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BANKS' CREDITS AND AGRICULTURAL SECTOR'S DEVELOPMENT IN NIGERIA

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Abstract

The study examined the impact of banks' credits on the growth of agricultural outputs in Nigeria. It covers the periods of thirty one (31) years, from 1984 to2014. Data were gathered through secondary sources from Central Bank of Nigeria's Statistical bulletins (2014). E-Views 9 was used to run the data gathered. . The data collected were analysed using Vector Autoregressive models. The following tests were conducted: Unit root test; Co-integration test; Vector error correction test; and Causality test. The result of co-integration test reveals that there is a long-run relationship between the variables employed in this study. The VECM result indicates that GDP will converge to its long-run equilibrium. Granger causality test confirmed that there is presence of unidirectional causality from the variables. Based on the findings, the study concluded that banks' credits have significant relationship with agricultural output in Nigeria, it was concluded that banks' credits have a significant impact on the growth of agricultural sector in Nigeria. This will help to stabilize and boost Nigerian economy. The study recommended that there is need for a resilient and strong institutional development plan in order to provide credit facilities to small scale and large scale farmers at friendly interest rate; and also that government should provide required infrastructural supports to agro-processors with aim to enhanced value addition and job opportunity to the youths

Keywords: *Agricultural sector, Banks' credits, Interest rate, Money supply.*

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Background to the Study

Agriculture is an integral component of the on-going economy revival in Nigeria. Dependency on non-oil sectors and dereliction of agricultural sector have caused more havoc than good in the recent years, Agriculture that contributed to 70% of Nigeria's Gross Domestic products (GDP) and employment has been reduced to the shadow of itself until the clarion calls by the stakeholders. Failure by the governments to improved concentration on agriculture over the last decades hinder the growth of Gross Domestic Product and export earning capacity of the sector to other sectors, like gas and oil.

With the price of crude oil slumped in the international market, the over-dependence on the oil sector showed the weakness in the Nigerian economy. Unfortunately, there were notable dropped in the following economic indicators; real GDP, income, employment, manufacturing output, and while economic variables were on the increase. The inflation rate stretched to 17.1%; GDP shrank by 2.06%. The Nigeria's Bureau of Statistics (NBS) released a report on the implications on the oil price shrieked to less than $50 per barrel, the picture was gloomy with Nigeria's oil production output around 400,000 barrels from over two (2) million barrels due to militancy activities, which hinder the oil production in Niger Delta region.

Unfortunately, this sordid activity has increased the level of unemployment from 1.4 million in 2015; 2.6 million were added in 2016, resulted in an increase in the unemployment rate by 13.3% and was 12.1 in 2016. However, in spite of numerous instigations thwarting the growth of Nigerian economy, Nigeria has not tapped to the abundance of land resource and the population that she was blessed with, in order to revamp the economy from the shadow of oil revenue and to take the opportunity abundance in the agricultural sector.(ASDS,2001)

The agriculture has maintained a steady decline growth rate over the last few decades; presumably, this is considered unsatisfactory because it has not been able to bring a significant number of the rural poor above the poverty line and has perpetuated the existing impoverished people among the farmers in the community. The efforts to increase the agricultural products will entail technologies to stretch utilization of land areas or improve the cultivated areas. Other factors, such as marketing strategies, appropriate environment, and infrastructure will attract private investment that will obviously raise farm production and profitability.(ASDS,2001) Taking the relevancy of agriculture as the engine of rural livelihoods, agriculture must grow faster, if agriculture must take its rightful position in poverty reduction, increase employment and expansion of GDP in Nigeria. Regrettably, lack of access to the fund, double tax along with taxation, insufficient power to increase production; the dearth of critical infrastructures and insecurity, as in the case of herdsmen, are the negative hindrance to agricultural productivity. Central to the challenge facing the sector is the issue relating to the access to finance, which is central to for the growth of the agricultural sector. The shift from subsistence farming to commercial agricultural production requires funding, financing for investment in agriculture is scarce, even for large investors in Africa, less than 1% (percent) of commercial banks' lending is apportioned to agriculture (IFC, 2013). Financial

institutions are disinclined to accept the risks, posed by this sector. The agricultural sector has the following risk factors, such as droughts, floods, pests, and diseases or the transaction costs of covering large geographical distance.

