Impact of Capital Formation on the Economic Development of Nigeria

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Abstract
Capital formation is one of the major determinants of economic growth. There is a conventional perception that the most pertinent obstacle to economic growth is shortage of capital. The paper applied Harrod – Domar model to Nigerian economic development and tested if it has a significant relationship with Nigerian economy. The work studies the extent to which capital formation affects economic growth in Nigeria. Making use of the multiple linear regression model through the ordinary least square (OLS) method, the impact of capital formation on the Nigeria’s economic growth was examined. The analysis discovered that there is a significant positive relationship between capital formation and economic growth in Nigeria both in the short-run and long-run. It also discovered that the rate of savings is not significant to enhance economic growth. The paper recommended based on the econometric results that the government should encourage savings, create conducive investment climate and improve the infrastructural base of the economy to boost capital formation and hence promote sustainable growth.

Key Words: Capital, Savings, Investment, Growth, Expenditure, Interest Rate
1. Introduction

1.1 Background of the Study

Capital formation is one of the engines of economic growth. Deficiency of capital has been cited as the most serious constraint to sustainable economic growth. Ugwuegbu and Uruakpa (2013) posits that the rate of growth in the Nigeria economy cannot be fully analyzed without a closer look at the contribution of capital formation to Nigeria’s economic growth. On the definition of capital formation, Bakare (2011) stressed that it refers to the proportion of present income saved and invested in order to augment future output and income. According to Ugwuegbu and Uruakpa, (2013), capital formation is equivalent to an increase in physical capital stock of a nation with investment in social and economic infrastructure. Bakare classified capital formation into gross private domestic investment and gross public domestic investment. The gross public domestic investment includes investment by government and public enterprises while gross private domestic investment is investment by private enterprises. Gross domestic investment can be attributed to gross fixed capital formation plus net changes in the level of inventories. Economic theories reveal that capital formation plays crucial roles in economic growth (Beddies 1999, Gbura and Thadji Mmichael 1996, Ghura 1997). Growth models like the ones developed by Romer (1986) and Lucas (1988) predict that increased capital accumulation can result in a permanent increase in growth rates. Youopoulos and Nugent (1976) as cited in Bakkare (2011), supported the view of capital fundamentalism.

The process of capital formation is cumulative and self-feeding. It involves three interrelated conditions; (a) the existence of real savings and rise in them; (b) the existence of credit and financial institutions to mobilize savings and to direct them to desired channels; and (c) to use these savings for investment in capital goods (Jhingan, 2006). In 1986, the Nigerian government imbibed the culture of capital formation by pursuing an economic reform that laid emphasis on private sector. In this program, it was expected to ensure that interest rates were positive in real terms and to encourage savings, thereby ensuring that investment funds would be readily available to the real sector.

The decline in capital formation can be as a result of macroeconomic imbalances such as deteriorating foreign exchange rate and corruption in public sector. The inadequacy in economic infrastructure such as poor power supply, bad road network as well as poor health facilities were equally responsible for the decline in capital formation over time. Overall, the speed and the strength of economic growth in Nigeria have not been satisfactory.

1.2 Statement of the Problem

Three decades ago, Nigeria policy makers pursued a structural adjustment program which shifted emphasis from public sectors to private sectors. The goal was to encourage private
domestic savings, private domestic investment and capital formation in order to enhance economic growth. In an attempt to achieve this goal, resources were diverted from current consumption and were invested in capital formation through privatization and commercialization of state enterprises. Diversion of resources from current consumption is called saving. But unfortunately, the initial optimism expressed about public sector reforms has not been met. Although the reform program led to privatization and commercialization of many state enterprises and improvement in some macroeconomic variable like the nominal interest rate and money supply, there have been some disappointing performances. For example, Nigeria continues to be confronted with low rate of economic growth. Besides, the aggregate supply continued to diminish leading to demand-pull inflation. One worrisome aspect of the result of liberalization of the public sector in Nigeria is the extent of distress in the sector including high rate of unemployment. The literature is a replete account of the serious impacts of these crises on the economy, particularly as they affect the real sector. In spite of these, the distress syndrome remains inadequately detected and controlled. The need for a better understanding of the extent and implications of the problem becomes quite important. This is the focus of this study.

