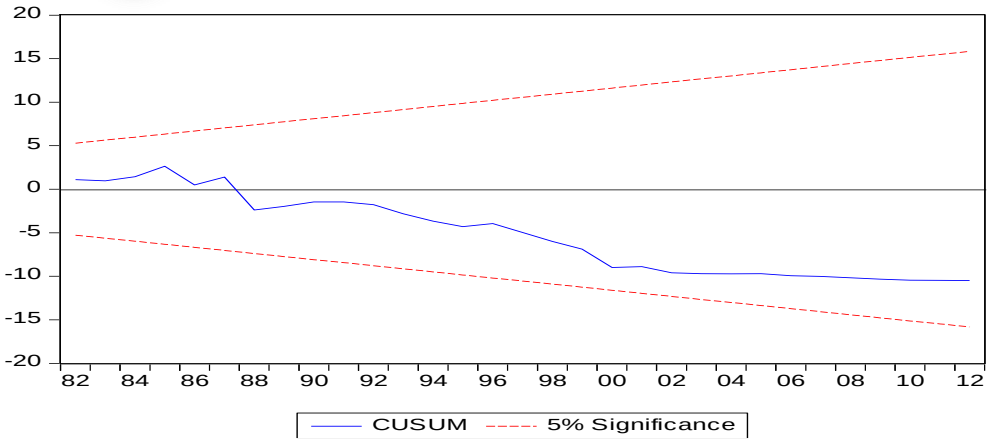
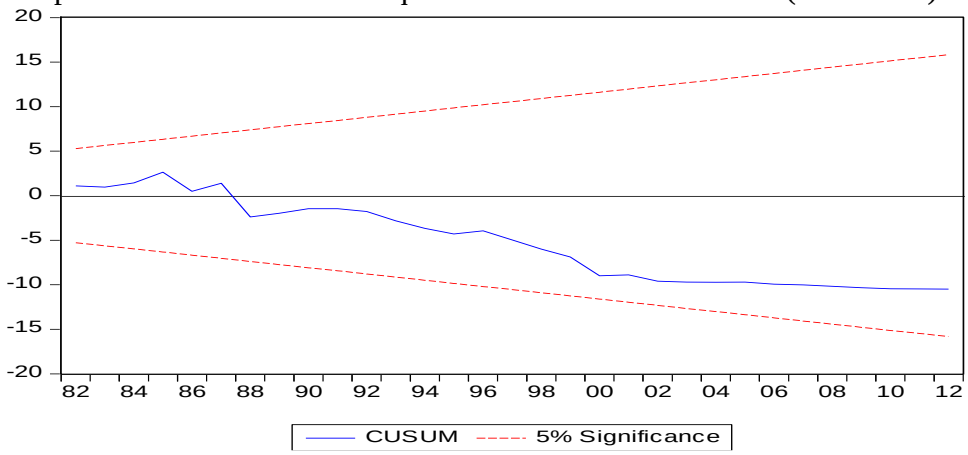


Fig. 1 Graph of CUSUM Test

The two straight red lines represent the critical bounds at 5% significance
Graph of cumulative sum of Squares of Recursive Residuals (CUSUMS)



The straight line represents critical bounds at 5% significance levels (cusumsq) graph of test of stability. From the findings the regression specification and estimation are significant having passed all diagnostic tests. (CUSUMSQ) stability tests are shown. Since the estimated model is stable over the study period of the line will lie between the critical points.

Another stage is to check the goodness of fit and the validity of the model. Diagnostic tests such as Lagragian multiplier (LM) test for serial correlation and the plot of cumulative sum of recursive residues (CUSUM) and

cumulative sum of squares of recursive residuals (Cumusq) stability test.

Serial correlation F (2,34) 0.095 (0.90) The null hypothesis of no serial correlation was not rejected. This implies that there is evidence of not serial correlation since P-value of F-statistic of 0.095 is 0.90 which is greater than 0.05. The goodness of fit of the model is relatively high. Also, the CUSUM test shows that the line lies within the two red lines. The graph is presented below.
Graph of Cumulative Sum of Recursive Residuals (CUSUM)

DISCUSSION

In this section study aimed at evaluating impact of financial inclusion on economic growth of Nigeria. The dependent variable in this study is the GDP growth while the independent variables included; Point of Sale (POS), bank credits, bank branches and number of automated teller machines in the country.

