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# Causal links between foreign capital inflows and economic growth: empirical evidence from Nigeria

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## Abstract

The impact of foreign capital inflows on domestic investment in developing countries cannot be over emphasized. This study is designed to empirically examine the causal link between foreign capital inflows and economic growth in Nigeria. Time series data were employed spanning from 1970 to 2014. The study employed Granger causality test, co-integration and error correction mechanism as the major tools of analysis. Granger causality test showed a unidirectional causality among the components of capital inflows used in the study except remittances and real GDP. The result also indicated that there is long run relationship between capital inflows and economic growth. The policy implication that can be drawn from the above finding is that all the foreign capital components used in the study are very important sources of capital for Nigeria to finance its underdeveloped infrastructural base and pave way for growth and development of the country. What is more important is, foreign capital inflows will further help in setting a turning point for the progressive structural transformation of the country's economy by and largely in oil based economy to a growing and diversified economy with expanding industrial, service and agricultural sector though creating job opportunities, reducing poverty and overall economic performance of Nigerian economy. The paper recommends that government should ensure proper channeling of foreign capital into productive sectors of the economy, create enabling environment and macroeconomic stability and encourage domestic savings and investment in the country.

**Keywords:** Economic growth, foreign capital, Granger causality

## 1. Introduction

Foreign capital inflows have attracted the attention of most developing countries because of its perceived role of promoting economic growth and development. It also appears to be a substitute for domestic capital as a source of investment in many third world economies of Asia, Africa and Latin America and these countries offer incentive packages to external investors ranging from fiscal incentives (such as grants, credits or equity), to subsidized infrastructural facilities, market preferences, labour training, and research and development.

Majority of less developed countries are financially deficient and handicap couple with their huge demand for funds to finance developmental projects like road, bridge, schools, and industries for the overall development of their economies.

Therefore, the need for foreign capital become necessary which prompted most less developed countries to adopt economic and social reforms which include structural adjustment, financial liberalization, incentive packages, and other related policy measures like conducive business environment and sound macroeconomic policies to improve the inflow of overseas capital. Unfortunately, the result have not yielded up to expectation as statistics from world investment report (2011) shows that between 1991 and 2010 only 30.6% of world capital inflows goes to LDCs, out of which Africa received mere 2.8%, and the developed countries received 66.5%. It is therefore important to study the trend, impact and behaviour of various components of capital inflows so as to guide policy makers in their desire to create visible and more robust policies toward enhancing the inflow of overseas capital.

Although, there is plethora of empirical studies on foreign capital inflows and growth nexus, which resulted to two conflicting views. The first proponents assert that external capital inflow is pre-requisite and necessary for the overall growth and development of poor income countries (see: Gupta, 1970; Nkoro and Uko, 2013; Narayan, 2014; Adebogye et al, 2014; Fambon, 2013; Chigbu et al, 2015). According to them, there exist a strong positive and significant correlation between the flow of foreign capital and the level of economic growth because it support and supplements domestic resources and savings. For instance, Fambon (2013) stressed that foreign capital inflows and other financial resources that manifest themselves through externalities, are not only the adoption of new technologies and innovations, but also their complements with domestic sources of finance that affect major macroeconomic variable such as domestic investment, job creation, the acquisition of technical knowhow by workforce and business environment, as well as the competitiveness of developing countries' exports.

On the other hand, the second proponents are related to the emergence of the view that external capital exerts significant negative effects on the economic growth of recipient countries. According to this view, foreign capital mostly consumed and substitutes rather than compliments domestic resources. Furthermore, foreign capital inflows assists to import inappropriate technology, distort the domestic income distribution, and encourages a bigger, inefficient and corrupt government in developing countries (Griffin and Enos, 1970; Levine and Carcovic, 2002; Durham, 2003; Quatarra, 2006; Asien and Oriavwote, 2013). Based on the foregoing it shows that the debate is not clearly resolved. Besides that, most of the studies on foreign capital inflows and growth nexus are cross-sectional, (see: Bowen, 1998; Chigbu, 2015; Ndambendia, 2010; De Mello, 1999) such results obtained by cross-country studies must be carefully treated as they are subject to extreme limitations. Such lapses include; a common economic structure and similar production technology

across different nations which appears not to be true in reality. Therefore, this study will contribute to the existing body of literature on capital inflows and growth nexus and as well it will add knowledge to the field of international finance.

