
**DEPOSIT MONEY BANK LOANS TO SMES AND ITS EFFECT ON
ECONOMIC GROWTH IN NIGERIA (1992-2016).**

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Abstract

This study investigated deposit money bank loans to small and medium enterprises and its effect on economic growth in Nigeria from 1992 to 2016. The study employed two predictor variables (deposit money bank loans to small and medium enterprises and bank lending rate), one predicted variable (gross fixed capital formation representing economic growth) and one controlled variable (inflation rate). Test carried out include unit root test, co-integration test and ordinary least square. The findings revealed that: There is positive significant relationship between deposit money bank loans to small and medium enterprises and gross fixed capital formation in Nigeria, there is negative and significant relationship between bank lending rate and gross fixed capital formation in Nigeria, and there is negative insignificant relationship between inflation rate and gross fixed capital formation in Nigeria. Based on the findings, the study recommends that, Since deposit money banks are scared of granting loan facilities due to the nature of small and medium enterprises, to be more secure and to attained the desired economic growth, government should put policies that will enable deposit money banks to be part or stakeholders in every small or medium sized enterprise that seeks loan facility, so that granting of credit facilities could be made easier and more secured; also government should put policies to favor small and medium sized enterprises by fixing a lower lending rate to enable the subsector to strive maximally.

Keywords: Deposit money bank credit to SMEs, bank lending rate, inflation rate and gross fixed capital formation.

INTRODUCTION

Financial adequacy and stability could play a vital role in small and medium enterprises performance and the nation's economy at large. Small and medium scale enterprises exist in our society. These organizations are established principally for the purpose of making profit. These businesses are relatively small or medium in size and may be operating on a small or medium scale.

Small and medium enterprises have been seen to be pivotal for sustainable growth of many nations (Ikpor, Nnabu and Obaji, 2017). Small and medium scale businesses could play

some key role such as employment creation; transformation of the traditional industries, etc. thereby contributes to the growth of the economy.

The small and medium enterprises sector occupies a unique position in the economy of any developing nation including Nigeria. The small and medium businesses could play significant role in providing the necessary support for large scale industrialization. The exploitation of the enormous natural and human resources available to Nigeria for economic growth and development would to a great extent depend on how the small and medium enterprises in the nation are coordinated. Although it is widely believed that small and medium enterprises constitute important part of economic growth and development process, small and medium enterprises in Nigeria have continue to bristle with challenges. Problems particularly associated with limited access to finance, limited managerial ability, low strength to maintain specialize personnel, low adoption of international financial reporting standard, low level or non adoption of e-commerce in business practice and limited market have among others resulted to a high incidence of mortality of these businesses (Simeon, 2000). It is imperative that measures are taken to proffer solutions to enable the full potentials of the small and medium businesses in order to be realized for accelerating the pace of economic growth and development in Nigeria.

A country with intention for economic growth and development needs capital accumulation. Shuaib and Dania (2015) assert that what constitutes economic development is the provision of social overhead capital. Development cannot be made possible with the absence of capital formation. Gross fixed capital formation refers to investment on fixed assets such as land, roads, buildings, railways, plants, machinery, etc. According to Kanu and Nwaimo (2015), gross fixed capital formation is part of gross domestic expenditure which indicates the extent of new value that is provided through savings in the economy rather than consumed. The thought that the nation's gross fixed capital formation depends on the revenue from the crude oil has over time worsen the level of capital formation in Nigeria. It has been observed that, even with high level of crude oil production with higher prices of the crude oil product with higher government expenditure, it has not reflected in the nation's gross fixed capital formation (Kanu and Nwaimo, 2015).

Looking at the accelerator theory of investment, which opined that, increase in economy is related with investments made by firms including small and medium enterprises; meaning that, increase in gross fixed capital formation could be made possible with the aid of investments from small and medium sized enterprises. Therefore, anything that can hinder the growth of small and medium sized firms could have an impact on economic growth.

Most of the developed economies have discovered the role of small and medium enterprises in industrial growth and have advanced to formulate and adopt national financial policies for the growth of small and medium enterprises (Ikpor, Nnabu and Obaji, 2017). The Nigerian government has made effort on this but have not yielded the needed results. With the equity scheme introduction do not make significant impact on loan disbursement to finance SMEs in Nigeria (Ibrahim, 2017). Iloh and Chioke (2015) maintained that, the role of deposit

money bank credits is crucial to the growth and development of small and medium enterprises. The Nigerian economy is facing challenges; the rate of unemployment is high, high inflation rate, low level of food production, low infrastructures etc. Many scholars have attributed this to the gross underperformance of the small and medium business sub-sector which has resulted to limit its contribution to employment creation, improvement of local technology, output diversification, development of indigenous companies, etc. From the FSS 2020 small and medium sector report 2007, the key issues affecting the small and medium sized enterprises in Nigeria were grouped into four, namely; unfriendly business environment, poor funding, low managerial skills and lack of access to modern technology. Among these four, lack of finance stands as the major issue.

Bank credit refers to loans, advances and discounts of specific sums, which are normally with terms and other conditions available to individuals, small and medium sized business to start, grow or sustain any economic activity (John and Onwubiko, 2013).

A widespread concern is that, the deposit money banks attitude towards the subsector; which supposed to be the major source of funding to small and medium sized businesses are not providing enough aids and therefore limiting the potentials that could be tapped from the subsector. The deposit money banks in their mode of operations most of the time call for more sure form of financial security, if they are to grant credit facility to small or medium sized business that need funds for business activities. However, due to the nature of small and medium sized businesses, in most cases, they tend not meeting up the requirements for the granting of the facilities. This has become a major challenge to the small and medium sized business operations in Nigeria. Robinson and Victor (2015) assert that most SMEs growth was hindered as a result of inability to access fund from financial institutions.

Due to the felt importance, several studies have examined the impact of bank credits to SMEs and its effect on economic growth; but these studies end up with conflicting results and conclusions. The studies from Omonigho (2017), Hedwigis (2017), Iloh and Chioke (2015) and Akingunola (2011) found a positive and significant relationship between bank credit to SMEs and economic growth. The results from Benson (2017), and Okey (2016), found insignificant relationship between bank credit to SMEs and economic growth; while the studies from Richard, (2016), Oluwarotimi and Adamu (2017) found a negative relationship between bank credit to SMEs and economic growth. This disparity call for a study such as this at this time that Nigerian economy is facing challenges to employ more recent data to verify the previous claims.

1. Literature review:

Literature is yet to provide a conclusive definition of what constitutes a small and medium sized enterprise. This is partly because most definitions that have advanced have been related to the prevailing state of the economy in various countries including Nigeria, and also because business organizations are evaluated in terms of some internal variables that are subject to influences arising from the aggregate economy.

SME's in Nigeria, as defined by Small and Medium Industries Equity Investment Scheme as enterprises with a total capital employed not less than ₦1.5 million, but not exceeding ₦200 million, including working capital, but excluding cost of land and/or with staff strength of not less than 10 and not more than 300. Esuh and Adebayo (2012) noted that they are firms or businesses arising as a result of entrepreneurial activities of individual.