The study adopted ex-post facto research design, used secondary data collected from various sources for the period 2006 and 2018. The study undertook an Autoregressive model (ARDL) analysis to establish long run relationship between the variables of study and the impact of financial inclusion on GDP growth of Nigeria: In other to empirically estimate the impact of financial inclusion on economic growth of Nigeria, the selected financial inclusion variables were subjected to unit root test to ascertain if there are stationary and if otherwise, to determine their order of integration: First; the Augumented Dickey Fuller test statistic was used to examine and ascertain the order of integration of the variables to know whether there are stationary at level or non-stationary; otherwise, the series was in other to avoid producing spurious and misleading regression result. Secondly, the variables were subjected to cointegration test. The justification of cointegration is to establish whether there is long-run relationship between the variables of interest. In this study, there existed a mixture of linear combinations of series with different levels integration. Some series are I (1). This implies that series are not integrated of the same order. From the estimated result in table 3, the ARDL result obtained indicated that there existed a long-run relationship between financial exclusion variables and economic growth of Nigeria. The result is in conformity with finance led theory of Bagehot (1873) and inclusive growth theory that the existence of financial sector combined with inclusive growth strategy generates growth enhancing effects. Thus, financial access to all has the potency of boosting Nigeria's economy. This theory is validated by the findings of Kama and Adigun (2013) and Stephen, Flora and Louise (2009) that a long run relationship existed between

financial inclusion variables and economic growth in Nigeria.

These findings are consistent with the findings of Ngugi, Amanja and Maana (2010) who established that financial sector plays a crucial role in economic development. The depth of the financial sector has generally promoted economic growth in Nigeria.

The study findings established that there was a strong positive relationship between GDP growth and Branch Networks which is one of the variables of financial access. These findings are consistent with those of Mbutor and Uba (2013) who found that there was evidence of effect of financial inclusion proxies on economic growth of Nigeria. Also, the study found that access to credit impacted significantly on economic growth and this is in tandem with the works of Aduda and Kalunde (2012) and Oruo (2013).

The study findings established that there was positive relationship between GDP growth and the number of POS users but effect on economic growth. The relationship between GDP growth and Number of Automated Teller machines in the Country was weak but negative relationship between GDP Growth and bank lending rates was a strong negative. Branch Networks had the highest influence on the GDP growth followed by number of mobile money users/ accounts, number of automated teller machines and banking lending rates. This measures the relative importance of a specific type of financial institutions (commercial banks) in the financial system. The study findings further established that GDP growth over the study period was increasing as well as number of automated teller machines, number of mobile money users/accounts and branch networks.

CONCLUSION

This study employed the ex-post facto research design to estimate the impact of financial inclusion variables on Nigeria's economic growth. The data for the variables used were mainly from CBN statistical bulletin. The study covered a period between 2006 and 2018. The empirical results obtained were from pre-test and post test conducted which included the Augumented Dickey Fuller (ADF) test; Johansen cointegration test. The result indicated a mixed order of integration and existence of long-run relationship existing between financial inclusion variables and economic growth. Furthermore, the ARDL estimation was conducted to obtain the long and short run coefficients of the variables under consideration. On the basis of the result obtained, it is concluded that the system of financial inclusion has significant contribution to GDP growth in Nigeria.

Proposal for Future Enquiries

In the light of the results and findings in this paper and in reference to the objectives of the study and estimated

result of the model, the following proposals are worthwhile:

i. Since the size of bank credit is significant in raising domestic output of Nigeria and its access has increased following increase in financial inclusion then the Central Bank of Nigeria should encourage the commercial banks to raise their credit creating abilities.
ii. Since the number of POS is positive and significantly related to output growth of Nigeria but has no impact on output, it shows that the number of POS available in the country is grossly inadequate to propel and facilitate banking transaction. This is evident given the size of bank customers that crowds our banking halls daily and the long queues at the ATM dispensing centers. Therefore, the commercial banks should increase the supply of POS agents by reducing the stringent conditions attached to POS subscription.
iii. lastly, it is evident that the spread of branch networks of banks in Nigeria impedes financial access of the bankable adults therefore it is exigent for banks to expand their operations especially the rural communities who have been financially excluded.