Unlike what obtains in many developed countries of the world, agriculture financing takes the form of commodity trading and non-formalized financing methods to trigger agricultural performance through the value chain. Agriculture involves different actors in a channel that links activities in a value chain financing a particular actor in the value chain of the agricultural sector is the traditional approach of financing farmers in developing countries (Mariam, 2015). The stages at which value chain is clustered, such as, input suppliers of seeds, fertilizer to processors, traders and exporters, each of the action in this value chain need financing. The prevailing channel of distribution can still work effectively in a value chain. Farmers (producer/manufacturers) need funds to produce goods in large quantity and readily available for middlemen (wholesaler & retailer) to buy in large quantity and smaller value. All need financing to get food from the producer to the final consumers.

Consequently, in the current Nigerian economy recession, a number of factors hamper the development of financial services in rural areas. The transaction costs in rural areas are higher than in urban areas due to a large population and weak infrastructure (IFAD 2009), furthermore, risk factors inherent in agriculture seldom inhibit financial institutions from lending to the agricultural sector. Governments are now making efforts to attract investment for agriculture, despite the deprivation of much-needed funds in order to boost production, processing, and marketing (Mariam, 2015).

Literature Review

Bank credit is the total amount of extra funds created through mobilization of funds from customers and/or surplus unit of the economy, to make available to the deficit units .Bank credit is the aggregate amount of credit available to a person or business from a banking institution Banks' credit depend on the borrower's ability to repay and the total amount available in the banking institution (Investopedia 2016). Nwanyanwu (2011), explained that the banks' credits as the tools that prop self–employment; maintaining a business to take advantage of economies of scale and help prevent an economic activity from comatose.

Bank credit comes at a cost, the cost and terms vary by banks, credit types, the borrower's credit returns and the purpose of the funds. There are two types of bank credit; secured and unsecured. Both have different requirements, fees, interest rates, commissions, terms and condition, and regulation. Fees include the amount borrowed plus interest and other charges. Predominantly, some fees are mandatory, such as interest rate and search report fees. In the study of Olokoloyo (2011), investigating determinants of commercial banks lending behavior in Nigeria cited Cholechai (2004) while investigating factors that affects interest rates , degree of lending volume and collateral setting in the loan decision of banks says: “banks have to be careful with their pricing decision as regard to lending, as banks cannot charge loan rates that are too low because the revenue from the interest income will

not be enough to cover the cost of deposit, general expenses and the loss of revenue from borrowers that do not pay . Moreover, charging too high loan rates may also create an adverse selection situation and moral hazard problems for the borrower".

Interest Rate

An interest rate or rate of interest is the amount of interest due per period, as a proportion of the amount lent, deposited or borrowed called the principal sum. The total interest on an amount lent or borrowed depends on the principal sum, the interest rate, the compounding frequency and the length of time over which it is lent, deposited or borrowed. Ogunseye (2015) defines interest rate as a premium paid by a borrower for the use of money that he borrows from a lender. Uchendu (1993) further explained interest rate as the opportunity cost, borne by the borrower for the use of lenders fund. The classical theory view interest rate determination as real forces effect while the Keynesian theory sees interest rate determination as the monetary phenomenon. Simply put, interest , as "cost of credit" or as a "reward of investment". However, the interest rate is influenced in various ways; the currency of the principal sum, the term to maturity of the investments or loan, the perceived default probability of the borrower and market forces.

Policies and Programmes towards Development of Agriculture

Due to the neglect suffered by this important sector in the past and its declining roles to national development, successive governments have come up with several programmes and policies to revamp, revive and address the challenges with a view to finding lasting solutions and to bring the sector back to her rightful place. Some of the government programmes implemented towards repositioning the agriculture sector in the past are as follow:

Establishment of the Bank of Agriculture Limited (B.A.L)

The bank has the mandate to improve the processes to ensure effective delivery of agricultural rural finance services on a sustainable basis and to improve access to finance, and effectiveness of agricultural and rural development in view of the importance of this sector to national development

Establishment of the Agriculture Credit Guarantee Scheme Fund (A.C.G.S.F)

The fund was put in place by the Central Bank of Nigeria in 1979. It has the mandate to provide a guarantee on the credits extended by the commercial and merchant banks to the farmers, which hitherto, the banks were not willing to grant the credits to the farmers because of the long period of time being demanded by farmers and the high default rates by the farmers.