This definition is what the Small and Medium Enterprises Credit Guarantee Scheme adopted. SMEs have also been broadly defined as businesses with turnover of less than N100million, for the Small and Medium Enterprises Equity Investment Scheme (SMEEIS), a small and medium enterprise is defined as any enterprise with a maximum asset base of N1.5 billion (excluding land and working capital) with no lower or upper limit of staff (Ghandi and Amissah, 2014). However in the case of Nigeria, the definition of small and medium scale enterprises in general is that of the National Council of Industries, which defines small and medium enterprises as business enterprises whose total costs excluding land is not more than two hundred million naira (N200, 000,000.00) (Oluwarotimi and Adamu, 2017).

One might want to know why the continued support for investment in small and medium enterprises. The reason is that small and medium businesses play vital role in the growth and development of a nation; including Nigeria. It is well noted that, small and medium businesses make more efficient use of inputs than the big ones (Chima, 1994). The potential role of small and medium enterprises could be enormous; including employment generation which leads to economic restructuring; contributing to the development of a diversified economic structure (including their role as suppliers to larger companies); contributing to the trade balance through export earnings or import substitution; and, in some cases, as a source of innovative activity, thereby could act as a source of changing the productive sector and adding to GDP.

Kadiri (2012) established that small and medium enterprises play a major role of employment generation, national growth, poverty reduction and economic development. Imoughele and Ismaila (2014) concluded that, the contribution of small and medium enterprises to an economy, especially developing ones like Nigeria include: greater utilization of raw materials, employment generation, encourage of rural development, development of entrepreneurship, mobilization of local savings, linkages with bigger industries, provision of regional balance by spreading investments more evenly, provision of avenue for self-employment and provision of opportunity for training managers and semi-skilled workers.

Hedwigis (2017) empirically analyzed banking role to performance improvement on Indonesian small and medium enterprises from 2005 to 2015. The study employed regression technique to measure bank credit to SMEs, number of SMEs and output value of SMEs. The results from the study indicated that bank credit to small and medium enterprises, number of small and medium enterprises and output value of small and medium enterprises has positive and significant effect on economic growth. Iloh and Chioke (2015) ascertained commercial bank credit availability to small and medium enterprises in Nigeria. Real gross domestic product was used as a dependent variable as a proxy on economic growth, while small and medium enterprises activities, commercial bank credit, exchange rate and lending rate as independent variables. The result from the generalized least square revealed that, commercial bank credit to small and medium enterprises has significant effect on Nigerian economic growth by positively

affecting the gross domestic product. Akingunola (2011) in an attempt to know the role of financing SMEs investigated the small and medium scale enterprises in Nigeria between 1999 and 2009 with a descriptive statistics and spearman rho correlation. The results showed a positive and significant relationship between small and medium enterprises financing and economic growth in Nigeria via investment level. Ikor, Nnabu and Obaji (2017) examined bank lending to small and medium scale enterprises and its implication on economic growth from 1992 to 2013. The study employed co-integration and vector error correction model in measuring gross domestic product, small and medium scale enterprises loan, government expenditure, broad money supply, exchange rate and bank lending rate. Evidence from the results revealed a long run relationship between bank lending to small and medium enterprises and economic growth. It was further revealed that, bank lending rate has no impact on small and medium enterprises growth in Nigeria. Oke and Aluko (2015) investigated the impact of commercial banks on small and medium enterprises financing in Nigeria. In using the constant effect, fixed effect and random effect in measuring the small and medium enterprises finance as dependent variable, while commercial bank credit to small and medium enterprises, commercial bank equity and ratio of commercial bank loan to small and medium enterprises to total credit in the economy as independent variables from 2000 to 2012, the results showed that commercial banks credit to small and medium enterprises, the ratio of credit to small and medium enterprises to total credit in the economy and equity of commercial banks explained a substantial proportion of changes that arises in small and medium enterprises financing.

Okey (2016) examined commercial banks credit and the growth of small and medium scale enterprises in Nigeria. Small and medium enterprises output was used as a dependent variable while commercial bank credit, lending rate, inflation rate, exchange rate and bank density were used as independent variables. The regression result indicated insignificant relationship between commercial bank credit and growth of small and medium enterprises. Furthermore, commercial bank credit to small and medium enterprises, total government expenditure and bank density has direct but insignificant impact on small and medium enterprises output. Benson (2017) also investigated bank credits and its impact on Nigeria economic growth from 1992 to 2015. In using the ordinary least square method in measuring gross domestic product as explained variable and commercial bank credits to small and medium enterprises, credit to private sector, money supply and interest rate as explanatory variables, the result revealed insignificant relationship among the explained and explanatory variables. In another similar development, Nwosa and Oseni (2013) examined the impact of banks loan to small and medium enterprises on manufacturing in Nigeria from 1992 to 2010. With the application of error correction model, the result also indicated insignificant relationship between banks loan to the small and medium enterprises sector and manufacturing output both in the short and long run.

Imoughale and Ismaila (2014) evaluated the impact of commercial bank credit on the growth of small and medium scale enterprises in Nigeria from 1986 to 2012. Wholesale and retail output as a component of gross domestic product stand as endogenous variables, commercial bank credit to small and medium enterprises, savings an time deposit, exchange rate and interest rate as exogenous variables. The result from the regression analysis revealed that,

small and medium enterprises and selected macroeconomic variables included in the model had a long run relationship with small and medium enterprises output. Bello and Mohammed (2015) ascertained the impact of banking sector credit on the growth of small and medium enterprises in Nigeria from 1985 to 2010. Using growth rate as predicted variable while banking sector credit, trade debt, exchange rate and inflation rate were used as predictor variables. The results from the descriptive statistics, correlation matrix and error correction model revealed that, banking sector credit has significant impact on the growth of small and medium enterprises in Nigeria, as it has positive impact on some major macro-economic variables of growth such as inflation, exchange rate, trade debt among others. Imoisi and Ephraim (2015) analyzed the relationship between small and medium scale enterprises and economic growth in Nigeria from 1975 to 2012. Gross domestic product in the work was used as outcome variable, finance availability to small and medium enterprises, interest rate and inflation rate were used as stimulus variables. The results from the ordinary least square show that financial availability to small and medium enterprises had a positive and significant relationship with economic growth. While interest rate and inflation rate showed a negative and positive influence on economic growth respectively. Muganda, Umulkher, Kadian and John (2016) evaluated the effect of business financing on the performance of small and medium enterprises in Lurambi sub-country, Kenya. The descriptive statistics result revealed that source of business financing affected financial performance of small and medium enterprises significantly; commercial loan financing affected financial performance significantly; retained earnings financing affected financial performance significantly; trade credit financing affected financial performance of small and medium enterprises significantly, as financial performance stand as controlled variable. John and Olorunfemi (2014) examined the relationship between SMEs financing and economic growth in Nigeria between 1980 and 2012. Error correction mechanism and granger causality test were employed in the analysis. Findings revealed that, commercial bank loans as a form of small and medium enterprises financing options significantly improve the economic size of the Nigerian economy in the long run, but not significant in the short run.

