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Financial Liberalization and Credit to the Private Sector Components

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ABSTRACT

The aim of the study was to ascertain the effect of liberalising the Nigerian financial system on credit components in the private sector of the economy, therein investigating the possibility of credit crunch. Employing data from 1970 to 2009, sourced from the Central Bank of Nigeria Statistical Bulletins, on an Autoregressive Distributed Lag (ARDL) Model to test for the long and short run impacts of financial liberalization and the presence of credit crunch in the private sector, the results revealed that liberalising the Nigerian financial system had boomerang effects on the credits allocated to the sub-sector in the long run (except for mining and quarrying), and in the short run, financial liberalization was in all insignificant and negative. On investigating the presence of credit crunch in the long and short run, the results lead to the conclusion that Deposit Money Banks (DMBs) in Nigeria had a strong discriminating credit behaviour towards the real sectors (Agriculture, Manufacturing and Mining and Quarrying) and the SMEs, as credit crunch was present in these sectors in both the short and long run as indicated by the inverse relationship between increasing deposit liabilities that make up savings and the credit that flows to these sub-sectors. However, their preference was observed in the significant positive flow of savings in form of credits to services, real estate, commerce and others (private individuals, professional, and government). Suggesting that credit crunch does not exist in this sectors as reflected when aggregate credit is reported.

Keywords: *ARDL-Bound Test, Credit Crunch, Credit to Private Sector Components, Financial Liberalization.*

1. INTRODUCTION

Series of studies have concluded that private sector investment enterprise is a mainstay in propelling economic development but government enterprises are prone to inefficiency and poor delivery, thus, resulting to liberalization of various sectors/industries and privatization of many government parastatals and enterprises to encourage private sector participation. But owing to

inadequate infrastructures and well-functioning financial markets, which are sine-qua-non to kick-start and sustain economic development process, it has become very difficult for the private sector to undertake development-inducing functions via investment credit. Although, the World Bank (2010) reports that credit crunch (a phenomenon where increasing deposits/savings do not translate to increased credit allocation, but a shortage in credit allocation owing to unwillingness of financial institutions to expand for various reasons) does not exist in Nigeria, the disturbing anti-climax arises when the questions of "why has the increased credit, as emphasised by the absence of credit crunch, not led to economic development?" and "Did liberalizing the Nigerian financial sector affect its aggregate credit level?" If the report on the absence of credit crunch is accurate, do the various credit channels (i.e. credit to the real and services sectors) respond in similar fashion as the aggregate credit to the private sector, especially in the presence of various financial liberalization reforms? Whereas studies like Soyibo (1996), Nzotta and Okereke (2009), and Okpara (2010) amongst others point to the improper pace, sequence; discontinuing regulatory reforms and failure of banking policy as the factors responsible for the sluggish economic development. In line with these views, and coming from a specific to general intuitive reasoning, we are tempted to consider the areas to which these credits have been allocated, especially now that efforts are being made to sanitise the Nigerian banking sector following the incidents of distress banks, increasing volumes of non-performing loans and poor corporate governance. These have led to the establishment of the Asset Management Corporation of Nigeria (AMCON) in 2010 to intervene through the valuation and purchase of eligible toxic financial assets as well as takeover of some distressed banks' management boards by the Central Bank of Nigeria (CBN) in attempt to restore confidence in the financial markets (Afrinvest, 2010).

Nigeria has attempted various reforms to revitalize the financial sector with mixed results overtime. In 1986, the Nigerian financial system was deregulated, and from 1992 substantial changes had taken place: number of deposit money banks (DMBs) and Merchant banks (MBs) increased from 41 in 1986 to 50 in 1987, decreased from 119 in 1993 to 115 in 1996. Between 1998 and 2004, the number ranged between 89 and 90. But by 2005, the number plummeted to 25, then 24 in 2009 and currently 19 following the increased bank capital base of ₦25 billion and re-categorisation of banks into International, National and Regional banks. The post-liberalisation changes in the banking sector seem to have adverse effects on the spread between the lending and deposit rates as the narrow average margin of 4.01 in 1970 increased to 10.40 points three years after interest rate determination was left to market forces in 1986. The spread widened further to 15.99 in 1999 and 15.42 in 2009. Obviously, these suggest that the liberalisation-induced competition in the sector is yet to intensify as most banks use the spread between abnormal high lending rate and the low deposit rate as a strategy of survival by accumulating capital to meet required base and other regulatory requirements.

Low deposit rate in Nigeria casts some doubt on the increasing savings observed in Table H of Appendix I. To quell this curiosity, we infer that the increasing savings phenomenon was a function of the absence of less risky and profitable investment alternative outside financial institutions caused by unpredictable and unfavourable investment climate and the intensity of savings promo by the financial institutions which offer incentives and gifts to encourage savings. Also, variety of savings packages and services in form of corporative sinking funds attract regular income earners to gain mortgages acted as major catalyse to increase savings.

In line with this mixed outcomes of interest rates spread and the report of "no credit crunch" by the World Bank in 2010, this paper, unlike previous investigations by Soyibo (1996), Fowowe (2008) and Okpara (2010) which focused the effects on savings, interest rate and economic growth, examines the effect of financial liberalization on a bridge variable between savings and economic growth (i.e., the aggregate level of credit channelled from the financial sector to the private economy), the effect of liberalisation on the component credit units (i.e., credits to the real sectors and services). The driving objective is to determine whether credit crunch abounds or is actually absent when component credit units are considered. Specifically, this aspect of research is conspicuously absent in existing studies for Nigeria.