1.3 Objectives of the Study

The broad objective of this study is to determine the impact of capital formation on economic growth in Nigeria. The specific objectives are as follows:

i) To ascertain the nature of the relationship between capital formation and economic growth.

ii) To ascertain if gross fixed capital formation plays any significant role in economic growth.

iii) To determine the impact of savings on economic growth.

iv) To determine the role of inflation in the economic growth of Nigeria.

v) To know the direction and significance of interest rate on economic growth of Nigeria.

1.4 Hypothesis of the Study

i) $H_0$: There is no significant relationship between economic growth and capital formation.

ii) $H_0$: Gross Fixed Capital formation does not enhance economic growth.

iii) $H_0$: Interest rate does not have any positive significant impact on economic growth.

iv) $H_0$: Savings does not exert any significant positive impact on economic growth of Nigeria.

v) $H_0$: External Debt Stock does not play any significant positive role in economic growth.

vi) $H_0$: Inflation does not play any significant positive role in economic growth.

vii) $H_0$: Government Expenditure does not contribute positively to economic growth.
2. Review of Related Literature

2.1 Empirical Review

Shuaib, Igbinosun and Ahmed (2015) in their study titled “Capital Formation: Impact on the economic development of Nigeria” after applying Harrod-Domar model (using ordinary least square) discovered that there is a significant relationship existing between capital formation and economic development.

Bakare (2011) on the study of Theoretical Analysis of Capital Formation and Growth in Nigeria spanning over the period of 1979 to 2009 employed the Johansen test of cointegration and the error correction mechanism analysis and came out with a result that the net effects of depreciation in exchange rate is expansionary, and hence raises nominal incomes and stimulate production in Nigeria.

Adekunle and Aderemi (2012) studied the relationship between Domestic Investment, Capital Formation and Population Growth in Nigeria. Their linear result indicates the importance of government expenditure, capacity utilization and bank credit in increasing the income of Nigerians.

Kanu and Ozurumba (2014) in their work “Capital Formation and Economic Growth in Nigeria” used multiple regression technique. They used exports, imports, savings, inflation and gross domestic product for their secondary data. Their result revealed that gross fixed capital formation exerts wide and significant influence on economic growth.

3. Methodology

3.1 Research Design and Strategy

Research design is the structure and strategy for investigating the relationship between the variables of the study. The research design adopted for this work is the experimental research design. The reason is that experimental research design combines the theoretical consideration with empirical observation.

3.2 Model Specification

This work describes an initial attempt to model the theoretical relationship between capital formation and the growth of Nigerian economy. The model is the original version of Harrod-Domar model which has been extended to incorporate other variables that determine economic growth. The original version of Harrod -Domar model is usually stated in its raw form as:

\[ G = \frac{\Delta Y}{Y} = \frac{sY}{k} \]

This model implies that the growth rate of national income will directly or positively be related to saving ratio (i.e. the more an economy is able to save-and invest-out of given GNP, the greater will be the growth of that GNP) and inversely or negatively be related to the
economy’s capital/output ratio (i.e. the higher the k, the lower will be that rate of GNP growth).

Following the model of Ainabor, Shuab and Kadiri (2014), this enables the determination of the capital formation: impact on the economic development of Nigeria from 1973 to 2013. The model is designed below:

\[
GDП = f(GCF, TGE, INTR, INFR, SAV, EXD, + \varepsilon) \quad \ldots \quad (2)
\]

\[
GDП_t = \alpha_0 + \alpha_1 GCF + \alpha_2 TGE + \alpha_3 INTR + \alpha_4 INFR + \alpha_5 TS + \alpha_6 EXD + \varepsilon_t \ldots. \quad (3)
\]

Where:

GDП = Gross domestic product as a proxy for economic growth;

GCF = Gross Capital Formation which is a proxy for capital formation;

TGE = Total Government Expenditure which is a proxy for economic & social infrastructures—including electricity, Power generations;

INTR = Interest Rate;

INFR = Inflation Rate;

SAV = Total Savings;

EXD = External Debt Rate;

\varepsilon = stochastic term.

It has been agreed that a log-linear form is more likely to find evidence of a deterrent effect than a linear form, Cameron (1994) and Ehrlich (1996).