Oluwarotimi and Adamu (2017) evaluated deposit money bank credit to small and medium enterprises, social economic performance and economic growth in Nigeria between 1992 and 2015. The results from Pearson correlation and ordinary least square revealed a negative and highly significant relationship between the variables. Richard (2016) on a similar way examined the relationship between small and medium enterprises financing and economic growth in Nigeria from 1981 to 2014. Employing the ordinary least square for the analysis, the results show that both the levels of financing and interest rate had a negative and significant impact on economic growth which was proxy on real gross domestic product. Ibrahim (2017) also evaluated the role of commercial banks in financing small and medium scale enterprises in Nigeria between 1991 and 2012. The study utilized paired sample test, the result shows that commercial banks loans do not affect credit disbursement to small and medium enterprises positively.

Ezeaku, Anidiobu and Okolie (2017) assessed small and medium enterprises financing and its effect on manufacturing sector growth in Nigeria from 1981 to 2014. Manufacturing output, credit to small and medium enterprises, inflation rate and exchange rate were employed

in the analysis. The regression result shows that small and medium enterprises financing exerted positive influence on manufacturing output. Interest rate and inflation rate had a negative effect on manufacturing output. Omonigho (2017) evaluated the effect of small and medium scale enterprises on economic growth in Nigeria from 1982 to 2012. Small and medium enterprises contribution and gross domestic product at current price were used as variables. The result shows a significant and positive relationship between the variables. Onakoya, Fasanya and Abdulrahman (2013) investigated the link between small and medium scale enterprises financing and economic growth in Nigeria between 1992 and 2009. While real gross domestic product stand as explained variable with loan to small and medium enterprises and interest rate as explanatory variables, the ordinary least square result shows a positive impact among the variables. In a similar study Okuneye and Ogumuyiwa (2016) examined the determinants of small and medium enterprises in Nigeria from 1980 to 2013. Employing the ordinary square method, the results showed that credit facilities, interest rate as well as inflation rate are key determinants of the growth and survival of small and medium enterprises in Nigeria.

A close look at the previous studies indicated a debate that calls for studies such as this; meaning the relationship between bank credit to small and medium enterprises and economic growth have not reached a consensus in terms of results and conclusions. The studies from Omonigho (2017), Hedwigis (2017), Iloh and Chioke (2015) and Akingunola (2011) found a positive and significant relationship between bank credit to SMEs and economic growth. The results from Benson (2017), and Okey (2016), found insignificant relationship between bank credit to SMEs and economic growth; while the studies from Richard, (2016), Oluwarotimi and Adamu (2017) found a negative relationship between bank credit to SMEs and economic growth. This disparity call for a study such as this at this time that Nigerian economy is at a critical stage to employ more recent data to verify the previous claims. To improve nation's savings is one of the roles expected of small and medium enterprises to play. But none of the previous studies reviewed employed capital formation in their measurement. And to the best of our knowledge, this study is the first of its kind to examine the link between capital formation and bank credit to small and medium enterprises in Nigeria.

METHODOLOGY

3.1 Introduction

The methodology in this study deals with the methods and procedures of carrying out the regression tests. These include research design, data collection, model specification and data analysis techniques.

3.2 Area of coverage

This study basically covers the analysis of deposit money bank loans to small and medium enterprises and its effect on economic growth in Nigeria. Gross fixed capital formation; the dependent variable is proxy on economic growth. The variables that constitute the deposit money bank loans (i.e. the independent variables) include deposit money bank credits to small

and medium enterprises and lending rate, while inflation rate was also used as a control variable. All data were collected from 1992 to 2016.

3.3 Study design

According to Nelson, Ekokeme, Okoyan and Dumani (2018), ex-post facto study design refers to descriptive study in that a predictor variable has existed and in that a fact finder starts with an observation of the outcome variable then studies the predictor variable in retrospect for possible relationship and impact on the outcome variable. This study adopted ex-post facto study design.

3.4 Source of data collection

The source of data in all was secondary and from the CBN statistical bulletin and journal articles from the internet. The data used was mainly time series data that are quantitative in nature.

3.5 Model specification

In order to achieve the objectives of this work, a linear regression model was formulated. The model is stated as follows:

$$GCFM_t = f(CBLSME_t, BLR_t, IFR_t) \quad 1$$

The econometric specification of the model is:

$$GCFM_t = F_0 + F_1CBLSME_t + F_2BLR_t + F_3IFR_t + \xi \quad 2$$

Where:

F_0 is the constant term,

F_1 - F_3 are coefficients of stimulus variables. These also represent the rate of change in predicted variable for each unit change in the stimulus variables respectively.

GCFM = Gross fixed capital formation

CBLSME = Deposit money bank credit to small and medium enterprises

BLR = Bank lending rate

IFR = Inflation rate

t is the time period under study

ξ is the stochastic term

3.6 Data analysis method

This section present the various econometric tools explored in the analysis.

3.6.1 Descriptive statistics

The essence of descriptive statistics was to describe the overall character and distribution of the data. It enables ascertained the means, frequencies, variances and standard deviations.

3.6.2 Regression analysis

Regression analysis was used to analyze the impact on the predicted variable (Gross fixed capital formation) representing economic growth of the predictor variables (deposit money bank

credit to small and medium enterprises and bank lending rate) including the control variable (inflation rate).

3.6.3 Unit Root Test.

In order to avoid nonsense regression, the unit root test of Augmented Dickey-Fuller method was used achieve stationarity. This is due to the usual exhibition of stochastic trend of macroeconomic variables.

3.6.4 Co-integration test

This was employed to ascertain the long run relationship among the variables.

3.6.5 Error correction mechanism

In order to ascertain the speed of adjustment, the error correction mechanism was employed. The research anticipated negative coefficient of the ecm, which suggests automatic adjustment mechanism.

3.7 Testing of hypothesis

The above hypothesis will be tested at 5% significant level.

DATA PRESENTATION, RESULTS AND DISCUSSION OF FINDINGS.

4.1 Data presentation

The data for this research is attached as appendix to the work. It shows the variables employed for the study on yearly basis from 1992 to 2016. GCFM represents gross fixed capital formation, CBL SME represents deposit money bank credit to small and medium enterprises, BLR represents Bank lending rate and IFR represents Inflation rate.