2. REVIEW OF SOME RELATED LITERATURE

The banking sector, as an important sector in the financial landscape, needs to be reformed to enhance its competitiveness and capacity to play a fundamental role of financing investment. Many literatures indicate that banking sector liberalizations are propelled by the need to deepen the financial sector and reposition for growth, to become integrated into the global financial architecture. McKinnon and Shaw (1973) were the first to suggest that liberalizing a repressed financial system leads to higher interest rates which equate the demand and supply of savings; higher interest rates lead to increased savings and financial intermediation and improve the efficiency of savings and investment which translate to economic growth.

Outcome of banking sector reforms depends on several factors that are unique to each country's historical economic and institutional imperatives thus yielding differing results across borders of studies. However, there is the need to look at similar empirical works on liberalization as it affects economies with special focus on credit to the private economy. Rahila et al. (2010) examined the long run and short run association among investment, savings, real interest rate on bank deposits and effect of bank credit to the private sector under financial liberalization on key macroeconomic variables in Pakistan for the period 1973- 2007. Using an ARDL- Bound Testing Approach, DF-GLS and NG-Perron Tests, they established that private investment is positively and significantly affected by savings, real interest rate on bank deposits, bank credit to private sector and public investment in the long run for a developing country like Pakistan. This supports McKinnon's complementarity hypothesis, that high interest on deposit promotes capital formation (investment) by increasing the supply of credit through savings (McKinnon-Shaw, 1973).

To examine whether financial sector reforms necessarily result in expansion of credit to the private sector, how bank ownership affect the availability of credit to the private sector and whether public and private banks deployed resources freed up by reduced state pre-emption to increase credit to the private sector, Poonam et al. (2011) used bank-level data from 1991- 2007 and found that even after liberalization, public banks allocated a larger share of their assets to government securities than did private banks. They also found that public banks were more responsive in allocating relatively more resources to finance the fiscal deficit even during periods when state pre-emption declined. These suggest that in developing countries, where alternative channels of financing may be limited, government ownership of banks, combined with high fiscal deficits, may limit the gains from financial liberalization reforms.

In their study, Tressel and Detragiache (2008) used data for 90 countries over the period 1973-2005 to see if financial reforms resulted in financial deepening. They found that the evidence is

very context-dependent, differing over the long run and shorter horizons, for developing and developed countries, and across countries with different political institutions. Overall, the effect is positive for developing countries in the short run, and is stronger for countries that have political institutions that offer stronger protection of property rights. The findings suggest that the effect of financial liberalization reforms on the availability of credit to the private sector may also depend on the state ownership of banks and the size of the fiscal deficit.

Ogiogio (1994) examined the attitude of commercial banks towards risk before the 1987 deregulation of the economy and assessed the level of commitment by the banking sector to funding national economic development. He showed that if a bank has a stable deposit portfolio and high and timely repayment for its loans and advances, it obviously has the capacity for high risk lending. This is required to support investment in sectors like agriculture and manufacturing for rapid and sustainable economic growth. Thus, a bank's attitude towards risk management is conditioned by the nature of the flow of its deposits and its loan repayment history. He concluded that Nigerian banks are risk averters because of the decentralisation of management of assets and liabilities portfolios.

3. DATA, MODEL AND METHODOLOGICAL FRAMEWORK

Annual time series data (1970 - 2009) for Nigeria were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletins and the World Bank Development Indicator 2009. The econometric model has been specified by the standard literature following King and Levine (1993), King Ross and Levine (1997), Levine and Zervos (1998), Levine et al. (2000), Wachtel (2001) and Shrestha and Chowdhury (2005) specifying the demand for money and savings function subjected to testing the effects of financial developments as:

$m/p_t = \alpha_0 + \alpha_1 y_t + \alpha_2 s/y_t + \alpha_3\, i\text{-}p^e_t + \mu_t$ ---------- (1)

where m/p is the demand for money, dependent on the level of income y, volume of accumulated average savings s/y, the real interest rate $i\text{-}p^e$ and e is the error term. If the case of a transitory demand for cash balance prevails in a constrained situation, we can assume further that credit demand equals the money demand. Also when the effect of financial liberalization reform is to be tested, equation one seems restrictive as it has no variable therein to really reflect the degree of liberalisation effect, thus the equation is restated as:

$LCrdp/y_t = \alpha_0 + \alpha_1 y_t + \alpha_2 Ls/y_t + \alpha_3\, i\text{-}p^e_t + \alpha_4\, FinLb_t + \mu_t$ ---------- (2)

where; $Crdp/y_t$ is credit to the private economy/credit components as a ratio of aggregate output. y_t is economic growth, $i\text{-}p^e$ (afterward represented as RINTR) is the real interest rate, s/y is the savings output ratio and FinLb is the financial liberalisation measure. μ_t is the error term, L (in front of variables) is the Logarithmatic/log indicator for growth rate (it is not included for real interest rate because of the presence of negativity, and financial liberalization index) and $\boldsymbol{\alpha_0}$-$\boldsymbol{\alpha_4}$ are the parameters coefficients. $\boldsymbol{\alpha_0, \alpha_1 \ldots \alpha_4 > 0}$

$L(Crdp/GDP) = \alpha_0 + \alpha_1 LGDP + \alpha_2\, L(Sav/GDP) + \alpha_3 RINTR + \alpha_4 FinLb + \mu_t$ ---------- (3)

$\alpha_0, \alpha_1 \ldots \alpha_4 > 0$

Given the objective of this paper, equation three will be the basic equation for the study. Most of the studies that involve financial liberalization use individual financial liberalization policies such as real interest rate, credits as a ratio of economic output proxied with gross domestic products, or the money supply as a ratio of gross output, either treated the partial financial liberalization as the

full liberalization. While others measure liberalization using dummy variables of zero and one (0 for pre liberalisation and 1 for liberalization period), this technique fails to capture the progression sequence of liberalization in the system ignoring the fact that liberalization at various point in time may differ because it is a dynamic exercise involving different aspects and, in aggregate, reflects varying level of degree in liberalization. To avoid paying for the penalty of losing full liberalization information, we construct an index to measure the degree of financial liberalization in aggregate. We consider seven components of financial liberalization in the system and record a 0 or 1 score for each component following observations as various reforms are implemented in the country overtime. Thereafter, an aggregate of the scores is taken to give us a close proxy of the degree of financial liberalization (See Table I in Appendix II).