Banks' Credits to Agriculture

Bank credits to agriculture empower poor farmers through financial institution and help in increasing farmer's wealth and in the food production. The need for investing in agriculture is fast rising due to the recent endemic economic situation in Nigeria. The World Bank posits that "banking sector in developing countries lend a smaller share of their loan portfolio to an agriculture, compared to its share of the GDP. This limits

investment in agriculture by both the farmers and agro-enterprises. It also demonstrates that the barrier to lending is not due to a lack of liquidity in the banking sectors, but rather a lack of willingness to expand lending to agriculture due to perceiving of risk involved. Most times, when credit is available, it comes in terms of an informal and short-term that only covers farmers' financial needs and small agribusiness with high-interest rate".

Challenges of the Financial Institution in lending to Agriculture

The World Bank (2015) outlined three factors thwarting the financial institution in lending to agriculture.

i. The transaction costs of reaching remote rural population
ii. Higher perception of non–repayment due to sector-specific risks, such as production, price, and market risks
iii. Financial institutions lack the knowledge in managing transaction costs, agriculture-specific risks and how to market financial services to the agricultural clients

In many instances, government policies often prove to be ineffective and could, in fact, create impediments to offering financial services to the agricultural sector. However, agricultural finance needs to focus on the following four stages (World Bank, 2015):

i. Segment the smallholder farmers and identify their financial needs. Smallholder farmers are heterogeneous and have different needs. It is important to identify various smallholder sub-segments and assess their needs and constraints before designing solutions and products. Also, smallholder farmers do not just need credit for agricultural activities but they also need credit for other household needs/activities, savings, payments systems and insurance.
ii. Find a way to de-risk agricultural finance by addressing both idiosyncratic risks, as well as important systematic risks. Individual risks are often linked to credit risk assessments, and information and systems to help. Information can assist financial institutions in credit risk assessment by promoting credit bureaus and linkages with value chain companies, etc. finding good collateral, for example, movement collateral, and not just rely on titled land, could also help. On the systematic risk, agricultural insurance , catastrophic risk programmes, price hedging through commodity exchanges or value chain
iii. Identifying appropriate institutions and delivery channels that would reduce the costs to serve agricultural clients. A variety of institutions can provide agricultural finance, depending on the types of clients they serve. Micro Finance Institutions and cooperatives associations can serve sub-segments of smallholder farmers through their local presence and expertise. Commercial banks can also provide solutions through value chains and for better organized groups of small holders. New technologies and advancements in mobile banking solutions, as well as, increasing integration of farmers into better organized value chains can promote solutions and delivery channels that reduce the cost of serving to disperse populations in rural areas.

iv. Address issues in the enabling environment and specific government policies that limit the flow of financial services to small holders. Government policies can restrict lending but also can crowd in private sector.

Types of Credit or Finance to Farmers

The following are the types of finance available farmers

i. Cooperatives societies: The cooperatives movement main objective is to provide credit and other inputs at cheap rates to the farmers
ii. Friends and relatives: the friends and relatives of farmers provide credit to the farmers in the small amount to meet day to day needs and emerging needs of the farmer. They provide loan with or without interest and security.
iii. Leasing and factoring: in a country with a more developed financial system, financial institutions also offer more complex and innovative financial instruments to farmers and entrepreneurs, such as leasing and factoring (Mariam 2015). Leasing is used to finance machinery, automobiles, and equipment in agriculture. The farmer is allowed to use the concerned asset, with the payment of regular rents to the owner. Factoring is when a company sells its invoices to a third party (the factor) at a discount in order to improve cash flow. These mechanisms aim to reduce some of the traditional lending risks of agriculture. They are alternative options for the borrower with limited collateral and credit history, to be able to rent machinery, equipment, and other assets related to production (World Bank, 2009).

Theoretical Framework

Loanable Fund's Theory

The loanable fund's theory was formulated in the 1930s by British economist Dennis Robertson and Swedish economist Bertil Ohlin. , commonly used to explain interest rate movement suggests that the market interest rate determined by the factors that control the supply of and demand for loadable funds .the theory is especially useful for explaining movements in the general level of interest rates for a particular country. Furthermore, it can use along with other concepts to explain why interest rates on some debt securities of a given country vary, the phrase demand for loanable funds is widely used in financial markets to refer the borrowing activities of households, business, and government . Household, commonly demand loanable funds to finance housing expenditures. In addition, they finance the purchase of automobiles and households items, which results in installments debt.