4.2 Descriptive statistics

Descriptive statistics table

	LNGCFM	LNCBLSME	LNBLR	LNIFR
Mean	9.962099	4.436175	1.265720	1.165204
Median	9.812562	4.410165	1.254790	1.086360
Maximum	10.93323	4.955093	1.474216	1.862131
Minimum	8.572329	4.053378	1.131619	0.732394
Std. Dev.	0.666340	0.277815	0.068756	0.310578
Skewness	0.087408	0.212575	1.069899	0.937591
Kurtosis	1.990898	1.728884	5.081824	2.902720

Jarque-Bera	1.092549	1.871343	9.284086	3.672678
Probability	0.579103	0.392322	0.009638	0.159400
Sum	249.0525	110.9044	31.64301	29.13009
Sum Sq. Dev.	10.65623	1.852349	0.113458	2.315004
Observations	25	25	25	25

The descriptive statistics on table 4.1 shows that gross capital formation (lngcfm) has a mean value of 9.96, while the maximum and minimum values are 10.93 and 8.57 respectively. Deposit money bank credit to small and medium enterprise (lncblsme) has a mean value of 4.44, while the maximum and minimum values are 4.96 and 4.05 respectively. Bank lending rate (lnblr) has a mean value of 1.27, while the maximum and minimum values are 1.47 and 1.13 respectively. Inflation rate (lnifr) has a mean value of 1.17, while the maximum and the minimum values are 1.86 and 0.73 respectively.

The Jarque-Bera statistic indicated that only bank lending rate (lnblr) is not normally distributed with the p-value 0.009638, while gross capital formation (lngcfm = 0.579103), deposit money bank credit to small and medium enterprises (lncblsme = 0.392322), and inflation rate (lnifr = 0.159400).

4.3 Correlation matrix

Correlation matrix table

	LNGCFM	LNCBLSME	LNBLR	LNIFR
LNGCFM	1			
LNCBLSME	-0.5718	1		
LNBLR	-0.6083	0.3344	1	
LNIFR	-0.5055	-0.0825	0.4721	1

The correlation result on table 4.2 revealed the correlation among the variables. LNGCFM is shown to have a negative correlation of 0.5718 with LNCBLSME, a negative correlation of 0.6083 with LNBLR and a negative correlation of 0.5055 with LNIFR. LNCBLSME has a negative correlation of 0.5718 with LNGCFM, a positive correlation of 0.3344 with LNBLR and a negative correlation of 0.0825 with LNIFR. LNBLR has a negative correlation of 0.6083 with LNGCFM, a positive correlation of 0.3344 with LNCBLSME, and a positive correlation of 0.4721 with LNIFR. LNIFR has a negative correlation of 0.5055 with LNGCFM, a negative correlation of 0.0825 with LNCBLSME and a positive correlation of 0.4721 with LNBLR.

4.4 Unit root test results

Variables	ADF value	Critical values			P. values	Conclusion
		1%	5%	10%		
LNGCFM	-7.840837	-3.752946	-2.998064	-2.638752	0.0000	Stat. @ 1 st Dif.
LNCBLSME	-7.019286	-4.416345	-3.622033	-3.248592	0.0000	Stat. @ 1 st Dif.
LNBLR	-3.920732	-4.532598	-3.673616	-3.277364	0.0318	Stat. @ Level
LNIFR	-4.517984	-4.416345	-3.622033	-2.248592	0.0081	Stat. @ 1 st Dif.

Source: Extracted from Unit Root Test Result (Appendix)

The ADF Unit Root test result as summarized on table 4.3 above shows that all the variables are stationary at first difference except banking lending rate which is stationary at level.

4.5 Co-integration test results

Johansen Co-integration

Date: 05/09/18 Time: 21:48
 Sample (adjusted): 3 25
 Included observations: 23 after adjustments
 Trend assumption: Linear deterministic trend
 Series: LNGCFM LNCBLSME LNBLR
 LNIFR
 Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized	Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.755872	60.36708	47.85613	0.0022
At most 1	0.570869	27.93563	29.79707	0.0807
At most 2	0.307418	8.477770	15.49471	0.4158
At most 3	0.001269	0.029196	3.841466	0.8643

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 *	0.755872	32.43145	27.58434	0.0110
At most 1	0.570869	19.45786	21.13162	0.0843
At most 2	0.307418	8.448573	14.26460	0.3349
At most 3	0.001269	0.029196	3.841466	0.8643

Max-eigenvalue 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 Cointegrating Coefficients (normalized by b'S11*b=I):

LNGCFM	LNCBLSME	LNBLR	LNIFR
0.037104	4.192869	-39.70240	2.313035
0.836700	2.579523	-8.084121	5.229652
-2.890567	-5.974918	2.394495	-2.370719
1.075811	-1.768809	-3.643320	1.351888

Unrestricted Adjustment Coefficients (alpha):

D(LNGCFM)	-0.003228	0.006280	3.32E-05	-0.003818
D(LNCBLSM E)	-0.011441	0.055934	0.068351	0.001364
D(LNBLR)	0.033667	-0.010068	0.017410	0.000165
D(LNIFR)	-0.062841	-0.150271	0.026369	0.000856

1 CointegratingLog
Equation(s): likelihood 87.32760

Normalized cointegrating coefficients (standard error in parentheses)

LNGCFM	LNCBLSME	LNBLR	LNIFR
1.000000	113.0032	-1070.031	62.33930
	(21.1626)	(149.750)	(18.2691)

Adjustment coefficients (standard error in parentheses)

D(LNGCFM) -0.000120
(0.00097)

D(LNCBLSM
E) -0.000425
(0.00134)

D(LNBLR)	0.001249 (0.00035)
D(LNIFR)	-0.002332 (0.00188)

2	CointegratingLog	
Equation(s):	likelihood	97.05653

Normalized cointegrating coefficients (standard error in parentheses)

LNGCFM	LNCBLSME	LNBLR	LNIFR
1.000000	0.000000	20.07865 (7.95211)	4.677186 (1.21725)
0.000000	1.000000	-9.646713 (0.96688)	0.510270 (0.14800)

Adjustment coefficients (standard error in parentheses)

D(LNGCFM)	0.005135 (0.02181)	0.002667 (0.12818)
D(LNCBLSM E)	0.046376 (0.02804)	0.096312 (0.16483)
D(LNBLR)	-0.007174 (0.00773)	0.115191 (0.04546)
D(LNIFR)	-0.128063 (0.02950)	-0.651113 (0.17339)

3	CointegratingLog	
Equation(s):	likelihood	101.2808

Normalized cointegrating coefficients (standard error in parentheses)

LNGCFM	LNCBLSME	LNBLR	LNIFR
1.000000	0.000000	0.000000	-97.32243 (22.1262)
0.000000	1.000000	0.000000	49.51561 (11.0575)
0.000000	0.000000	1.000000	5.080004 (1.14863)

Adjustment coefficients (standard error in parentheses)

D(LNGCFM)	0.005039 (0.07836)	0.002469 (0.20157)	0.077453 (1.05679)
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D(LNCBLSM E)	-0.151197 (0.08755)	-0.312078 (0.22521)	0.165731 (1.18072)
D(LNBLR)	-0.057500 (0.02472)	0.011167 (0.06358)	-1.213582 (0.33333)
D(LNIFR)	-0.204285 (0.10423)	-0.808665 (0.26814)	3.772903 (1.40579)

Both trace test and Maximum Eigenvalue test on table 4.4 indicated one co-integrating equation existing between the predicted and predictable variables. This reveals that there is a long-run equilibrium relationship between the outcome and stimulus variables.