Settling for a methodology to investigate the long run and short run relationship among the running variables, one would need to use a fitting Co-integration technique for empirical analysis. Most of the available studies employ the Johansen-Juselius (1992) and Engle Granger (1987) Co-integration technique which requires that all the series should have the same order of integration. This study uses Bounds testing approach to Co-integration employed within the framework of Autoregressive Distributed Lag model (ARDL) developed by Pesaran, et al. (1997), as it can be applied without considering the same order of integration of all variables, i.e., either they are integrated of order I(0), I(1) or of mixed order. Contrary to other single equation co-integration procedures, this technique has certain econometric advantages. First, as the Engle-Grander method experiences endogeneity problems and failure to test hypothesis on the estimated coefficient in the long-run, Autoregressive Distributed Lag (ARDL) approach avoids such problems. Second, short run and long run parameters of the model are estimated simultaneously. Third, each and every variable is presupposed as endogenous. Fourth, the econometric methodology does not face the dilemma of finding the order of integration among the variables and of pre-testing for unit root. Hence, Autoregressive Distributed Lag (ARDL) approach of Pesaran et al. is applicable even if the underlining variables are of I(0), of I(1) or mutually co-integrated, as all other methods entail that the variables in a time series regression equation are integrated of the same order, essentially I(1). The statistic underlining this procedure is the familiar Wald or F-statistic in a generalized Dickey-Fuller type regression, which is used to test the significance of lagged levels of the variables under consideration in a conditional unrestricted equilibrium Error Correction Model (ECM) (Pesaran et al., 2001). One more reason to use the ARDL approach is its extra robustness and better performance for a small sample size as in this study.

The ARDL bounds test is based on the F-statistic, which has a non-standard distribution. Two critical bounds are given by Pesaran, et al. (1997) for Co-integration test. The lower critical bound assumes that all the variables are I(0), while the upper bound assumes all the variables to be I(1). Following Unrestricted Error Correction Model, the general form of ARDL is given as;

$$\Delta y_t = \alpha_0 + \lambda_1 y_{t-1} + \lambda_2 x_{t-1} + \sum_{i=1}^{k} \alpha_1 \Delta y_{t-i} + \sum_{i=1}^{k} \alpha_2 \Delta x_{t-i} + \mu_t \quad \text{..... (4)}$$

At start, the test for null hypothesis of no Co-integration against alternative of the existence of a long run relationship is tested using F-test such that:

$H_0 = \lambda_1 = \lambda_2 = \ldots = \lambda_n = 0$

$H_1 = \lambda_1 = \lambda_2 = \ldots = \lambda_n \neq 0$

If the computed F-statistic falls above the upper bound critical value of F-tabulated developed by Pesaran, the null hypothesis of no Co-integration is rejected which implies that long run relationship exists among the variables of interest. On contrary, if it falls below the lower bound, then the null hypothesis of no Co-integration cannot be rejected. Finally, if it lies between these two bounds, the result seems inconclusive.

Having confirmed the existence of a cointegrating relationship among the variables, then we determine the lag order of the variables using Akaike Information Criteria, or Schwarz Bayesian Criteria or R^2. After determining the lag order, the long run coefficients of the model are estimated and then short run estimations are carried out followed by the Error Correction Model (ECM). The ECM estimation coupled with ARDL model is obtained from the ARDL equation terms of the lagged levels and the first differences of the dependent and independent variables (Pesaran, et al. 1997). Specifying credit equation three in an Autoregressive Distributed Lag (ARDL) form along with its testable components, we have the following series of ADRL with the following interchanging credit component variables:

$Crdpgdp_t^{Agg}$ = Aggregate Credit to the Private Sector as a ratio of current GDP
$Crdpgdp_t^{Agri}$ = Credit Loan and advances to Agriculture as a ratio of current GDP
$Crdpgdp_t^{manf}$ = Credit Loan and Advances to manufacturing as a ration of current GDP
$Crdpgdp_t^{SMEs}$ = Credit Loan and Advances to SMEs as a ration of current GDP
$Crdpgdp_t^{Service}$ = Credit Loan and Advances to Service Industry as a ration of current GDP
$Crdpgdp_t^{Realestate}$ = Credit Loan and Advances to Real Estate and Building as a ration of current GDP
$Crdpgdp_t^{Commerce}$ = Credit Loan and Advances for Commerce as a ration of current GDP
$Crdpgdp_t^{M\&Q}$ = Credit Loan and Advances to Mining and Quarrying as a ration of current GDP
$Crdpgdp_t^{others}$ = Credit Loan and Advances to Others as a ration of current GDP

Stating all the equation for the model in the ARDL specification, we have:

$$\Delta LCrdpgdp^{i*}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{i*}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{i*}_{t-1} + ECM_{t-1}$$

Expressing the individual components in similar forms:
Where *i** is a vector of credit components, expanding individually to:
Equation 1:

$$\Delta LCrdpgdp^{aggt}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{aggt}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{aggt}_{t-1} + ECM_{t-1}$$