Theory of Financial Intermediation

Credit is an important aspect of financial intermediation that provides funds to those economic entities that can put them into the most productive use. Theoretical studies have established the relationship that exists between financial intermediation and economic growth. Greenwood and Jovanovich (1990) observed that financial development can lead to rapid growth. In a related study, Bencivenga and Smith (1991) explained that development of banks and efficient financial intermediation contributes to economic growth by channeling savings to high productive activities and reduction of liquidity risks. They, therefore concluded that financial intermediation leads to growth.

Empirical Framework

Uzomba, Chukwu, Jumbo and Nwankwo (2014) investigated the impact and the determinants of Deposit Money Banks' loans and advances granted to the agricultural sector in Nigeria from 1980 to 2011. Multiple OLS regression, Stationarity Test, Co-integration test, Error Correction Mechanism and Granger Causality Test are employed. The study concludes that there is a positive impact of deposit money banks' loans and advances on the agricultural sector. In Toby and Peterside.(2014) the study analyzes the role of banks in financing the agriculture and manufacturing sectors in Nigeria from 1981 – 2010. Data were generated from the Central Bank of Nigeria Statistical Bulletin (2010) and analyzed using both descriptive and inferential techniques. Two multiple regression models were estimated using the Software Package for Social Sciences (SPSS). The tolerance values are greater than zero in the estimated models. The inferential results show a significantly weak correlation between commercial banks' lending and the contribution of agriculture to GDP. However, there is a significantly positive correlation between merchant banks' lending and agricultural contribution to GDP. There is also a significantly inverse correlation between commercial banks' lending and manufacturing contribution to GDP. The results, however, indicate that the role of banks in facilitating the contribution of the agriculture and manufacturing sectors to economic growth is still significantly limited. The rise of numerous public intervention funding programs in these sectors is evidence of the lagging banking intermediation. The growing risk aversion of Nigerian banks is indicative of the liquidity and funding shortages in the agriculture and manufacturing sectors, The study of Adeyinka, Daniel and Olukotun (2015) examined the contributions of commercial banks' credits in financing agricultural sector in Nigeria , secondary data from 2002-2014 on sectoral distribution of commercial banks' loans and advances to agricultural sector , liquidity ratio of commercial banks , cash reserve ratio of commercial banks and money market minimum rediscount rate . Data were analyzed using multiple regression of ordinary least square to estimate the model, it was found out cash reserves ratio and rediscount rate is not statistically significant; and liquidity ratio is statistically insignificant; the study recommends that bank should provide a means of monitoring the end use of the loans given to farmers in order for them to manage the loans, effectively and efficiently.

Methodology

In order to test the causal relationships among the variables, Agricultural Sector Output, Banks' Credits to Private Sector, Interest Rate, Prime lending rate, Broad Money supply, and the Agricultural Credit Scheme Guarantee Fund. The Engle-Granger-causality test in Vector Auto regressive (VAR) framework is employed. Nevertheless, this approach has some prerequisites they must be satisfied (unit root test and cointegration) in order to avoid invalid conclusions.

The test also examined the stationarity of the time series data; three-variable VAR model; Johansen cointegration test; and Causality test

Data and Variable Definition

The data employed for this study and the variables used are as follows:

Model Specification
In carrying out the test two models were formulated for agricultural output. Agricultural output is a function of commercial banks' credits to the private sector, and interest rate, prime lending rate, money supply, agricultural scheme fund, and prime lending rate. Mathematically this can be expressed as:
GDPA = f (BCTPS, INT, PLR, MS, ACGSF) ---------- (1)

Econometrics Model
$GDPA = \beta 0 + \beta 1BCTPS + \beta 2INTR + \beta 3PLR + \beta 4MS + \beta 5ACGSF + \mu$ ------- (2)
Where:
GDPA = Agricultural Sector Output
BCTPS= Banks' Credits to Private Sector
INT = Interest Rate
PLR = Prime lending rate
MS2= Broad Money supply
ACGSF=Agricultural Credit Scheme Guarantee Fund
μ = Error Term

Stationarity Test: Financial and economic times series are often nonstationary in nature; they exhibit stochastic trends and need to be checked for stationarity in order to avoid spurious analysis. We, therefore, employ Augmented Dickey Fuller ((hereafter, ADF) test, to ascertain the stationarity of variables in the study.