4.6 Parsimonious error correction model test results

Parsimonious error correction results

Dependent Variable: LNGCFM
 Method: Least Squares
 Date: 05/09/18 Time: 22:16
 Sample (adjusted): 5 25
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.828567	1.344500	5.822661	0.0043
D(LNGCFM(-1))	55.39460	8.823288	6.278226	0.0033
D(LNGCFM(-2))	4.679194	0.739570	6.326910	0.0032
D(LNGCFM(-3))	0.492910	0.238019	2.070884	0.1071
LNCBLSME	0.666937	0.265563	2.511409	0.0540
D(LNCBLSME(-1))	0.433706	0.271314	1.598540	0.1852
D(LNCBLSME(-2))	0.214044	0.194693	1.099391	0.3333
D(LNCBLSME(-3))	0.399500	0.308474	1.295085	0.2650
LNBLR	-1.032431	0.903887	1.142212	0.0471
D(LNBLR(-1))	-0.513021	0.681796	-0.752456	0.4936
D(LNBLR(-2))	-0.333475	0.570501	-0.584530	0.5902
D(LNBLR(-3))	-0.238455	0.587325	-0.406002	0.7055
D(LNIFR(-1))	-0.076266	0.187547	-0.406649	0.7051
LNIFR	-0.226702	0.187919	-1.206382	0.2941
D(LNIFR(-2))	0.382247	0.143880	2.656701	0.0566
D(LNIFR(-3))	-0.237460	0.295298	-0.804135	0.4664
ECM(-1)	-54.16045	8.480966	-6.386118	0.0031

R-squared	0.995794	Mean dependent var	10.12095
Adjusted R-squared	0.978972	S.D. dependent var	0.588731
S.E. of regression	0.085373	Akaike info criterion	-2.122759
Sum squared resid	0.029154	Schwarz criterion	-1.277193
Log likelihood	39.28897	Hannan-Quinn criter.	-1.939249
F-statistic	59.19345	Durbin-Watson stat	2.200218
Prob(F-statistic)	0.000624		

The Parsimonious Error Correction results (table 4.5 above) on the impact of deposit money bank credit to small and medium enterprises in Nigeria shows that (LNCBLSME) has a coefficient of 0.6666937 meaning that one percentage change in deposit money bank credit to small and medium enterprises leads to 0.66666937 percent change in gross fixed capital formation in Nigeria. This indicates that there is a high and positive response of gross fixed capital formation to changes in deposit money bank credit to small and medium enterprises. At the short run, the result shows a probability value of 0.0540 which is statistically significant; indicating that it has a significant impact on gross fixed capital formation. But at the long run, though the impact is positive but not significant in all the periods.

(LNBLR) has a coefficient of -1.032431 meaning that one percentage change in bank lending rate leads to 1.032431 percent change in gross fixed capital formation in Nigeria. This indicates that there is a negative response of gross fixed capital formation to changes in bank lending rate. At the short run, the result shows a probability value of 0.0471 which is statistically significant; indicating that it has a significant impact on gross fixed capital formation. Also at the long run, the impact is negative but not significant in all the periods.

(LNIFR) has a coefficient of -0.226702 meaning that one percentage change in inflation rate leads to 0.226702 percent change in gross fixed capital formation in the negative direction. At the short run, the result shows a probability value of 0.2941 which is statistically not significant; indicating that it has no significant impact on gross fixed capital formation in the negative direction. On the long run relationship, the results revealed that changes in inflation rate is positive and statistically significant in period 2, but negative and statistically not significant in period 3.

The results further show that r-squared is 0.99 and adjusted r-squared is 0.97 indicating that 97 percent changes in gross fixed capital formation are attributable to deposit money bank credit to small and medium enterprises, bank lending rate and inflation rate.

Overall, the results show that F-statistic is 59.19 with a probability of 0.000624, indicating that the combined impact of the explanatory variables on economic growth represented by gross fixed capital formation is statistically significant only.

The Durbin-Watson statistic shows 2.200218 indicating the absence of serial or autocorrelation among the variables.

Furthermore, the Error Correction Co-efficient has a negative value of 54.16045 and is significant at 5% level of significance with a probability of 0.0031. The co-efficient indicates that the model has a 5416.045 percent speed of adjustment from equilibrium position on the long run.

4.7 Discussion of findings

From the parsimonious error correction result above, the relationship between deposit money bank credit to small and medium enterprises and gross fixed capital formation is found to be positive and statistically significant. Meaning that increase in deposit money bank credit to small and medium enterprises leads to increase in gross fixed capital formation. Nigeria has witnessed a significant rise in gross fixed capital formation from \$6,127,633,665 in 2005 to \$72,964,163,327 in 2013. The gross fixed capital formation moved to alltime high of \$85,749,726,905 in 2014 before declining to \$71,328,523,231 in 2015. Many factors such as global economic crises in 2008/2009, crude oil price fluctuation between 2005 and 2013 among others did not bring decline in gross fixed capital formation. And between these periods, there was no decline in deposit bank credit to small and medium enterprises but in 2015, there was a decline of deposit money bank credit to small and medium enterprises and the gross fixed capital formation also experienced a decline. This is fairly close to what accelerator theory of investment suggested that increase in small and medium enterprises is related to economic growth. And this result concur with that of Hedwigis (2017) that bank credit to small and medium enterprises has a positive significant effect on economic growth.

The relationship between the bank lending rate and gross fixed capital formation is found to be negative and significant. Meaning that, if bank lending rate increases, it will have negative effect on small and medium enterprises which will also affect economic growth represented by gross fixed capital formation. That is, increase in bank lending rate leads to decrease in gross fixed capital formation. When the lending rate is high, it becomes a problem to the small and medium enterprises which in turn negatively affect the growth of the economy. This is also in line with theoretical expectation because interest reduces net income which could have been retained and reinvested. The result from this work is in line with that of Okey (2016) that lending rate is negatively related with the growth of small and medium enterprises.

The relationship between inflation rate and economic growth is found to negative and not significant except in period 2 which is positive and significant.

The results further show that r-squared is 0.99 and adjusted r-squared is 0.97 indicating that 97 percent changes in gross fixed capital formation are attributable to deposit money bank credit to small and medium enterprises, bank lending rate and inflation rate.

The Error Correction Co-efficient has a negative value of 54.16045 and is significant at 5% level of significance with a probability of 0.0031. The co-efficient indicates that the model has a 5416.045 percent speed of adjustment from equilibrium position on the long run.

Overall, the results show that F-statistic is 59.19 with a probability of 0.000624, indicating that the combined impact of the explanatory variables on economic growth represented by gross fixed capital formation is statistically significant only. This overall result

concur with Imoisi and Ephraim (2015); John and Olorunfemi (2014); Ezeaku, Anidiobu and Okolie (2017); Omonigho (2017); Onakoya, Fasaya and Abdulrahman (2013) that there is a positive significant relationship between deposit money bank credit to small and medium enterprises and economic growth.