However, to the best of our knowledge, our study stands to be the first empirical attempt investigating the impact of foreign capital flows into Nigeria using a large sample covering the period between 1970 and 2014 with robust econometric analysis and decomposing capital inflows into four distinct and relevant components.

The remaining part of the paper is divided into seven sections. After the introduction Section 1 and Section 2 offers theoretical and empirical review of previous studies on the impacts of foreign capital flows. Section 3 discusses foreign capital inflow and growth nexus. Section 4 describes the data and methodology. Empirical results and discussion of the findings are treated in section 5 accompanied by conclusion and recommendations in the last section.

## **2. Literature review**

### **2.1 Theoretical literature**

#### ***2.1.1 two-gap model***

The argument for foreign capital inflows are usually founded on the need to supplement the level of domestic savings that can supply the required resources (financial, technical and managerial) for domestic economic growth (Anthony et al, 2014).

The benchmark for the analysis of foreign capital inflows can be dated back to the two-gap model developed by Solow (1956) which is an extension of the Harrod-Domar growth model in which growth is driven by physical capital formation. In the Harrod-Domar Model, output depends upon the investment rate and the productivity of investment. A savings gap exists if domestic savings alone are insufficient to finance the investment required to attain a target rate of growth. In addition to the savings gap, there is also a trade or foreign exchange gap which is based on the assumption that not all investment goods can be produced domestically.

#### ***2.1.2 Push- factor and pull- factor theories***

The movement of foreign capital flows into various countries is further explained by two pairs of theories, namely; push-factor and pull-factor theories. Thus, push- factor theory looks into direction and behaviour of capital flows components in the international arena such as falling international interest rates, cyclical fluctuation in advanced countries and the increasing trend toward international diversifications and economic changes. On the other hand, pull-factor theory traces the causes of capital flow components to such domestic factors as autonomous increases in the domestic money demand function, changes in the domestic productivity of capital, and increasing integration of domestic capital markets into world capitalist market making it vulnerable to fluctuations and other economic changes.

## 2.2 Empirical review

This section gives the review of numerous empirical studies on the impact of foreign capital inflows on developing economies. For instance, Adegboye et al (2014), in their paper analyse the impact of external capital flows on economic growth of Nigeria using time series data spanning from 1981 to 2012. They employed vector error correction mechanism. Results from the empirical analysis show the categorization of foreign capital inflows into direct and portfolio has significant relevance in terms of their effects on economic growth of Nigeria.

Asien and Oriavwote (2013) examine the impacts of foreign capital inflow on Nigerian economy using time series data covering the period between 1982 and 2012. They employed error correction mechanism and found a negative association between inflation and capital inflows to Nigeria. The short run of dynamic results suggests that domestic credit to private sector, real growth rate of GDP and market capitalization have been beneficial to foreign capital inflows to Nigeria.

In their paper, Nkoro and Uko (2013) examine the impact of capital inflows on Nigerian economy using time series data between 1981 and 2010. The study employed co-integration, variance, and impulse response analysis and block exogeneity tests. The results reveal that causality relationship exists between foreign capital inflows and economic growth in Nigeria.

Fambon (2013) investigates the impact of foreign capital inflows on economic growth of Cameroon using annual time series data between 1980 and 2008. The study employed augmented dickey fuller, Peter-perron tests and cointegration techniques. The results of the analysis show that the domestic capital stock and foreign direct investment have positive and significant impacts on economic growth in the short and long terms, while labour force shows a significant negative impact on economic growth.

In decomposing foreign capital inflows into its various components, Aurangzeb and Haq (2012) examine the impact of foreign capital inflows on the economy of Pakistan for the period between 1981 and 2010. Multiple regression techniques were employed to identify the significance of different factors. Their result shows that three capital inflows used in the model have positive and significant effect on economic growth. The result also shows that the granger causality test reveals a bi-directional relationship between remittances and external debt, RGDP and external debt, FDI and external debt and remittances and RGDP.

Using a set of data for WAMZ countries between 1981 and 2010, Orji et al (2014) examine the impact foreign capital components on economic growth. They used four components of capital inflows namely; foreign direct investment, official development assistance, foreign private investment and remittances. They employed SURE techniques and the result shows that more than one form of capital inflows contributed positively to the economic growth of Nigeria. Again, the result reveals that official development assistance positively contribute more to output growth of Ghana and Sierra Leon, whereas, FDI foster more output growth in Nigeria and Gambia. Also, from the result, remittances have the highest contribution in Liberia and none of the components have positive impact on guinea's economy.