Cointegration test: The second stage involves testing for the existence of a long-run equilibrium relationship. Cointegration naturally arises in economics and finance. In economics, cointegration is most often associated with economic theories that imply equilibrium relationships between time series variables. However, for conducting the cointegration analysis there are various techniques. Econometric literature has abundant econometric techniques to examine cointegration relationships. The most popular approaches are the well-known residual based approach proposed by Engle and Granger (1987) and the maximum likelihood-based approach proposed by Johansen and Julius (1990). In performing the cointegration technique, we need to determine the order of integration for each variable. However, both of the approaches require that the variables have the same order of integration. Johansen-Juselius introduce two statistics for determining the number of cointegrating vectors. These are known as max and trace tests.

Model Specification and Causality Testing
The cointegration and Granger no-causality approach based on VAR or VECM models. To estimate the econometric model, the theory of co-integration has been used for this purpose. It seems efficient to test the relationships between study variables and empirically validate the results obtained after carrying out the statistical tests applied to the model. Engle and Granger (1987) presented the theory of co-integration in which a stationary linear combination can be interpreted as a relationship of long-term equilibrium between the variables studied.

This research utilizes the second technique. Checking for cointegration properties of the series of interest prior to testing for causality is, therefore an important first step. Then if the variables are cointegrated, an Error Correction model should be used. VAR model is used when there is no cointegration among the variables and it is estimated using time series that have been transformed to their stationary values.

Results and Discussions

The aim of this study is to establish whether there is causality relationship between among the variables, Agricultural Sector Output, Banks' Credits to Private Sector, Interest Rate, Prime lending rate, Broad Money supply, and the Agricultural Credit Scheme Guarantee Fund. The data for the analysis consist of annual observations for the period 1981-2014.

Testing for Stationarity: The unit root tests are important in identifying the stationary trend of a time series data. It is vital to apply unit root test in order to avoid specious results as non-stationary data invalidate the normal statistical tests. This research applied two tests of unit root data which is the Augmented Dickey-Fuller test (ADF) test statistics to observe the integrated order and stationary behaviour of data. To investigate stationarity properties of the variables under consideration Agricultural Sector Output, Banks' Credits to Private Sector, Interest Rate, Prime lending rate, Broad Money supply, and the Agricultural Credit Scheme Guarantee Fund. We carry out a univariate analysis for testing the presence of a unit root.

Table 1 reports the results of Augmented Dickey-Fuller (ADF), the results indicate that the variables are nonstationary at level. All series turns into stationary ones at their second differences. Therefore, lag of 1, 2 is used for estimation purpose.

Table 2:

Cointegration Test As the econometric analysis suggests, when the concern of unit root has been addressed, the co-integration test can be applied to verify the existence of long run relationship. The theory of co-integration defines that even though the variables under consideration are non-stationary at individual level but the linear relationship among them may still be stationary. After confirming the stationarity of the variables at 1(2). We started the cointegration analysis by employing the Johansen and Juselius (1990) multivariate cointegration test. This technique observes the long run relationship among the non-stationary variables while showing number of cointegrating equations. The test is based on the comparison of H0 (r=0) against the alternative H1 ($r \neq 0$) where"r"represents the number of co integrating vectors.

Table 2.Test results from Johansen and Juselius procedure Unrestricted Cointegration Rank Test (Trace)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.673527	97.30513	95.75366	0.0389

Trace test indicates no cointegration at the

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.673527	32.46281	40.07757	0.2783

Max-eigenvalue test indicates there is cointegration at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level.. Based on these results, the rule is that if any of the two tests indicates that there is cointegration, then by extension be assumed that cointegration exists, meaning that we cannot find a cointegrating. This in effect suggests that the existence of long-run relationship between the variables employed in the study is not confirmed.

Granger Causality Test Granger Causality test is widely used by researchers to determine the causal relationship among the variables. This test has other advantages that it also specifies the direction of the causality. Having found no cointegration among the variables (, Agricultural Sector Output, Banks' Credits to Private Sector, Interest Rate, Prime lending rate, Broad Money supply, and the Agricultural Credit Scheme Guarantee Fund) The Granger causality test was carried out by the mean of VAR.