5.1 Summary of findings

The study ascertained the effect of deposit money bank loans to small and medium sized enterprises and its effect on economic growth in Nigeria from 1981 to 2016. The following were the findings from this study:

- i. The relationship between deposit money bank loans to small and medium sized enterprises and gross fixed capital formation indicated positive and significant at 5% level.
- ii. Bank lending rate and gross fixed capital formation indicated a negative relationship and it is significant at 5% level.
- iii. The relationship between inflation rate and gross fixed capital formation representing economic growth is found negative and not significant except in period 2 which is positive and significant.

5.2 Conclusion

- iv. The study investigated the effect of deposit money bank credits to small and medium sized enterprises and its effect on economic growth in Nigeria from 1981 to 2016. The variables employed in this study include: gross fixed capital formation (GCFM) as predicted variable, while deposit money bank loans to small and medium enterprises (CBL SME) and Bank lending rate (BLR) were used as predictor variable, and inflation rate (IFR) was used as a controlled variable. The relationship between deposit money bank loans to small and medium enterprises and gross fixed capital formation indicated positive and significant. The results suggested that, for a significant growth of gross fixed capital formation, the strategy should be on measures to put policies that will enable facilitate deposit money bank credits to small and medium enterprises. This is fairly in line with theoretical expectation. Adequate capital is needed for investment which leads to employment, output and savings accumulation. Small and medium enterprises required credits from deposit money banks whenever fund in the business is not adequate for its operations. The availability of fund from deposit money bank enables investment, employment, productivity and savings accumulation. Bank lending rate and gross fixed capital formation indicated a negative relationship and it is significant. The results from this study also suggested that, for a significant growth of the economy, the focus should be on measures to reduce the bank lending rate. Meaning increasing lending rates in banks leads to decrease in gross fixed capital formation representing economic growth. It is also fairly close to what economic theories may suggest. When lending

rates are high, small and medium firms will be scared of accessing such facilities, as it could affect their profit or could even run them to lose. And running away from such credit facilities due to high lending rates indicates that, the operations of these businesses are blocked. Therefore, the benefits that could have been received are hampered.

5.3 Recommendations

From the results of this study, the following are recommended:

- i. Since deposit money banks are scared of granting loan facilities due to the nature of small and medium enterprises, to be more secure and to attained the desired economic growth, government should put policies that will enable deposit money banks to be part or stakeholders in every small or medium sized enterprise which seeks loan facility, so that granting of credit facilities could be made easier and more secured.
- ii. Government should put policies to favor small and medium sized enterprises by fixing a lower lending rate to enable the subsector to strive maximally.

5.4 Suggestions for further studies

The study looked at the effect of deposit money bank loans to small and medium enterprises in Nigeria from 1992 to 2016 using descriptive statistics and normality test, regression analysis, ADF unit root tests, Johansen co-integration and error correction model. Further studies could increase the time bound (scope) or employ other economic growth indicators as dependent variables, or still, utilize other statistical techniques.

This will enable comparison and increase reliance on and robustness of the results of this study. This will also confirm the validity of the results of this study, since different methods, variables and time horizons will be used. It will also widen the body of existing literature on the subject matter. Also, further study should be conducted on e-commerce adoption by small and medium enterprises and the effect on customer satisfaction, business performance and economic growth.

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APPENDIX

OLS result

Dependent Variable: LNGCFM
 Method: Least Squares
 Date: 05/09/18 Time: 21:23
 Sample: 1 25
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.45593	1.796916	10.82740	0.0000
LNCBLSME	-1.284705	0.335897	-3.824695	0.0010
LNBLR	-2.116075	1.534365	-1.379122	0.1824
LNIFR	-0.958026	0.321224	-2.982427	0.0071
R-squared	0.664792	Mean dependent var	9.962099	
Adjusted R-squared	0.616905	S.D. dependent var	0.666340	
S.E. of regression	0.412429	Akaike info criterion	1.212142	
Sum squared resid	3.572052	Schwarz criterion	1.407162	
Log likelihood	-11.15177	Hannan-Quinn criter.	1.266232	
F-statistic	13.88256	Durbin-Watson stat	0.695583	
Prob(F-statistic)	0.000033			

Unit root @ level lnGCFM

Null Hypothesis: LNGCFM has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.759779	0.3902
Test critical values: 1% level	-3.737853	

5% level	-2.991878
10% level	-2.635542

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNGCFM)
 Method: Least Squares
 Date: 05/09/18 Time: 21:25
 Sample (adjusted): 2 25
 Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGCFM(-1)	-0.099369	0.056467	-1.759779	0.0923
C	1.081678	0.561566	1.926181	0.0671

R-squared	0.123395	Mean dependent var	0.095490
Adjusted R-squared	0.083549	S.D. dependent var	0.184733
S.E. of regression	0.176848	Akaike info criterion	-0.547401
Sum squared resid	0.688052	Schwarz criterion	-0.449230
Log likelihood	8.568810	Hannan-Quinn criter.	-0.521356
F-statistic	3.096821	Durbin-Watson stat	1.606393
Prob(F-statistic)	0.092345		

Unit root @ 1st diff. lnGCFM

Null Hypothesis: D(LNGCFM) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.840837	0.0000
Test critical values: 1% level	-3.752946	
5% level	-2.998064	
10% level	-2.638752	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNGCFM,2)
 Method: Least Squares
 Date: 05/09/18 Time: 21:26
 Sample (adjusted): 3 25
 Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGCFM(-1))	-1.097088	0.139920	-7.840837	0.0000
C	0.076315	0.029228	2.611000	0.0163
R-squared	0.745389	Mean dependent var	-0.032485	
Adjusted R-squared	0.733265	S.D. dependent var	0.238873	
S.E. of regression	0.123370	Akaike info criterion	-1.264323	
Sum squared resid	0.319621	Schwarz criterion	-1.165584	
Log likelihood	16.53972	Hannan-Quinn criter.	-1.239491	
F-statistic	61.47873	Durbin-Watson stat	1.944659	
Prob(F-statistic)	0.000000			

Unit root @ level lnCBLsME

Null Hypothesis: LNCBLSME has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.930171	0.6079
Test critical values: 1% level	-4.394309	
5% level	-3.612199	
10% level	-3.243079	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNCBLSME)
 Method: Least Squares
 Date: 05/09/18 Time: 21:28

Sample (adjusted): 2 25
 Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCBLSME(-1)	-0.249860	0.129450	-1.930171	0.0672
C	1.220549	0.606806	2.011431	0.0573
@TREND(1)	-0.009437	0.005008	-1.884471	0.0734
R-squared	0.194595	Mean dependent var	-0.009530	
Adjusted R-squared	0.117890	S.D. dependent var	0.162848	
S.E. of regression	0.152948	Akaike info criterion	-0.800966	
Sum squared resid	0.491256	Schwarz criterion	-0.653709	
Log likelihood	12.61159	Hannan-Quinn criter.	-0.761899	
F-statistic	2.536924	Durbin-Watson stat	2.472639	
Prob(F-statistic)	0.103074			