Equation 2:

$$\Delta LCrdpgdp^{Agri}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{Agri}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{Agri}_{t-1} + ECM_{t-1}$$

Equation 3:

$$\Delta LCrdpgdp^{Manf}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{Manf}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{Manf}_{t-1} + ECM_{t-1}$$

Equation 4:

$$\Delta LCrdpgdp^{SMEs}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{SMEs}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{SMEs}_{t-1} + ECM_{t-1}$$

Equation 5:

$$\Delta LCrdpgdp^{Services}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{Services}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{Services}_{t-1} + ECM_{t-1}$$

Equation 6:

$$\Delta LCrdpgdp^{RealEstate}_t = \alpha_0 + \sum_{i=1}^{k_1}\alpha_1\Delta Lgdp_{t-i} + \sum_{i=1}^{k_2}\alpha_2\Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3}\alpha_1\Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4}\alpha_1\Delta Finlb_{t-i} + \sum_{i=1}^{k_5}\alpha_1\Delta LCrdpgdp^{RealEstate}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{RealEstate}_{t-1} + ECM_{t-1}$$

Equation 7:

$$\Delta LCrdpgdp^{Commerce}{}_t = \alpha_0 + \sum_{i=1}^{k_1} \alpha_1 \Delta Lgdp_{t-i} + \sum_{i=1}^{k_2} \alpha_2 \Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3} \alpha_1 \Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4} \alpha_1 \Delta Finlb_{t-i} + \sum_{i=1}^{k_5} \alpha_1 \Delta LCrdpgdp^{Commerce}{}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{Commerce}{}_{t-1} + ECM_{t-1}$$

Equation 8:

$$\Delta LCrdpgdp^{M\&Q}{}_t = \alpha_0 + \sum_{i=1}^{k_1} \alpha_1 \Delta Lgdp_{t-i} + \sum_{i=1}^{k_2} \alpha_2 \Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3} \alpha_1 \Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4} \alpha_1 \Delta Finlb_{t-i} + \sum_{i=1}^{k_5} \alpha_1 \Delta LCrdpgdp^{M\&Q}{}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{M\&Q}{}_{t-1} + ECM_{t-1}$$

Equation 9:

$$\Delta LCrdpgdp^{Others}{}_t = \alpha_0 + \sum_{i=1}^{k_1} \alpha_1 \Delta Lgdp_{t-i} + \sum_{i=1}^{k_2} \alpha_2 \Delta LSavgdp_{t-i} + \sum_{i=1}^{k_3} \alpha_1 \Delta R\text{int}\, r_{t-i} + \sum_{i=1}^{k4} \alpha_1 \Delta Finlb_{t-i} + \sum_{i=1}^{k_5} \alpha_1 \Delta LCrdpgdp^{Others}{}_{t-i} + \lambda_1 Lgdp_{t-1} + \lambda_2 LSavgdp_{t-1} + \lambda_3 R\text{int}\, r_{t-1} + \lambda_4 Finlb_{t-1} + \lambda_5 LCrdpgdp^{Others}{}_{t-1} + ECM_{t-1}$$

In the above equations, the terms with the summation signs represent the error correction dynamics while the terms with λs show the long run relationship between variables.

4. ESTIMATION OF RESEARCH EQUATIONS AND ANALYSIS OF FINDINGS

Unit Root Test

Though the bounds test for cointegration does not depend on pre-testing for the order of integration, we conduct the unit root test to satisfy the curiosity and quell the anxiety of spurious result from regression which is obtainable from regressing non-stationary series, and also to scrutinize the integrating level of the variables to ensure that the variables are not of order I(2), especially as Ouattara (2004) has noted that in the presence of I(2) variables the computed F-statistics provided by Pesaran et al (2001) are not valid because the bounds test is based on the assumption that the variables are I(0) or I(1). We also conducted Diskey Fuller Generalized LeastSquares (DF-GLS) and Ng-Perron tests to determine the optimal lag length of the variables based on the Schwarz Information lag length Criterion (SIC), which is an alternative to the Akaike Information Criterion (AIC) and imposes a larger penalty for additional coefficients. The results show that all the variables are stationary at difference I(1) in the present or absent of trend (see Table A in the Appendix 1).

However, real interest rate variable (RINTR), Log of Real Gross Domestic Product (LogRgdp), Log of Credit Loan Advance to the Manufacturing and Small and Medium Enterprise ($LogCrdpgdp^{Manf\ \&\ SMEs}$) were stationary at level I(0); the remaining were non-stationary at level but became stationary after taking their first difference, i.e. I(1).

From the above test scenarios, there is evidence that estimated maximum lag length is three. Thus, we impose a maximum lag length of three on all the variables and then subjecting the lags to combinations that minimises the Schwarz Information criteria (SIC) and increasing R-Squared to get the optimal lag combination. This conforms to the automatic lag selected by the software analytical package.

Cointegration Test-Bounds Testing Procedure

The DF-GLS unit root tests results indicate that we can implement ARDL models for the equations 1 to 9 using the upper bound critical values reported in Pesaran et al. (2001) for determination of co-integration. The first step in the ARDL bounds testing approach is to estimate equations 1-9 by ordinary least squares (OLS) in order to test for the existence of a long-run and short run relationship among the variables having determined the optimal lag combinations and conducted a Wald Test (F-test) for the joint significance of the coefficients of the long run lagged one levels of the variables.

Equation One: Aggregate Credit

The F-statistic is computed for the joint significance of variables with λs signs. When one lag is imposed, there is a strong evidence of existence of co-integration among the variables. The F_{Crdgdp}^{AGG} (LCrdgdp^{AGG} | LSavgdp, Lrgdp, RINTR, FinLB) ≈ 4.027 (as shown in Table C in Appendix I) for ARDL (1,0,0,1,1) is higher than the upper bound critical Value 4.01 at 5% significance level (Peseran et al, 2001: see Tables F & G of the Appendix for extract). Therefore, there exists a co-integrating long-run relationship among the variables. We therefore proceed to analyse the long and short run coefficients of the variables (See Table C in Appendix I).