The results are reported in Table no. 3.Pair-wise Granger Causality test Null Hypothesis F-Statistic Probability GDP_AO does not Granger Cause BCP; GDP_AO does not Granger Cause ACGFS; INTR does not Granger Cause GDP_AO; GDP_AO does not Granger Cause INTR; GDP_AO does not Granger Cause MS; PLR does not Granger Cause GDP_AO; GDP_AO does not Granger Cause PLR; BCP does not Granger Cause ACGFS; INTR does not Granger Cause BCP; BCP does not Granger Cause INTR; BCP does not Granger Cause MS; BCP does not Granger Cause INTR.

The next step is the Granger test to determine the Pair-wise causal relationship between the variables. The results suggest that the null hypothesis does not hold BCP does not Granger Cause GDP_AO; ACGFS does not Granger Cause GDP_AO; MS does not Granger Cause GDP_AO ; MS does not Granger Cause ACGFS , which indicates causality running from Banks' Credits to Private Sector to Agricultural Sector Output ; Agricultural Credit Scheme Guarantee Fund to Banks' Credits to Private Sector ; Broad Money supply to Agricultural Sector Output; Broad Money supply to Agricultural Credit Scheme Guarantee Fund.

Conclusion

This paper examines the causal relationship between Agricultural Sector Output, Banks' Credits to Private Sector, Interest Rate, Prime lending rate, Broad Money supply, and the Agricultural Credit Scheme Guarantee Fund for the period 1981-2014. The study uses multivariate VAR framework. The Johansen's multivariate cointegration test evidence from the result suggests that the null hypothesis of no cointegration (r =0) cannot be rejected. Based on these results, The Granger causality test confirmed that there is presence of unidirectional causality from the variables. Based on the findings, the study concluded that banks' credits have significant relationship with agricultural output in Nigeria, it was concluded that banks' credits have a significant impact on the growth of agricultural sector in Nigeria. This will help to stabilize and boost Nigerian economy.

Recommendations

The study makes the following recommendations:

1. Establishment of new farm settlement centres for micro farmers and upgrading of the existing ones.
2. Provision of subsidized farm inputs and equipment to the farmers
3. Encouraging farmers' co-operative societies to cater for different agricultural sub-sectors and interests.
4. Additional and counter funding should be made available to the banks to make them give more credits to the farmers
5. Provision of more infrastructure in term of power supply, good road networks, storage facilities, silos, cold rooms etc
6. There is a need for resilient and strong institutional development plan in order to provide credit facilities to small scale and large scale farmers at friendly interest rate

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Table 1

Null Hypothesis: D(GDP_AO,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.05255	0.0000
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP_AO,3)
Method: Least Squares

Null Hypothesis: D(ACGFS,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.29522	0.0000
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ACGFS,3)
Method: Least Squares
Date: 11/27/16 Time: 18:50
Sample (adjusted): 1988 2014
Included observations: 27 after adjustments

Null Hypothesis: D(BCP,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.399810	0.0001
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BCP,3)
Method: Least Squares
Date: 11/27/16 Time: 18:41
Sample (adjusted): 1989 2014
Included observations: 26 after adjustments

Null Hypothesis: D(INTR,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.279025	0.0001
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR,3)
Method: Least Squares
Date: 11/27/16 Time: 18:43
Sample (adjusted): 1989 2014
Included observations: 26 after adjustments

Null Hypothesis: D(MS,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.590578	0.0000
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

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

Null Hypothesis: D(PLR,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.865176	0.0000
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PLR,3)
Method: Least Squares
Date: 11/27/16 Time: 18:46
Sample (adjusted): 1988 2014

Table 2

Vector Error Correction Estimates
Date: 11/27/16 Time: 18:56
Sample (adjusted): 1987 2014
Included observations: 28 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
GDP_AO(-1)	1.000000
BCP(-1)	-201.8088 (17.0389) [-11.8440]
ACGFS(-1)	0.085530 (0.01208) [7.08192]
INTR(-1)	-1788.125 (2110.26) [-0.84735]
MS(-1)	141.1490 (18.1143) [7.79212]
PLR(-1)	-622.0448 (1397.81) [-0.44501]
C	-58613.47