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Appendix

ADF UNIT ROOT TESTS
ATM @ level

Null Hypothesis: ATM has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.12673	0.0000
Test critical values:	1% level	-4.886426	
	5% level	-3.828975	
	10% level	-3.362984	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ATM)
Method: Least Squares
Date: 10/17/19 Time: 22:49
Sample (adjusted): 2006 2018
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM (-1)	-0.424107	0.041880	-10.12673	0.0000
D (ATM (-1))	0.268065	0.061402	4.365715	0.0018
C	0.874898	0.057340	15.25806	0.0000
@TREND ("2004")	0.026299	0.011320	2.323315	0.0452

R-squared	0.968199	Mean dependent var	0.247247
Adjusted R-squared	0.957599	S.D. dependent var	0.360839
S.E. of regression	0.074302	Akaike info criterion	-2.113692
Sum squared resid	0.049687	Schwarz criterion	-1.939861
Log likelihood	17.73900	Hannan-Quinn criter.	-2.149422
F-statistic	91.33714	Durbin-Watson stat	2.500186
Prob(F-statistic)	0.000000		

BKBR @ level

Null Hypothesis: BKBR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.043808	0.5259
Test critical values:	1% level	-4.886426	
	5% level	-3.828975	
	10% level	-3.362984	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BKBR)
Method: Least Squares
Date: 10/17/19 Time: 22:51
Sample (adjusted): 2006 2018
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BKBR (-1)	-0.325289	0.159158	-2.043808	0.0713
D (BKBR (-1))	0.446775	0.258191	1.730405	0.1176
C	2.212582	0.864915	2.558149	0.0308
@TREND ("2004")	-0.054165	0.038435	-1.409278	0.1924

R-squared	0.550104	Mean dependent var	0.009514
Adjusted R-squared	0.400139	S.D. dependent var	0.605545
S.E. of regression	0.468999	Akaike info criterion	1.571227
Sum squared resid	1.979640	Schwarz criterion	1.745058
Log likelihood	-6.212977	Hannan-Quinn criter.	1.535497
F-statistic	3.668215	Durbin-Watson stat	2.441460
Prob(F-statistic)	0.056430		

BKBR @ 1st difference

Null Hypothesis: D(BKBR) has
a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.901284	0.0114
Test critical values:	1% level	-4.992279	
	5% level	-3.875302	
	10% level	-3.388330	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BKBR,2)
Method: Least Squares
Date: 10/17/19 Time: 22:52
Sample (adjusted): 2007 2018
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (BKBR (-1))	-1.357345	0.276937	-4.901284	0.0012
D (BKBR (-1),2)	0.423127	0.208995	2.024578	0.0775
C	1.288369	0.375891	3.427506	0.0090
@TREND ("2004")	-0.146472	0.041734	-3.509673	0.0080

R-squared	0.757813	Mean dependent var	0.021657
Adjusted R-squared	0.666993	S.D. dependent var	0.696584
S.E. of regression	0.401976	Akaike info criterion	1.276354
Sum squared resid	1.292679	Schwarz criterion	1.437989
Log likelihood	-3.658122	Hannan-Quinn criter.	1.216510
F-statistic	8.344103	Durbin-Watson stat	1.241510
Prob(F-statistic)	0.007600		

BKCR @ Level

Null Hypothesis: BKCR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.224034	0.1265
Test critical values:	1% level	-4.992279	
	5% level	-3.875302	
	10% level	-3.388330	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BKCR)
Method: Least Squares
Date: 10/17/19 Time: 22:52
Sample (adjusted): 2007 2018
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BKCR (-1)	-1.070202	0.331945	-3.224034	0.0104
C	0.116562	0.238275	0.489190	0.6364
@TREND ("2004")	-0.015962	0.026020	-0.613450	0.5548

R-squared	0.537717	Mean dependent var	-0.010395
Adjusted R-squared	0.434988	S.D. dependent var	0.411611
S.E. of regression	0.309397	Akaike info criterion	0.703933
Sum squared resid	0.861537	Schwarz criterion	0.825160
Log likelihood	-1.223600	Hannan-Quinn criter.	0.659051
F-statistic	5.234300	Durbin-Watson stat	1.478004
Prob(F-statistic)	0.031052		