The long run results on the growth rate of Aggregate Credit to Private Sector-GDP ratio (LCrdpgdp^{Agg}) show that the growth rate of total financial domestic savings, real interest rate and growth in GDP do affect the aggregate credit to private sector. The coefficient of the growth rate per financial savings is positive (≈ 0.783536) and highly significant at 1 percent. That is, a 1 percent change in the financial savings per GDP leads to a 0.78% increase in the volume of financial credit to private sector per GDP. This is in conformity with the a priori expectation of a positive relationship, and conforming to the absence of credit crunch in Nigerian financial system the long run at aggregate, as reported by the World Bank News Report (2010), following the global financial meltdown/crises of 2007/08 and domestic banking crises 2009/10. The coefficients of real interest rate (RINTR) and growth rate of Gross Domestic Product (LRGDP) were also significant at 1% and 10% respectively. However, their values where very small and indicates a positive effects (0.00571088 and 0.0656019, respectively) on the aggregate credit to private sector. The appropriateness of the explanatory variable is backed by the goodness of fit R^2 and the Adjusted R^2. The curiosity aroused by the DW value is settled on the fact that *if there are lagged dependent variables on the right-hand side of the regression or its parent's source, the DW test is no longer valid (Johnson and DiNardo 1997).*

The Schwarz criterion is minimal at -26.43343, where the value of the goodness of fit of explanatory variable to the explained stands at 89.3% and supported by the R-squared adjusted. This implies that 89.3 percent variation in the growth of aggregate credit to the private sector in the long run, can be attributed to the variables of real gross domestic output (Lrgdp), which encourages larger financial savings (LSavgdp) in response to the Real interest rate (RINTR) and financial liberalization (Finlb). The remaining 10.7% variation in the dependent variable is accounted for by other factors embedded in the error term.

If total financial savings increases by a unit change, the aggregate credit to private sector increases by approximately 0.784 percent. Also, a unit increase in GDP translates to aggregate credit to private sector growth by 0.0656 percent. The real interest rate in the model indicates a positive relationship to the aggregate credit to the private sector in the long-run, suggesting that despite discouraging real interest rate, the aggregate credit seem not to be deterred by its negativity, as there seems to more accessible and reliable sources of credit outside the commercial banks. The coefficient of financial liberalization, though positive, is not significant. This leads us to the conclusion that despite the advantages of financial liberalization, its benefits is yet to bring about significant positive changes in the volume of credit to the private sector. Inferring upon this, we deduce that the objective of continued liberalization of the financial system, though indicating a positive long run impact on financial deepening, is yet to be accomplished (See Appendix, Table D and Figure I).

The Error Correction Model or the Short Run Dynamics of the ARDL indicates that the lagged error correction term (ECM_{t-1}) is negative and highly significant at 1 percent. Its coefficient of -0.605576 implies a fairly speed of adjustment to equilibrium after a shock. Approximately 60.6% of disequilibria from previous period shocks are adjusted into long run equilibrium in the current period. The significant negative coefficient of the $ECM_{t-1,}$ further buttress the existence of long run relationship among the variables. The result of the short run shows that the change in the total financial savings ($\Delta LSavgdp_t$) has a significantly high positive effect on aggregate credit to the private sector in the short run. The coefficient of changes in total financial savings of 0.760737 implies that, *ceteris paribus*, a one shot increase in the total financial savings brings about approximately 0.76 percent increase in credit to private sector in the short run. Again, there is no credit crunch. Similar effect is observed on the changes in aggregate credit to private sector when the change emerges from the real interest rate ($\Delta RINTR_t$). Highly significant also at 1 percent, its effect on the aggregate credit to private sector in the short run is minimally positive (0.0054%). Other things constant, previous financial liberalization policies (lagged one = $\Delta Finlb_{t-1}$) unlike the long run seem to have a minor negative effect (significant at 5 percent) on the changes in aggregate credit to private sector in the short run. Its value of -0.0694576 provides empirical evidence that a 1 percent increase in the financial liberalization index ($\Delta Finlb_{t-1}$) leads to approximately 0.8522 (i.e. $10^{-0.0694576}$) percentage decrease in $\Delta LCrdpgdp_t$**.** This switch in effects, from an insignificantly positive long run to a short run significant negative effect when the effect of immediate past liberalization is considered, is attributable to the manner of inconsistency in the implementation of liberalization policy reforms, as the short run is not long enough to accommodate the adjustment in the industry induced by frequent changes in reforms that normally a single reform requires long enough periods to accomplish positive benefits. There is also the undeveloped nature of financial institutions and functioning of financial mobilization and allocation, given the reform environment (Nzotta and Okereke, 2009). Previous aggregated Credit to Private Sector ($\Delta LCrdpgdp_{t-1}$) also had a positive impact on the current aggregate credit to the sector ($\Delta LCrdpgdp_t$) in the short run by approximately 0.20%, significant only at 10 percent.

The reliability and explanatory power of the short-run dynamic estimate, as depicted by its goodness of fit R^2 at 77.92%, is further supported by a high adjusted R^2 of 0.718281. This implies that the explanatory variables in the short-run model account for approximately 78% variation in the change of the dependent variable, while the remaining 22% is accounted for by variables not explicitly included in the model but comprised in the error term.