Error Correction:	D(GDP_AO)	D(BCP)	D(ACGFS)	D(INTR)	D(MS)	D(PLR)
CointEq1	-0.003065 (0.01790) [-0.17120]	0.009180 (0.00292) [3.14861]	16.12454 (2.48080) [6.49974]	-1.27E-05 (2.7E-05) [-0.46279]	0.011342 (0.00269) [4.21812]	-1.91E-05 (3.5E-05) [-0.54618]
D(GDP_AO(-1))	-0.661959 (0.18604) [-3.55823]	0.009168 (0.03030) [0.30256]	-1.241675 (25.7831) [-0.04816]	-0.000111 (0.00029) [-0.39054]	0.003276 (0.02795) [0.11721]	-0.000586 (0.00036) [-1.61168]
D(GDP_AO(-2))	-0.361658 (0.19433) [-1.86102]	0.010695 (0.03165) [0.33787]	-6.735958 (26.9330) [-0.25010]	-1.65E-05 (0.00030) [-0.05545]	0.004406 (0.02919) [0.15094]	-0.000473 (0.00038) [-1.24564]
D(BCP(-1))	0.985999 (4.11264) [0.23975]	1.451770 (0.66988) [2.16722]	2966.702 (569.978) [5.20494]	-0.003154 (0.00631) [-0.50006]	2.116994 (0.61780) [3.42666]	-0.002355 (0.00804) [-0.29292]
D(BCP(-2))	-0.094779 (2.67483) [-0.03543]	-0.091426 (0.43568) [-0.20985]	2584.311 (370.709) [6.97127]	-0.003530 (0.00410) [-0.86048]	1.249349 (0.40181) [3.10928]	-0.001517 (0.00523) [-0.29007]

D(ACGFS(-1))	8.41E-05	-0.001227	-2.252253	-1.27E-06	-0.001377	2.47E-06
	(0.00210)	(0.00034)	(0.29059)	(3.2E-06)	(0.00031)	(4.1E-06)
	[0.04012]	[-3.59246]	[-7.75070]	[-0.39577]	[-4.37331]	[0.60326]
D(ACGFS(-2))	-0.000712	-0.001539	-1.722452	-8.36E-07	-0.001111	9.76E-07
	(0.00199)	(0.00032)	(0.27526)	(3.0E-06)	(0.00030)	(3.9E-06)
	[-0.35824]	[-4.75601]	[-6.25760]	[-0.27447]	[-3.72247]	[0.25124]
D(INTR(-1))	-355.1331	29.10189	-5554.374	-0.399952	24.86458	-0.071353
	(177.594)	(28.9269)	(24613.1)	(0.27238)	(26.6783)	(0.34722)
	[-1.99969]	[1.00605]	[-0.22567]	[-1.46837]	[0.93202]	[-0.20550]
D(INTR(-2))	-519.5543	24.02206	-12085.72	-0.345902	17.09320	-0.097653
	(148.525)	(24.1920)	(20584.3)	(0.22779)	(22.3114)	(0.29039)
	[-3.49810]	[0.99297]	[-0.58713]	[-1.51849]	[0.76612]	[-0.33628]
D(MS(-1))	-0.645728	-1.174589	-2804.324	0.004469	-2.257839	0.003790
	(5.29079)	(0.86178)	(733.261)	(0.00811)	(0.79478)	(0.01034)
	[-0.12205]	[-1.36299]	[-3.82446]	[0.55079]	[-2.84082]	[0.36636]
D(MS(-2))	1.576630	1.242201	-2609.641	0.005605	-0.519073	0.000980
	(3.40642)	(0.55485)	(472.102)	(0.00522)	(0.51171)	(0.00666)
	[0.46284]	[2.23882]	[-5.52770]	[1.07289]	[-1.01438]	[0.14721]
D(PLR(-1))	72.51223	-3.316415	569.6111	0.274710	-0.740993	-0.584098
	(139.199)	(22.6730)	(19291.8)	(0.21349)	(20.9105)	(0.27215)
	[0.52093]	[-0.14627]	[0.02953]	[1.28676]	[-0.03544]	[-2.14620]
D(PLR(-2))	292.4588	-15.15297	11408.58	-0.138786	-12.15766	-0.170113
	(153.346)	(24.9773)	(21252.4)	(0.23519)	(23.0356)	(0.29981)
	[1.90719]	[-0.60667]	[0.53681]	[-0.59011]	[-0.52778]	[-0.56739]
C	441.0546	794.9599	1605914.	-0.712443	1106.193	-0.640245
	(1706.30)	(277.926)	(236479.)	(2.61696)	(256.321)	(3.33607)
	[0.25849]	[2.86033]	[6.79094]	[-0.27224]	[4.31566]	[-0.19192]
R-squared	0.651784	0.913811	0.930229	0.473372	0.885748	0.414126
Adj. R-squared	0.328441	0.833777	0.865441	-0.015639	0.779658	-0.129900
Sum sq. resids	90635249	2404606.	1.74E+12	213.1973	2045284.	346.4638
S.E. equation	2544.395	414.4364	352632.2	3.902356	382.2195	4.974677
F-statistic	2.015767	11.41791	14.35811	0.968018	8.348963	0.761224
Log likelihood	-249.5924	-198.7800	-387.6753	-68.15047	-196.5141	-74.94831
Akaike AIC	18.82803	15.19857	28.69109	5.867891	15.03672	6.353451