BKCR @ 1st difference

Null Hypothesis: D(BKCR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.887654	0.0039
Test critical values:	1% level	-5.124875	
	5% level	-3.933364	
	10% level	-3.420030	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BKCR,2)
Method: Least Squares
Date: 10/17/19 Time: 22:53
Sample (adjusted): 2008 2018
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (BKCR (-1))	-1.446786	0.245732	-5.887654	0.0004
C	-0.286797	0.304465	-0.941969	0.3738
@TREND ("2004")	0.023028	0.031962	0.720466	0.4918

R-squared	0.819250	Mean dependent var	-0.057973
Adjusted R-squared	0.774063	S.D. dependent var	0.702296
S.E. of regression	0.333821	Akaike info criterion	0.870579
Sum squared resid	0.891493	Schwarz criterion	0.979096
Log likelihood	-1.788184	Hannan-Quinn criter.	0.802174
F-statistic	18.13005	Durbin-Watson stat	1.129692
Prob(F-statistic)	0.001067		

POS @ 1st Difference

Null Hypothesis: POS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.880910	0.0463
Test critical values:	1% level	-4.886426	
	5% level	-3.828975	
	10% level	-3.362984	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POS)
Method: Least Squares
Date: 10/17/19 Time: 22:56
Sample (adjusted): 2006 2018
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POS (-1)	-0.305887	0.078818	-3.880910	0.0037
D (POS (-1))	1.416964	0.308395	4.594642	0.0013
C	-2292937.	2025188.	-1.132210	0.2868
@TREND ("2004")	614480.8	348026.1	1.765617	0.1113

R-squared	0.886151	Mean dependent var	4877555.
Adjusted R-squared	0.848201	S.D. dependent var	5660490.
S.E. of regression	2205407.	Akaike info criterion	32.29838
Sum squared resid	4.38E+13	Schwarz criterion	32.47221
Log likelihood	-205.9395	Hannan-Quinn criter.	32.26265
F-statistic	23.35061	Durbin-Watson stat	2.398244
Prob(F-statistic)	0.000140		

ARDL Bound test

ARDL Bounds Test
Date: 10/17/19 Time: 23:02
Sample: 2007 2018
Included observations: 12
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	71.88745	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	3.03	4.06
5%	3.47	4.57
2.5%	3.89	5.07
1%	4.4	5.72

Test Equation:
Dependent Variable: D(GDP4)
Method: Least Squares
Date: 10/17/19 Time: 23:02
Sample: 2007 2018
Included observations: 12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POS)	4.12E-09	8.71E-10	4.728941	0.1327
D(BKCR)	-0.079401	0.015389	-5.159623	0.1219
D(BKBR)	0.141356	0.011362	12.44145	0.0511
D(ATM)	-0.375998	0.027485	-13.68011	0.0465
C	-0.403011	0.065960	-6.109932	0.1033
@TREND	0.071271	0.006732	10.58668	0.0600
POS (-1)	5.11E-09	6.35E-10	8.042225	0.0788
BKCR (-1)	-0.131152	0.024804	-5.287530	0.1190
BKBR (-1)	0.316513	0.024862	12.73075	0.0499

ATM (-1)	-0.746068	0.057731	-12.92321	0.0492
GDP4(-1)	-1.972259	0.107550	-18.33809	0.0347

R-squared	0.999385	Mean dependent var	-0.011320
Adjusted R-squared	0.993239	S.D. dependent var	0.053169
S.E. of regression	0.004372	Akaike info criterion	-8.678787
Sum squared resid	1.91E-05	Schwarz criterion	-8.234289
Log likelihood	63.07272	Hannan-Quinn criter.	-8.843356
F-statistic	162.5891	Durbin-Watson stat	2.515554
Prob(F-statistic)	0.060963		

ARDL Short run and long run

ARDL Cointegrating And Long Run Form
Dependent Variable: GDP4
Selected Model: ARDL (1, 1, 1, 1, 1)
Date: 10/17/19 Time: 23:04
Sample: 2004 2018
Included observations: 12

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POS)	0.000000	0.000000	4.728941	0.1327
D(BKCR)	-0.079401	0.015389	-5.159623	0.1219
D(BKBR)	0.141356	0.011362	12.441454	0.0511
D(ATM)	0.375998	0.027485	13.680111	0.0465
D (@TREND ())	0.071271	0.006732	10.586684	0.0600
CointEq (-1)	-0.972259	0.107550	-18.338092	0.0347