A graphical representation of the Cumulative Sum (CUSUM) and the Cumulative Sum of Square (CUSUMSQ) of the Recursive Residual is shown to indicate stability in the coefficient over the sample periods (See Figure I in Appendix I). Compare with credit component results in Appendix Tables E and F.

5. SUMMARY AND CONCLUSION

On the claim of absent-credit shortage in the aggregate credit, it is discovered that the result from the real sectors (agriculture and manufacturing) did not concur with the report of- "NO CREDIT CRUNCH", as Credit allocated by the commercial banks to this sectors given increasing bank savings liabilities were not impressive. Thus, they offer unfavourable interest rates the agricultural, manufacturing, small and medium enterprises (SMEs) and mining and quarrying sectors. However, the answer to the question of- Where the credits allocated by deposit money banks (DMBs) went

in the long run is seen in the positive effects of savings on services, real estate, commerce and other private units. Thus, there is the tendency that the credit demand of the services, real estate, commerce and others, crowd-out credit to the real sectors agriculture, manufacturing, SMEs and mining sectors in the long run. The long run result suggests that larger portions of commercial bank credit are allotted to the services (0.849) and private individuals/organisations (others; 0.855) that are more prone to high moral hazard and adverse selection. All the equations in the long-run (Table B) are far from being spurious as DW > R^2; with an average R^2 of 0.73 and DW of 1.52.

In the Dynamic- Short Run ARDL Result, aside credit to agriculture and SMEs that had no co-integrating relationship on the account of $F_{calculated}$ < $Pesaran_{Lower\ bound}$, insignificant ECM and unavailable SMEs data for a bound test at given lags, we conclude that the other variables in $equations_{1,\ 3,\ 5,\ 6,\ 7,\ 8,\ and\ 9}$ are all co-integrated and have a long run relationship having satisfied the bound test and ECM criteria (see appendix) with an average speed of adjustment for the equations at -0.62 after a shock to long run equilibrium. Thus, approximately 60% of disequilibrium from previous period shocks is adjusted into long run equilibrium in the current period. On the short run effects of financial liberalization on the credit components, we note that liberalizing the financial sector in the short run had only insignificant negative effect. Thus, we conclude that the short run is not ample enough to real the gains from liberalization, and the reform needs time maturity. Both long- and short-run analyses suggest that commercial banks (DMBs) are credit bias towards the real sector and liberalization have not been able to help remedy the situation (See Appendix for full ARDL Results on Equations 2- 9).

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Appendix I

Table A: DF-GLS Stationarity Testing, Optimal Lag based on the Schwarz Information Criterion and Order of Integration

DF-GLS {Intercept and No Trend}						DF-GLS {Intercept and Trend}			
	At Level		At First Difference			At Level		At First Difference	
Variables	Lag	T-Statistics	Lag	T-Statistics		Lag	T-Statistics	Lag	T-Statistics
LogCrdpgdp^{Agg}	0	0.628132	0	-4.258540***		1	-1.494015	0	-4.486770***
LogCrdpgdp^{Agri}	0	-1.206339	0	-6.125741***		0	-1.251523	0	-6.667546***
LogCrdpgdp^{Manf}	0	-1.773658**	0	-6.928168***		0	-2.064873	0	-7.106866***
LogCrdpgdp^{SMEs}	0	-2.498796**	0	-8.486537***		0	-2.754934	0	-8.538023***
LogCrdpgdp^{Services}	1	-1.009032	0	-4.295146***		0	-1.513284	0	-4.411543***
LogCrdpgdp^{RealEstate}	1	-1.406904	0	-3.557258***		1	-1.505541	0	-3.614797**
LogCrdpgdp^{Commerce}	0	-0.815662	0	-4.692176***		0	-1.332807	0	-4.768634***
LogCrdpgdp$^{M\&Q}$	0	0.455981	1	-3.426503***		2	-0.944737	1	-3.982088***
LogCrdpgdp^{Others}	1	-1.151553	0	-4.230249***		1	-1.558425	0	-4.321644***
LogSavgdp	1	-1.059173	0	-3.956053***		1	-1.199463	0	-3.899653***
LogRgdp	0	2.285067**	0	-5.358386***		0	-1.073132	0	-5.981510***
RINTR	0	-3.809840***	3	-1.253165		0	-5.172495***	0	-7.236657***
FinLb	0	-0.502907	0	-8.355731***		0	-2.838236	1	-6.783784***
Critical Levels of Significance:						Critical Levels of Significance:			
1% 5% 10%		-2.625606 -1.949609 -1.611593	1% 5% 10%	-2.627238 -1.949856 -1.611469		1% 5% 10%	-3.770000 -3.190000 -2.89000	1% 5% 10%	-3.770000 -3.190000 -2.890000

*Source: Authors' Computation. Note: ***, **,*Indicates critical values; 1%, 5%, and 10% respectively.*

Table B: F-Statistic for the Joint Significance of Variables with λs signs

Null hypothesis: the regression parameters are zero for the variables
LCrdgdp^{AGG} (-1), LSavgdp (-1), Lrgdp(-1), RINTR (-1), Finlb (-1)
H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$
H_1: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 \neq 0$
Asymptotic test statistic:
Wald chi-square(5) = 20.136, with p-value = 0.00117836
F-form: F(5, 27) = 4.02721, with p-value = 0.00736351

Source: Authors' analysis

Table C: Long Run: Model 1- using observations 1970-2009 (T = 40)

Dependent variable: $LCrdpgdp^{Agg}$

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	0.0350659	0.272167	0.1288	0.89822	
RINTR	0.00571088	0.00186076	3.0691	0.00413	***
Fiblb	0.0185411	0.0187131	0.9908	0.32858	
LSavgdp	0.783536	0.081865	9.5711	<0.00001	***
Lrgdp	0.0656019	0.0339981	1.9296	0.06180	*

Variance Inflation Factors:
Minimum possible value = 1.0
Values > 10.0 may indicate a multi-collinearity problem

RINTR	1.087
Finlb	3.881
LSavgdp	1.936
Lrgdp	4.712

R-squared	0.893271	Adjusted R-squared	0.881073
Schwarz criterion	-26.43343	Durbin-Watson	1.195819

*Note: ***, **,*Indicates critical values; 1%, 5%, and 10% respectively.*

Table D: ARDL (1, 0, 0, 1, 1) Model ECM-Short Run Result for Model 1

Using observations 1972-2009 (T = 38)

Dependent variable: ΔLCrdpgdpAgg.