For the estimation purposes for this paper, equation (3) was transformed into double-log. We re-specify equation (3) thus:

\[
logGDП_t = \alpha_0 + \alpha_1 logGCF_t + \alpha_2 logTGE_t + \alpha_3 INTR_t + \alpha_4 INFR_t + \alpha_5 logSAV_t + \alpha_6 logEXD_t + \varepsilon_t \quad \ldots \quad (4)
\]

Where: \varepsilon = White noise error

The a priori expectations are as follows:

\[
\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, <> 0
\]

3.3 Estimation Procedure

The estimation commences with a group unit root test to confirm the stationarity state of the variables that entered the model. In order to test for the stationarity, group unit root test will be adopted. Recent literature suggests that panel-based unit root tests have higher power than unit root tests based on individual time series. EViews will compute one of the following five types of panel unit root tests: Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-type tests using ADF and PP tests (Maddala and Wu (1999) and Choi (2001)), and Hadri (2000). After that the co-integration will be applied under the assumption that the series are not co-integrated, all linear combinations of \((Y_t, X_t)\), including the residuals from OLS, are unit root non-stationary. Therefore, a test of the null hypothesis of no co-
integration against the alternative of co-integration corresponds to a unit root test of the null of non-stationarity against the alternative of stationarity. This will be done with Engle-Granger test. Then the multiple regressions will be obtained with the OLS estimation. The hypothesis will further be tested with Granger Causality Test.

3.4 Summary of Empirical Results

3.4.1 Group Unit Root Test

Series: EXD, GDP, GFC, INFR, INTR, SAV, TGE.

Table 3.1: Summary of Unit Root Test

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levin, Lin &amp; Chu t</td>
<td>13.7683</td>
<td>1.0000</td>
<td>5.70908</td>
<td>1.0000</td>
<td>13.1364</td>
<td>0.5158</td>
<td>10.4690</td>
<td>0.7272</td>
</tr>
<tr>
<td>Level</td>
<td>Im, Pesaran and Shin W-stat</td>
<td>4.12212</td>
<td>1.0000</td>
<td>0.23296</td>
<td>0.5921</td>
<td>49.3296</td>
<td>0.0000</td>
<td>94.1195</td>
<td>0.0000</td>
</tr>
<tr>
<td>1st Diff</td>
<td>ADF-Fisher Chi-square</td>
<td>1.58942</td>
<td>0.0440</td>
<td>-10.6812</td>
<td>0.0000</td>
<td>124.663</td>
<td>0.0000</td>
<td>176.055</td>
<td>0.0000</td>
</tr>
<tr>
<td>2nd Diff</td>
<td>PP-Fisher Chi-square</td>
<td>-5.869661</td>
<td>0.0351</td>
<td>132.8474</td>
<td>0.0429</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Extract from Eviews 7.2 output

The result has a mixed scenario. At level, all the tests suggest the presence of unit root which means that the model is not stationary both at 1% and 5% respectively. At 1st diff., the model is non-stationary with Im, Pesaran and Shin W, Levin, Lin and Chu t but stationary with ADF-Fisher chi-square and PP-Fisher chi-square at 10%, 5% and 1%. At 2nd diff., the model is has no unit root and therefore is stationary as depicted by all the tests types.

3.5 Co-integration Test

Table 3.2: Co-integration Test - Engle-Granger

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engle-Granger tau-statistic</td>
<td>-5.869661</td>
<td>0.0351</td>
</tr>
<tr>
<td>Engle-Granger z-statistic</td>
<td>132.8474</td>
<td>0.0429</td>
</tr>
</tbody>
</table>

As to the tests themselves, the Engle-Granger tau-statistic (t-statistic) and normalized autocorrelation coefficient (which we term the z-statistic) both reject the null hypothesis of no co-integration (unit root in the residuals) at the 5% level. On balance, the evidence clearly suggests that all the variables are co-integrated.

Table 3.3: Summary of Multiple Regression Result

Dependent Variable: Log (GDP)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistics</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.840617</td>
<td>0.848983</td>
<td>2.168027</td>
<td>0.0395</td>
</tr>
<tr>
<td>Log(EXD)</td>
<td>0.120934</td>
<td>0.054056</td>
<td>2.237180</td>
<td>0.0341</td>
</tr>
<tr>
<td>Log(GFC)</td>
<td>0.359136</td>
<td>0.160378</td>
<td>2.239310</td>
<td>0.0339</td>
</tr>
<tr>
<td>INFR</td>
<td>0.003121</td>
<td>0.002123</td>
<td>1.470257</td>
<td>0.1535</td>
</tr>
<tr>
<td>INTR</td>
<td>-0.022055</td>
<td>0.008940</td>
<td>-2.466927</td>
<td>0.0205</td>
</tr>
<tr>
<td>Log(SAV)</td>
<td>0.195862</td>
<td>0.104904</td>
<td>1.867056</td>
<td>0.0732</td>
</tr>
<tr>
<td>Log(TGE)</td>
<td>0.459285</td>
<td>0.187556</td>
<td>2.448783</td>
<td>0.0214</td>
</tr>
<tr>
<td>F-Statistics</td>
<td>812.5455</td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>ECM</td>
<td>-0.471601</td>
<td>0.198454</td>
<td>-2.376377</td>
<td>0.0258</td>
</tr>
</tbody>
</table>
R-squared = 0.994695, Adjusted R-squared = 0.993471, Durbin-Watson stat = 1.312429