Chigbu et al, (2015) investigate the impact of foreign capital inflows of developing countries of Nigeria, India and Ghana using set of data spanning from 1986 to 2012. They employed co-integration test, augmented dickey fuller test, granger causality and ordinary least square method.

The results reveal that capital inflows have significant positive impact on the economies of the three countries.

Narayan (2013) examine the causal relationship between foreign capital inflows and economic growth in India. The study tests the long run relationship using co-integration test. The result indicates that there is long run equilibrium between economic growth and capital inflow components used in the model.

This section presents empirical literature on some of the relevant components of capital inflows. For instance, Lensink and Morrissey (2001) examine the effect of aid on by controlling aid uncertainty for a number of developing aid recipient countries. The study posits that the impact of aid on growth depends fundamentally on the effect of aid on the level efficacy of investment. The study showed that aid uncertainty is consistently and significantly have negative effect on growth and controlling for uncertainty has a negative robust effect on growth via the level of investment. The study by Karras (2006) examines the correlation between foreign aid and growth in per capita GDP, using annual data for the period 1960-97 and sample of 71 developing countries recipient of foreign aid. The author finds the impact of foreign aid on economic growth is positive, permanent, statistically significant, and non-negligible.

Bowen (1998) carried out a study to measure the direct and indirect relationship between foreign aid and economic using a cross sectional data for 67 developing countries. He observed an indirect foreign aid growth relationship through its interaction with domestic savings and is found significant and negative.

Ezeabasili, Isu and Mojekwu (2011) investigate the relationship between Nigeria's external debt and economic growth, between 1975 and 2006. The choice of period was guide by data availability and escalation of Nigeria's external debt. They found that external debt has negative relationship with economic growth in Nigeria. For example on per cent increase in external debt resulted in a decrease of 0.027 per cent in growth domestic product, while a per cent increase in total debt service resulted to 0.034 per cent (decrease) in growth domestic product. These relationships were both found to be significant at the ten per cent level. In addition, the pairwise granger causality test reveals that unidirectional causality exist between external debt service payment and economic growth at the 10 per cent level of significance. In addition, external debt was found to granger cause external debt service payment at the 1 per cent level of significance, while statistical interdependence was however found between external debt and economic growth.

Omankhanlen (2011) examines the impact of foreign direct investment on Nigerian economy. The study employed OLS regression techniques using time series data spanning from 1980 to 2009. Base on the data analysis it was discovered that significant impact on current account balance in balance of payment. While inflation was seen not to have significant impact on foreign direct investment inflows. The exchange rate has positive effect on foreign direct investment. Therefore it is recommended that for Nigeria to attract the desired level of FDI, it must introduce sound economic policies and make the country investor friendly. There must be a political stability, sound economic management and well developed infrastructural facilities.

Folorunso (2009) examines the impact of foreign direct investment on economic growth of Nigeria. He employed granger causality and spearman's rho in the analysis. Time series data was utilized spanning from 1980 to 2007. The study reveals that the link between FDI and economic growth in Nigeria is very weak. However, FDI is found to be related with export growth while human capacity

building is found to be related to FDI flow. The endogeneity theory of FDI was found to be unrealistic for Nigeria. The study therefore, recommends infrastructural development, human capacity building and strategic policies towards attracting FDI flow.

Akinlo (2004) investigates the impact of direct foreign investment (DFI) on economic growth in Nigeria using data for period 1970-2002. The result from error correction model (ECM) shows that both private capital and lagged foreign capital have small significant impact on export and economic growth. Financial development, which measured as M2/GDP has significant negative impact on growth. This he attributed to capital flight. Also, the results showed labour force and human capital have significant positive effect on growth. These findings suggest for labour force expansion and education policy to raise the stock of human capital in the country.