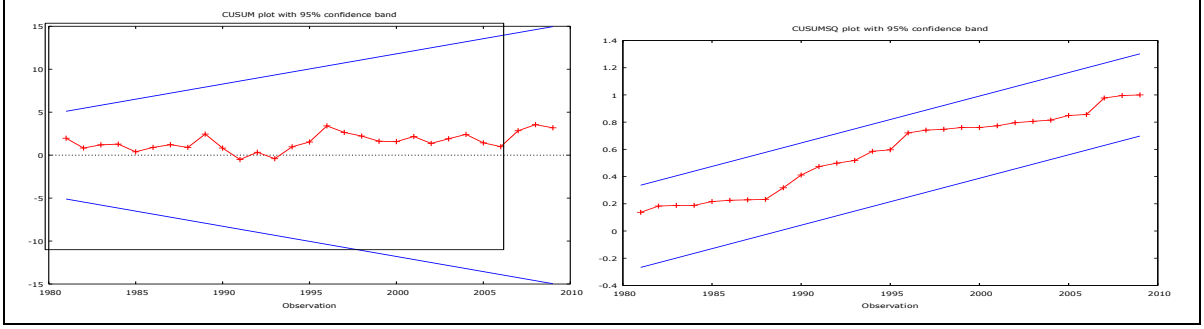
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	0.0123425	0.0230213	0.5361	0.59595	
$\Delta LCrdpgdp_{t-1}$	0.204697	0.117687	1.7393	0.09258	*
$\Delta Lrgdp_t$	0.0117796	0.0580816	0.2028	0.84070	
$\Delta LSavgdp_t$	0.760737	0.110317	6.8959	<0.00001	***
$\Delta RINTR_t$	0.00541813	0.00157966	3.4299	0.00183	***
$\Delta RINTR_{t-1}$	-7.51669e-05	0.00164577	-0.0457	0.96388	
$\Delta Finlb_t$	0.0053112	0.0301619	0.1761	0.86145	
$\Delta Finlb_{t-1}$	-0.0694576	0.027686	-2.5088	0.01796	**
ECM_{t-1}	-0.605576	0.152861	-3.9616	0.00044	***
R-squared	0.779194		Adjusted R-squared		0.718281
Schwarz criterion	-32.45371		Durbin's h		-0.006830

Variance Inflation Factors:
Minimum possible value = 1.0
Values > 10.0 may indicate a multi-collinearity problem

$\Delta LCrdpgdp_{t-1}$	1.795
ΔLrgdp	1.098
ΔLSavgdp	1.435
ΔRINTR	1.756
$\Delta RINTR_{t-1}$	2.096
ΔFiblb	1.652
$\Delta Fiblb_{t-1}$	1.392
ECM_{t-1}	1.268

*Note: ***, **,*Indicates critical values; 1%, 5%, and 10% respectively.*

Figure I: CUSUM and CUSUM SQUARE Test for Equation One ECM Equation



Source: Authors' Analysis

Tables E & F: Extracted Results for Long and Short Run ARDL Equations (1 - 9)

Table E:

Long Run Effects: Regressors							
	Lgdp	***LSavgdp***	***Rintr***	***Finlb***	**R^2**	**Adj R^2**	**DW**
Equation1: Credit Aggregate	*0.06**	*0.78****	*0.005****	*Insignificant*	0.89	0.88	1.119
Equation2: Credit Agriculture	*0.50****	*Insignificant*	*Insignificant*	*-0.0675***	0.54	0.49	1.46
Equation 3: Credit Manufacturing	*0.438****	*Insignificant*	*Insignificant*	*-0.156***	0.489	0.43	1.93
Equation4: Credit Small & Medium Enterprise (SMEs)	*-2.68****	*Insignificant*	*Insignificant*	*Insignificant*	0.898	0.867	1.35
Equation5: Credit Services	*0.135***	*0.849****	*0.002***	*-0.03****	0.83	0.81	1.84
Equation6: Credit Real Estate	*0.292****	*0.668****	*Insignificant*	*-0.09****	0.80	0.78	1.06
Equation7: Credit Commerce	*0.187****	*0.689****	*Insignificant*	*-0.037*	0.84	0.828	1.99
Equation8: Credit Mining and Quarrying (M&Q)	*Insignificant*	*Insignificant*	*0.013****	*0.155****	0.616	0.57	1.34
Equation9: Credit to Other Units	*0.147****	*0.855****	*0.002**	*-0.04****	0.847	0.82	1.73

*Note: ***, **,*Indicates critical values; 1%, 5%, and 10% respectively.*

Table F:

Short Run ARDL Effects: Regressors (and Relevant Lag)								
	Δ*Lgdp*	**Δ*LSavgdp***	**Δ*Rintr***	**Δ*Finlb***	***ECM***	**R^2**	**Adj R^2**	**Lag of Dependent Variable**
Equation1: ΔCredit Aggregate	*Insignificant*	*0.76****	*0.005****	*Lag (1) -0.069***	*-0.605****	0.779	0.71	Lag one significant and Positive
Equation2: ΔCredit Agriculture	*Insignificant*	*Lag (2) 0.616*	*0.003**	*Insignificant*	*Insignificant*	0.447	0.12	Insignificant
Equation 3: ΔCredit Manufacturing	*0.398****	*Insignificant*	*Insignificant*	*-0.108***	*-0.765****	0.869	0.809	Insignificant
Equation4: ΔCredit SMEs	*Insignificant*	*Insignificant*	*Insignificant*	*Insignificant*	*Insignificant*	0.898	0.560	Insignificant
Equation5: ΔCredit Services	*Insignificant*	*0.696****	*0.003****	*Insignificant*	*-0.69****	0.680	0.57	Insignificant
Equation6: Δ Credit Real Estate	*Insignificant*	*0.403****	*0.00278***	*-0.040**	*-0.567****	0.613	0.46	Lag (1) 0.372** Lag (2) 0.344*
Equation7: ΔCredit Commerce	*Insignificant*	*0.427****	*0.0030****	*Insignificant*	*-0.562****	0.711	0.614	Lag (2) 0.258*
Equation8: Δ M&Q	*Insignificant*	*Insignificant*	*0.0077***	*Insignificant*	*-0.507***	0.637	0.423	Insignificant
Equation9: ΔCredit to Other Units	*Insignificant*	*0.547****	*0.003****	*Insignificant*	*-0.650****	0.66	0.56	Lag (1) 0.237

*Note: ***, **,*Indicates critical values; 1%, 5%, and 10% respectively.*

Source: Authors' Estimation.

Note: The estimates obtained from the Autoregressive Distributed Lag (ARDL)-Bound Test analysis for the component equations or models 2-9 can be seen in full in Tables K to Z in Appendix II, with graphical Analysis for Long and Short run below each table in comparison to the findings of the Aggregate Credit to the Private Sector.

Appendix II

Table G: Financial Liberalization Index: Liberalization Variables and Years

Year	BPDR	IRL	PRIDC	DSCA	FEB-DBL	EXCL-DFEM	CAPML-EDH	DEGREE OF LIBERALIZATION
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	1	0	1
1987*	0	1	0	0	1	1	0	3
1988	0	1	0	0	1	1	0	3
1989	0	1	0	0	1	1	0	3
1990	1	1	0	0	1	1	0	4
1991	1	0	0	0	0	1	0	2
1992	1	1	0	1	0	1	1	5
1993	1	1	1	1	0	1	1	6
1994	1	0	1	1	0	0	1	4
1995	1	0	1	1	0	1	1	5
1996	1	0	1	1	0	1	1	5
1997	1	0	1	1	0	1	1	5
1998	1	0	1	1	0	1	1	5
1999	1	0	1	1	0	1	1	5
2000	1	0	1	1	0	1	1	5
2001	1	0	1	1	0	1	1	5
2002	1	0	1	1	0	1	1	5
2003	1	0	1	1	0	1	1	5
2004	1	0	1	1	0	1	1	5
2005	1	0	1	1	0	1	1	5
2006	1	1	1	1	0	1	1	6
2007	1	1	1	1	0	1	1	6
2008	1	1	1	1	0	1	1	6
2009	1	1	1	1	0	1	1	6

Source: Authors' Computations

Note: The table shows a summary of financial liberalization policy index derived using principal component analysis. Each cell gives the presence or absence of liberalization in that variable. 0 indicating no liberalization and 1 indicating liberalization. The last column is the summation of the total presence of liberalization among the seven variables; the study uses this as a proxy to measure the degree of financial liberalization.

BPDR= Bank Privatization/Denationalization and Restructuring. **IRL=** Interest Rate Liberalization/Deregulation. **PRIDC**= Prudential Regulation and Introduction of Indirect Policy Controls. **DSCA**= Direct/Selective Credit Abolition. **FEB-DBL**= Free Entry into Bank-Deregulation of Bank Licensing. **EXCL-DFEM**= Exchange Rate Liberalization-Deregulation of Foreign Exchange Market (introduction of autonomous exchange market and bureaux de change). **CAPML-EDH=** Capital Market Liberalization- Establishment of Discount Houses.

Table H: Extracted from Pesaran et al (2010), Case III: Unrestricted Intercept, With No Trend

	***0.100* (10%)**		***0.050* (5%)**		***0.025* (2.5%)**		***0.010* (1%)**	
K	***I(0)***	***I(1)***	***I(0)***	***I(1)***	***I(0)***	***I(1)***	***I(0)***	***I(1)***
0	*6.58*	*6.58*	*8.21*	*8.21*	*9.80*	*9.80*	*11.79*	*11.79*
1	*4.04*	*4.78*	*4.94*	*5.73*	*5.77*	*6.68*	*6.84*	*7.84*
2	*3.17*	*4.14*	*3.79*	*4.83*	*4.41*	*5.52*	*5.15*	*6.36*
3	*2.72*	*3.77*	*3.23*	*4.35*	*3.69*	*4.89*	*4.29*	*5.61*
4	*2.45*	*3.52*	*2.86*	*4.01*	*3.25*	*4.49*	*3.74*	*5.06*
5	*2.26*	*3.35*	*2.62*	*3.79*	*2.96*	*4.18*	*3.41*	*4.68*
6	*2.12*	*3.23*	*2.45*	*3.61*	*2.75*	*3.99*	*3.51*	*4.43*

Source: Authors' Analysis.

Notes: *Asymptotic critical value bounds are obtained from Table CI (iii) case III: unrestricted intercept and no trend for k = 4 (Pesaran et al, 2001).*