Substituted Co-efficient in the long-run.

\[ \text{LOG} (\text{GDP}) = 1.84061704567 + 0.120933716575 \times \text{LOG} (\text{EXD}) + \\
0.359135820351 \times \text{LOG} (\text{GFC}) + 0.00312129201131 \times \text{INFR} - \\
0.0220554062729 \times \text{INTR} + 0.195861753343 \times \text{LOG} (\text{SAV}) + \\
0.45928454318 \times \text{LOG} (\text{TGE}) \]

The estimate regression is not spurious because the R-squared value is less than the Durbin-Waston stat.

In the short-run, the estimated coefficient is:

\[ \text{DLOG} (\text{GDP}) = 0.174098473647 - 0.0129846993064 \times \text{DLOG} (\text{EXD}) + \\
0.399049461418 \times \text{DLOG} (\text{GFC}) + 0.00195466541432 \times \text{D(INFR)} - \\
0.0020157998997 \times \text{D(INTR)} - 0.26252245861 \times \text{DLOG} (\text{SAV}) + \\
0.243295509241 \times \text{DLOG} (\text{TGE}) - 0.471600871571 \times \text{U(-1)}. \]

4. Discussion of Findings

From the estimated output in Table 3.2, capital formation, external debt, inflation rate, savings and government expenditure have a positive impact on the economic growth of Nigeria, but interest rate has a negative impact all in the long-run. From Breusch-Godfrey Serial Correlation LM Test, Savings and external debts have a negative impact. The model as shown by the Adjusted R-square has a moderate fit and about 99.5% of the variation in economic growth is accounted for by the variation in the independent variables. The Error Correction Model is statistically significant at 5% level and is negative. Thus, it will rightly act to restore any distortion in the equilibrium with a speed of adjustment of 47.2% annually. The ECM model is not spurious because the value of the R-square is less than the Durbin-Waston stat. The ECM is not serially correlated as shown by the p-value (0.7799) of Prob. Chi-Square (2) in appendix … leading to the acceptance of the null hypothesis.

Test of Hypothesis:

i) The overall regression is significant at 5% and 1% level of significance in the long-run as the probability of F-stat (0.0000) in table 3.3. It is also significant in the short-run. So we accept the fact that there is a significant relationship between economic growth and capital formation.

ii) Gross Fixed capital Formation is significant at 5% (Prob of t-stat =0.0339) level in the long-run. It is also significant at 1% and 5% in the short run, so we reject the null hypothesis and conclude that Gross Fixed Capital Formation enhances economic growth.

iii) The prob of t-stat for interest rate is significant at 5% level in the long-run but not significant in the short-run. This connotes that interest rate plays a crucial role in economic growth only in the long-run.
iv) Due to the high probability value of savings both in the long-run and short-run, we accept the null hypothesis and conclude that savings does not exert any significant positive impact on economic growth of Nigeria.

v) External debt stock is significant in the long-run and we deduce that it plays a significant positive role in economic growth.

vi) Inflation rate is insignificant both in the long-run and short-run. So we conclude that it does not contribute positively to economic growth.

vii) In the short-run period, government expenditure does not play any significant positive role in economic growth but in the long-run it does.

5. Conclusion

This work investigated the impact of capital formation on economic growth. The analysis discovered that there is a significant positive relationship between capital formation and economic growth in Nigeria both in the short-run and long-run. It also discovered that rate of savings is not significant to enhance economic development.

6. Recommendation

The public authorities should encourage savings by enhancing interest rate. The government should be creating an enabling atmosphere and provide more infrastructural facilities to pave way for investment which in turn will boost capital formation.

Government should induce the money and capital market to function adequately in order to enhance investors’ confidence. This will go a long way in boosting the capital formation and thereby enhance economic growth.

References