Okon et al, (2011) investigates the impact of foreign direct investment on economic growth in Nigeria. They employed econometric model using time series data spanning between 1970 and 2010. The study reveals that there is endogeneity i.e bi-directional relationship between FDI and economic growth in Nigeria. Their finding shows that FDI and economic growth are jointly determined in Nigeria and there is positive feed-back from FDI to growth and from growth to FDI. The overall policy implication of the result is that policies that attract more foreign direct investment to the economy, greater openness and increased private participation will need to be pursued and reinforced to ensure that the domestic economy captures greater spill overs from FDI inflows and attains higher economic growth rate.

Oke, Uadiale and Okpala (2011) investigated the impact of workers' remittances on financial development in Nigeria from 1977 to 2009 using ordinary least square estimation (OLSE) technique as well as the Generalized Method of Moments (GMM) estimator. With the indicators of the ratio of money supply to GDP (M2/GDP) and the ratio of private credit to GDP (CPS/GDP), they found that remittances positively and significantly influence financial development in Nigeria.

Motelle (2011) studied the role of remittances in financial development in Lesotho vis-à-vis other alternative measures of financial development. The method of Error Correction Model was used for this purpose and the stationarity test was done using the conventional methods, such as Augmented Dickey-Fuller (ADF) and Phillips-Perron (1988) (PP), and Kwiatkowski, Phillips, Schmidt and Shin (1992) KPSS for robustness sake and eliminating the size and power problems associated with the traditional methods. He found out that remittances tend to have a long run effect on financial development; however, they do not cause financial development. The Granger causality test revealed that financial development causes more remittances.

Nyeadi and Atiga (2014) investigated the link between remittances and economic growth in Ghana using time series data spanning from 1980 to 2012. They employed granger causality and co-integration tests under the vector error correction model. The result reveals that there is a unidirectional causality between remittances and economic growth in Ghana.

Feeny et al, (2014) examined the impact of remittances on economic growth in Small Island Developing States (SIDS). Results from variants of an empirical model suggested that while, on average, there is at best no association between remittances and growth in developing countries, there is positive association between these variables in SIDS. This finding holds for SIDS in sub-Saharan Africa and the Pacific but not for those in Latin America and the Caribbean.

### **3. Foreign capital inflows components and economic growth Remittances**

Remittances are the portion of international migrant workers' earnings sent back from the country of employment to the country of origin, and play a central role in the economies of many labour-sending countries. Workers' remittances consist of goods or financial instruments transferred by migrants living and working abroad to residents of the home economies of the migrants. It is limited to transfer made by workers who have stayed in foreign countries for at least one year, while workers who are self-employed are excluded (IMF, 1999). As mentioned above, whether remittances promote economic growth or not is an important issue of debate amongst economists. Those that believe remittances do not contribute to economic growth point to their expenditure on conspicuous consumption (Rahman et al, 2006) and that any savings are being spent on consumption rather than for the accumulation of productive assets (Stahl and Arnold, 1986), and the theoretically low marginal propensity to consume out of transitory income. Those that argue for the positive developmental effects of remittances focus on the multiplier effects of consumption (Stahl and Arnold, 1986), development of the financial institutions that handle remittance payments (Aggarwal et al, 2006), use of remittances as foreign exchange (Ratha, 2005), and the role of remittances as an alternative to debt that helps alleviate individuals' credit constraints in countries where micro-financing is not widely available (Guilamo and Ruiz-Arranz, 2006).

#### **3.1 Foreign direct investment**

An agreed framework definition of foreign direct investment (FDI) exists in the literature. That is FDI is an investment made to acquire a lasting management interest (normally 10% of voting stock) in a business enterprise operating in a country other than that of the investor defined according to residency (World Bank, 1996).

Foreign Direct Investment (FDI) generally refers to long-term participation by one country in another country. It usually involves participation in capital transfer, transfer of technology and expertise. There are two types of FDI: inward foreign direct investment and outward foreign direct investment, resulting in a net FDI inflow (positive or negative) and stock of foreign direct investment.

FDI plays a major role in developing countries like Nigeria. They act as a long term source of capital as well as a source of advanced and developed technologies. The investors also bring along best global practices of management. As large amount of capital comes in through these investments more and more industries are set up. This helps in increasing employment opportunities. FDI also helps in promoting international trade. This investment is a non-debt, non-volatile investment and returns received on these are generally spent on the host country itself thus helping in the development of the country. Some of the sectors that attract high FDI inflows in Nigeria are the extractive industries, insurance sector, telecommunication, real estate, hotel, power, drugs, financial services, infrastructure etc.