Cointeq = GDP4 - (0.0000*POS -0.0665*BKCR + 0.1605*BKBR + 0.3783 *ATM -0.2043 + 0.0361*@TREND)

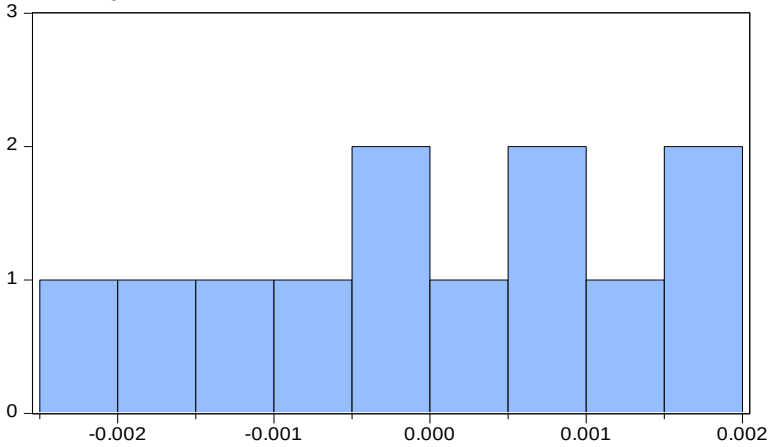
Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POS	0.000000	0.000000	8.299855	0.0763
BKCR	0.066499	0.011189	5.943363	0.0161
BKBR	0.160483	0.009435	17.009214	0.0374

ATM	0.378281	0.019885	19.023230	0.0334
C	-0.204340	0.031838	-6.418059	0.0984
@TREND	0.036137	0.002522	14.328866	0.0444

POST DIAGNOSTIC TESTS

Normality Test



Series: Residuals
Sample 2007 2018
Observations 12

Mean	9.49e-17
Median	0.000131
Maximum	0.001582
Minimum	-0.002293
Std. Dev.	0.001318
Skewness	-0.404407
Kurtosis	1.955440
Jarque-Bera	0.872642
Probability	0.646410

Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.484207	Prob. F (10,1)	0.8188
Obs*R-squared	9.945934	Prob. Chi-Square (10)	0.4452
Scaled explained SS	0.032996	Prob. Chi-Square (10)	1.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/17/19 Time: 23:07
Sample: 2007 2018
Included observations: 12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.43E-06	3.37E-05	0.220582	0.8618
GDP4(-1)	8.22E-05	5.49E-05	1.497796	0.3748
POS	1.92E-13	4.45E-13	0.432335	0.7402
POS (-1)	-1.40E-13	2.85E-13	-0.489794	0.7101
BKCR	4.71E-06	7.85E-06	0.599083	0.6564
BKCR (-1)	6.80E-06	6.01E-06	1.131933	0.4607
BKBR	-2.07E-07	5.80E-06	-0.035738	0.9773
BKBR (-1)	-1.08E-05	1.13E-05	-0.948656	0.5168
ATM	5.40E-06	1.40E-05	0.384783	0.7662
ATM (-1)	3.08E-05	2.59E-05	1.192940	0.4441
@TREND	-5.07E-06	3.44E-06	-1.475629	0.3792

R-squared	0.828828	Mean dependent var	1.59E-06
Adjusted R-squared	-0.882894	S.D. dependent var	1.63E-06
S.E. of regression	2.23E-06	Akaike info criterion	-23.83945
Sum squared resid	4.98E-12	Schwarz criterion	-23.39496
Log likelihood	154.0367	Hannan-Quinn criter.	-24.00402
F-statistic	0.484207	Durbin-Watson stat	2.515554
Prob(F-statistic)	0.818766		

Autocorrelation test

Date: 10/17/19 Time: 23:08
Sample: 2004 2018
Included observations: 12

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.439	-0.439	2.9435	0.086
		2	0.163	-0.036	3.3917	0.183
		3	-0.333	-0.341	5.4615	0.141
		4	0.171	-0.144	6.0788	0.193
		5	-0.272	-0.363	7.8589	0.164
		6	0.244	-0.191	9.5211	0.146
		7	-0.117	-0.205	9.9811	0.190
		8	0.249	-0.031	12.582	0.127
		9	-0.130	0.013	13.524	0.140
		10	-0.110	-0.321	14.546	0.150
		11	0.074	-0.016	15.468	0.162

*Probabilities may not be valid for this equation specification.