Unit root @ 1st diff. lnCBLSME

Null Hypothesis: D(LNCBLSME) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.019286	0.0000
Test critical values: 1% level	-4.416345	
5% level	-3.622033	
10% level	-3.248592	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNCBLSME,2)
 Method: Least Squares
 Date: 05/09/18 Time: 21:30
 Sample (adjusted): 3 25
 Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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D(LNCBLSME(-1))	-1.401558	0.199672	-7.019286	0.0000
C	0.118622	0.070469	1.683328	0.1079
@TREND(1)	-0.009831	0.004896	-2.007936	0.0583
R-squared	0.711419	Mean dependent var	0.006429	
Adjusted R-squared	0.682561	S.D. dependent var	0.266901	
S.E. of regression	0.150377	Akaike info criterion	-0.830238	
Sum squared resid	0.452263	Schwarz criterion	-0.682130	
Log likelihood	12.54774	Hannan-Quinn criter.	-0.792989	
F-statistic	24.65230	Durbin-Watson stat	1.814448	
Prob(F-statistic)	0.000004			

Unit root @ level lnBLR

Null Hypothesis: LNBLR has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 5 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.920732	0.0318
Test critical values: 1% level	-4.532598	
5% level	-3.673616	
10% level	-3.277364	

*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 19

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNBLR)
 Method: Least Squares
 Date: 05/09/18 Time: 21:31
 Sample (adjusted): 7 25
 Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBLR(-1)	-1.751882	0.446825	-3.920732	0.0024

D(LNBLR(-1))	0.736331	0.322565	2.282737	0.0433
D(LNBLR(-2))	0.577819	0.312265	1.850414	0.0913
D(LNBLR(-3))	0.727556	0.256861	2.832492	0.0163
D(LNBLR(-4))	0.613840	0.224118	2.738910	0.0193
D(LNBLR(-5))	0.282776	0.171347	1.650309	0.1271
C	2.334364	0.589316	3.961144	0.0022
@TREND(1)	-0.008307	0.002170	-3.827696	0.0028
<hr/>				
R-squared	0.823588	Mean dependent var	0.005026	
Adjusted R-squared	0.711326	S.D. dependent var	0.061524	
S.E. of regression	0.033056	Akaike info criterion	-3.685675	
Sum squared resid	0.012020	Schwarz criterion	-3.288017	
Log likelihood	43.01391	Hannan-Quinn criter.	-3.618376	
F-statistic	7.336293	Durbin-Watson stat	2.240336	
Prob(F-statistic)	0.002022			

Unit root @ level lnIFR

Null Hypothesis: LNIFR has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.927759	0.6092
Test critical values: 1% level	-4.394309	
5% level	-3.612199	
10% level	-3.243079	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNIFR)
 Method: Least Squares
 Date: 05/09/18 Time: 21:33
 Sample (adjusted): 2 25
 Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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LNIFR(-1)	-0.345634	0.179293	-1.927759	0.0675
C	0.429077	0.286122	1.499627	0.1486
@TREND(1)	-0.003490	0.008025	-0.434971	0.6680
R-squared	0.185575	Mean dependent var	-0.015785	
Adjusted R-squared	0.108011	S.D. dependent var	0.221774	
S.E. of regression	0.209455	Akaike info criterion	-0.172147	
Sum squared resid	0.921300	Schwarz criterion	-0.024890	
Log likelihood	5.065761	Hannan-Quinn criter.	-0.133079	
F-statistic	2.392538	Durbin-Watson stat	1.678113	
Prob(F-statistic)	0.115860			

Unit root @ 1st diff. lnIFR

Null Hypothesis: D(LNIFR) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.517984	0.0081
Test critical values: 1% level	-4.416345	
5% level	-3.622033	
10% level	-3.248592	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNIFR,2)
 Method: Least Squares
 Date: 05/09/18 Time: 21:34
 Sample (adjusted): 3 25
 Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIFR(-1))	-1.025911	0.227073	-4.517984	0.0002
C	-0.136689	0.105793	-1.292044	0.2111
@TREND(1)	0.008823	0.007198	1.225723	0.2345

R-squared	0.511987	Mean dependent var	0.008967
Adjusted R-squared	0.463185	S.D. dependent var	0.310795
S.E. of regression	0.227712	Akaike info criterion	-0.000362
Sum squared resid	1.037055	Schwarz criterion	0.147746
Log likelihood	3.004168	Hannan-Quinn criter.	0.036886
F-statistic	10.49124	Durbin-Watson stat	1.993984
Prob(F-statistic)	0.000766		

Unit root @ level lnGCFM

Null Hypothesis: LNGCFM has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.352724	0.0819
Test critical values: 1% level	-4.394309	
5% level	-3.612199	
10% level	-3.243079	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNGCFM)
 Method: Least Squares
 Date: 05/09/18 Time: 21:38
 Sample (adjusted): 2 25
 Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGCFM(-1)	-0.606800	0.180987	-3.352724	0.0030
C	5.509381	1.596305	3.451333	0.0024
@TREND(1)	0.048665	0.016715	2.911438	0.0083

R-squared	0.375478	Mean dependent var	0.095490
Adjusted R-squared	0.316000	S.D. dependent var	0.184733
S.E. of regression	0.152782	Akaike info criterion	-0.803137
Sum squared resid	0.490191	Schwarz criterion	-0.655881

Log likelihood	12.63765	Hannan-Quinn criter.	-0.764070
F-statistic	6.312856	Durbin-Watson stat	1.053908
Prob(F-statistic)	0.007133		

Unit root @ 1st diff. lnGCFM

Null Hypothesis: D(LNGCFM) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.485146	0.0000
Test critical values: 1% level	-4.416345	
5% level	-3.622033	
10% level	-3.248592	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LNGCFM,2)
 Method: Least Squares
 Date: 05/09/18 Time: 21:40
 Sample (adjusted): 3 25
 Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGCFM(-1))	-1.088013	0.145356	-7.485146	0.0000
C	0.057364	0.062571	0.916788	0.3702
@TREND(1)	0.001389	0.004029	0.344647	0.7340

R-squared	0.746892	Mean dependent var	-0.032485
Adjusted R-squared	0.721581	S.D. dependent var	0.238873
S.E. of regression	0.126042	Akaike info criterion	-1.183288
Sum squared resid	0.317734	Schwarz criterion	-1.035180
Log likelihood	16.60781	Hannan-Quinn criter.	-1.146039
F-statistic	29.50884	Durbin-Watson stat	1.966688
Prob(F-statistic)	0.000001		