Empirical studies have support the positive effect of FDI on economic growth. For instance, Jenkin and Thomas (2002) assert that FDI is expected to contribute to economic growth not only by providing foreign capital but also by crowding in additional domestic investment. By promoting

both forward and backward linkages with the domestic economy, additional employment is indirectly created and further economic activity stimulated.

According to Adegbite and Ayadi (2010) FDI helps fill the domestic revenue-generation gap in a developing economy, given that most developing countries' governments do not seem to be able to generate sufficient revenue to meet their expenditure needs. Other benefits are in the form of externalities and the adoption of foreign technology. Externalities here can be in the form of licencing, imitation, employee training and the introduction of new processes by the foreign firms (Alfaro, 2006).

Caves (1996) observe that the rationale for increase efforts to attract more FDI stem from the belief that FDI has several positive effects. Among these are productivity gain, technology transfers and the introduction of new processes like managerial skills and know how in the domestic market, employee training, international production networks, and access to market. Carcovic and Tevine (2002) notes that the economic rationale for offering special incentives to attract FDI frequently derives from the belief that foreign investment produces externalities in form of technology and spill-over. FDI provides much needed resources to developing countries such as capital, technology, managerial skills, entrepreneurial ability, brand and access to market which are essential for developing countries to industrialize, develop, create jobs, and attack the poverty situation in their countries.

Dauda (2007) argues that FDI is generally believe to propel in developing countries as it makes significant contribution to the host country's development process especially through easing of constraints of low levels of domestic savings and investment as well as foreign exchange shortage, he further argues that FDI increases the GDP and generates a streams of real incomes in host country. The increased productivity benefits local income groups through higher wages and expanded employment, lower product prices paid by customers, rent to local resource owners and high tax revenue or royalties to government.

### **3.2 Foreign Aid**

Foreign aid plays a fundamental role in stimulating economic growth as an additional source of domestic finance which include savings and domestic as well as foreign borrowing (Fambon, 2013). Therefore, it is expected that foreign assistance in form of aids will generates a lot of economic benefits through transfer of resources, skills and technology to less developed countries.

The role of foreign aid has been globally recognized as an effective tool and mechanism for accelerating growth and reducing poverty in third world economies. This generated numerous empirical studies analysing the impact of foreign aid on economic growth of developing economies. Morrissey (2001) pointed out that foreign aid may contribute to economic growth by increasing investment in physical and human capital, as well as in the capacity of the country to import capital goods and technology. Besides that, it is worthy to know that aids do not have any of those indirect effects that reduce investment and saving rates. Hansen and Tarp (2000) provide strong support to other studies which find that foreign aid has not only led to an increase in aggregate savings and investment, but also has a positive impact on economic growth. McGillivray (2005) also posited that foreign aid granted to Africa has significantly reduce their poverty level.

Levey (1988), Gomanee et al, (2005), Ekanayake and Chatrnas (2010) also present some evidence according to which foreign aid has contributed positively to economic growth in SSA countries by financing public investment and reducing poverty level. Even though some scholars like Boone (1996) find evidence that foreign aid does not increase the rate of economic in developing countries but others like Burnside and Dollar (2000) are of the opinion that in poor countries where sound economic policies are implemented, foreign aid fosters economic growth and reduce poverty level *substantially*.

### **3.3 External debt**

It is generally assumed that developing countries are facing scarcity of capital and other financial resources needed to finance their large developmental projects, this make them vulnerable to external borrowing to supplement domestic revenue. Also, most poor income countries prefer external borrowing to domestic debt because the interest rates charged by international financial institutions like International Monetary Funds (IMF) is about half to the one charged in the domestic market. However, whether or not external debt would be beneficial to the borrowing nation depends on whether the borrowed money is used in the productive sectors of the economy or for consumption. Adepoju et al, (2007) stated that debt financed investment need to be productive and well managed enough to earn a rate of return higher than the cost of debt servicing

The main lesson of the standard “growth with debt” literature is that a country should borrow abroad as long as the capital thus acquired produces a rate of return that is higher than the cost of the foreign borrowing. In that event, the borrowing country is increasing capacity and expanding output with the aid of foreign savings. The debt, if properly utilised, is expected to help the debtor country’s economies by producing a multiplier effect which leads to increased employment, adequate infrastructural base, a larger export market, improved exchange rate and favourable terms of trade. But, this has never been the case in Nigeria and several other developing countries where it has been misused, and the management of the debt by way of service payment, which is usually in foreign exchange, has also affected their macroeconomic performance (Aluko and Arowolo, 2010).