Date: 11/27/16 Time: 19:02
Sample (adjusted): 1986 2014
Included observations: 29 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP_AO BCP INTR MS PLR
ACGFS
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.673527	97.30513	95.75366	0.0389
At most 1	0.598834	64.84232	69.81889	0.1170
At most 2	0.398374	38.35427	47.85613	0.2868
At most 3	0.332188	23.61880	29.79707	0.2170
At most 4	0.272736	11.91010	15.49471	0.1613
At most 5	0.088102	2.674586	3.841466	0.1020

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.673527	32.46281	40.07757	0.2783
At most 1	0.598834	26.48805	33.87687	0.2918
At most 2	0.398374	14.73547	27.58434	0.7688
At most 3	0.332188	11.70870	21.13162	0.5766
At most 4	0.272736	9.235512	14.26460	0.2671
At most 5	0.088102	2.674586	3.841466	0.1020

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

TABLE 3
Pairwise Granger Causality Tests
Date: 11/27/16 Time: 19:07
Sample: 1984 2014
Lags: 2

Null Hypothesis:	OBS	F-Statistic	Prob.
BCP does not Granger Cause GDP_AO	29	4.59780	0.0204
GDP_AO does not Granger Cause BCP		1.08868	0.3527

ACGFS does not Granger Cause GDP_AO	29	5.26123	0.0127
GDP_AO does not Granger Cause ACGFS		0.35412	0.7054
INTR does not Granger Cause GDP_AO	29	0.22626	0.7992
GDP_AO does not Granger Cause INTR		1.31549	0.2870
MS does not Granger Cause GDP_AO	29	6.13926	0.0070
GDP_AO does not Granger Cause MS		0.42127	0.6610
PLR does not Granger Cause GDP_AO	29	0.05674	0.9450
GDP_AO does not Granger Cause PLR		2.50744	0.1026
ACGFS does not Granger Cause BCP	29	14.0461	9.E-05
BCP does not Granger Cause ACGFS		0.23482	0.7925
INTR does not Granger Cause BCP	29	1.00992	0.3792
BCP does not Granger Cause INTR		1.76217	0.1932
MS does not Granger Cause BCP	29	18.7087	1.E-05
BCP does not Granger Cause MS		3.24779	0.0565
PLR does not Granger Cause BCP	29	0.22817	0.7977
BCP does not Granger Cause PLR		0.65777	0.5271
INTR does not Granger Cause ACGFS	29	0.58814	0.5632
ACGFS does not Granger Cause INTR		2.48037	0.1049
MS does not Granger Cause ACGFS	29	4.00214	0.0316
ACGFS does not Granger Cause MS		1.30308	0.2902
PLR does not Granger Cause ACGFS	29	0.32218	0.7277
ACGFS does not Granger Cause PLR		0.87801	0.4285
MS does not Granger Cause INTR	29	3.01347	0.0680
INTR does not Granger Cause MS		0.48698	0.6204
PLR does not Granger Cause INTR	29	2.99510	0.0690
INTR does not Granger Cause PLR		0.62937	0.5415
PLR does not Granger Cause MS	29	0.01937	0.9808
MS does not Granger Cause PLR		0.75500	0.4808