Descriptive statistics

	LNGCFM	LNCBLSME	LNBLR	LNIFR
Mean	9.962099	4.436175	1.265720	1.165204
Median	9.812562	4.410165	1.254790	1.086360
Maximum	10.93323	4.955093	1.474216	1.862131
Minimum	8.572329	4.053378	1.131619	0.732394
Std. Dev.	0.666340	0.277815	0.068756	0.310578
Skewness	0.087408	0.212575	1.069899	0.937591
Kurtosis	1.990898	1.728884	5.081824	2.902720
Jarque-Bera	1.092549	1.871343	9.284086	3.672678
Probability	0.579103	0.392322	0.009638	0.159400
Sum	249.0525	110.9044	31.64301	29.13009
Sum Sq. Dev.	10.65623	1.852349	0.113458	2.315004
Observations	25	25	25	25

Correlation Analysis

	LNGCFM	LNCBLSME	LNBLR	LNIFR
LNGCFM	1	-0.5718170195172861	-0.6082577540035828	-0.5054512478257306
-	0.57181701951728			
LNCBLSME	61	1	0.3343657774371775	-0.08245480546887055
-	0.60825775400358			
LNBLR	28	0.3343657774371775	1	0.472117344410447
-	0.50545124782573			
LNIFR	06	-0.08245480546887055	0.472117344410447	1

Johansen Co-integration

Date: 05/09/18 Time: 21:48
 Sample (adjusted): 3 25

Included observations: 23 after adjustments
 Trend assumption: Linear deterministic trend
 Series: LNGCFM LNCBLSME LNBLR
 LNIFR
 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 *	0.755872	60.36708	47.85613	0.0022
At most 1	0.570869	27.93563	29.79707	0.0807
At most 2	0.307418	8.477770	15.49471	0.4158
At most 3	0.001269	0.029196	3.841466	0.8643

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 *	0.755872	32.43145	27.58434	0.0110
At most 1	0.570869	19.45786	21.13162	0.0843
At most 2	0.307418	8.448573	14.26460	0.3349
At most 3	0.001269	0.029196	3.841466	0.8643

Max-eigenvalue 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 Cointegrating Coefficients (normalized by b'S11*b=I):

LNGCFM	LNCBLSME	LNBLR	LNIFR
0.037104	4.192869	-39.70240	2.313035
0.836700	2.579523	-8.084121	5.229652
-2.890567	-5.974918	2.394495	-2.370719
1.075811	-1.768809	-3.643320	1.351888

Unrestricted Adjustment Coefficients (alpha):

D(LNGCFM)	-0.003228	0.006280	3.32E-05	-0.003818
D(LNCBLSM				
E)	-0.011441	0.055934	0.068351	0.001364
D(LNBLR)	0.033667	-0.010068	0.017410	0.000165
D(LNIFR)	-0.062841	-0.150271	0.026369	0.000856

1 CointegratingLog
Equation(s): likelihood 87.32760

Normalized cointegrating coefficients (standard error in parentheses)

LNGCFM	LNCBLSME	LNBLR	LNIFR
1.000000	113.0032	-1070.031	62.33930
	(21.1626)	(149.750)	(18.2691)

Adjustment coefficients (standard error in parentheses)

D(LNGCFM) -0.000120
(0.00097)

D(LNCBLSM
E) -0.000425
(0.00134)

D(LNBLR) 0.001249
(0.00035)

D(LNIFR) -0.002332
(0.00188)

2 CointegratingLog
Equation(s): likelihood 97.05653

Normalized cointegrating coefficients (standard error in parentheses)

LNGCFM	LNCBLSME	LNBLR	LNIFR
1.000000	0.000000	20.07865	4.677186
		(7.95211)	(1.21725)
0.000000	1.000000	-9.646713	0.510270
		(0.96688)	(0.14800)

Adjustment coefficients (standard error in parentheses)

D(LNGCFM) 0.005135 0.002667
(0.02181) (0.12818)

D(LNCBLSM
E) 0.046376 0.096312

	(0.02804)	(0.16483)
D(LNBLR)	-0.007174	0.115191
	(0.00773)	(0.04546)
D(LNIFR)	-0.128063	-0.651113
	(0.02950)	(0.17339)

3 CointegratingLog
Equation(s): likelihood 101.2808

Normalized cointegrating coefficients (standard error in parentheses)

LNGCFM	LNCBLSME	LNBLR	LNIFR
1.000000	0.000000	0.000000	-97.32243 (22.1262)
0.000000	1.000000	0.000000	49.51561 (11.0575)
0.000000	0.000000	1.000000	5.080004 (1.14863)

Adjustment coefficients (standard error in parentheses)

D(LNGCFM)	0.005039 (0.07836)	0.002469 (0.20157)	0.077453 (1.05679)
D(LNCBLSM E)	-0.151197 (0.08755)	-0.312078 (0.22521)	0.165731 (1.18072)
D(LNBLR)	-0.057500 (0.02472)	0.011167 (0.06358)	-1.213582 (0.33333)
D(LNIFR)	-0.204285 (0.10423)	-0.808665 (0.26814)	3.772903 (1.40579)

Parsimonious error correction results

Dependent Variable: LNGCFM
Method: Least Squares
Date: 05/09/18 Time: 22:16
Sample (adjusted): 5 25
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.828567	1.344500	5.822661	0.0043

D(LNGCFM(-1))	55.39460	8.823288	6.278226	0.0033
D(LNGCFM(-2))	4.679194	0.739570	6.326910	0.0032
D(LNGCFM(-3))	0.492910	0.238019	2.070884	0.1071
LNCBLSME	0.666937	0.265563	2.511409	0.0540
D(LNCBLSME(-1))	0.433706	0.271314	1.598540	0.1852
D(LNCBLSME(-2))	0.214044	0.194693	1.099391	0.3333
D(LNCBLSME(-3))	0.399500	0.308474	1.295085	0.2650
LNBLR	1.032431	0.903887	1.142212	0.0471
D(LNBLR(-1))	-0.513021	0.681796	-0.752456	0.4936
D(LNBLR(-2))	-0.333475	0.570501	-0.584530	0.5902
D(LNBLR(-3))	-0.238455	0.587325	-0.406002	0.7055
D(LNIFR(-1))	-0.076266	0.187547	-0.406649	0.7051
LNIFR	-0.226702	0.187919	-1.206382	0.2941
D(LNIFR(-2))	0.382247	0.143880	2.656701	0.0566
D(LNIFR(-3))	-0.237460	0.295298	-0.804135	0.4664
ECM(-1)	-54.16045	8.480966	-6.386118	0.0031

R-squared	0.995794	Mean dependent var	10.12095
Adjusted R-squared	0.978972	S.D. dependent var	0.588731
S.E. of regression	0.085373	Akaike info criterion	-2.122759
Sum squared resid	0.029154	Schwarz criterion	-1.277193
Log likelihood	39.28897	Hannan-Quinn criter.	-1.939249
F-statistic	59.19345	Durbin-Watson stat	2.290218
Prob(F-statistic)	0.000624		