## **4. Methodology**

### **4.1 Sources and type of data**

The data used in this study were all collected from secondary sources. It include annual time series data for Nigeria on real gross domestic product which was taken as proxy for economic growth, while foreign capital inflows components include foreign direct investment, foreign aids, workers’ remittances and external debt, collected for the period spanning between 1970 and 2014. The data were obtained from World Bank data on economic indicators, Global Development Finance Statistics, International Development Statistics and Central Bank of Nigeria Statistical Bulletin.

## 4.2 Model specification

In attempting to establish a relationship between foreign capital inflows components and economic growth in Nigeria, the model is specified as follows:

$$RGDP_t = f(FDI_t, FA_t, RMC_t, ED_t, \mu_t) \quad (1)$$

Where RGDP represent real gross domestic product and was taken as proxy for economic growth and FDI, FA, RMC and ED represents foreign direct investment, foreign aid, remittances and external debt respectively. Equation 2 can also be estimated in econometric form as:

$$RGDP_t = \delta_0 + \delta_1 FDI_t + \delta_2 FA_t + \delta_3 RMC_t + \delta_4 ED_t + \dots + \mu_t \quad (2)$$

$\delta_0$  denote the constant term, and  $\delta_1$ ,  $\delta_2$ ,  $\delta_3$  and  $\delta_4$  are slope of coefficients representing coefficient to be estimated and  $\mu_t$  is the stochastic error term which represent all other variables that are not captured in the model. Our apriori expectations will be the following. The coefficient of foreign direct investment is expected to be positive, as a rise in FDI inflows should potentially increase the level of economic activities in a country. A positive sign is also expected for the coefficient of foreign aid in line with the existing literature. Worker's remittances are hypothesized to positively influence economic growth. The expected coefficient of external debt is ambiguous; it depends on how the funds are being used in the country. We can expressed it in econometric form as  $\delta_0, \delta_1, \delta_2, \delta_3 > 0$  and  $\delta_4 < 0$

## 4.3 Estimation Procedure

In view of the fact that this study used time series data and inherently it might exhibit some strong trends, the non-random disposition of the series might undermine the use of some of econometrics tests such as F and t-tests. This is because they can cause rejection of a hypothesis which would have otherwise not been rejected. This study conducted stationery test to mitigate such situations. Also, test for causation and long run relationship between foreign capital inflow components and economic growth in Nigeria was conducted using relevant econometric tools.

### 4.3.1 Testing for stationary

In empirical analysis, non-stationary of time series data is a perennial problem. To avoid estimating and getting spurious results, the study employed Augmented Dickey Fuller (ADF) and Peter-Perron (PP) tests and established the order of integration.

### 4.3.2 Testing for co-integration

The study employed co-integration to test for long run relationship between the variables by using Johansen Co-integration test method. Co-integration is a technique used to test for existence of long-term relationship (co-movement) between variables in a non-stationary series. Before testing for co-integration, it is important to determine the order of integration of the individual time series. A variable  $X_t$  is integrated of order  $d$  (1d) if it becomes stationary for the first time after being differenced  $d$  times.

### 4.3.3 Granger causality test

One of the major objectives of this study is to examine the causal relationship between foreign capital inflow components and economic growth for the period 1970 to 2014. In this study, we employed the Granger (1969) causality test. Granger (1969) causality method of investigating whether A cause B is to see how much of current B can be explained by past values of B and then to see whether by including lagged values of A we can improve the explanation of B. B is said to be Granger-caused by variable A if A helps in the prediction of B, or if the coefficients on the lagged A's are statistically significant (E-Views User's Guide 1994-1997).

### 4.3.4 Error correction mechanism

After determining that the variables of the model are co-integrated, an error correction model (ECM) would be estimated. The error-correction model arises from the long-run co-integration relationship. To check for the speed of adjustment of the model from the short run to the long run equilibrium state, then we also consider the error correcting term (ECM). The greater the coefficient of the error correction term, the faster the speed of adjustment of the model from the short run to the long run.

## 5. Empirical analysis of results

In this section, the basic results will be supplied ranging from stationery test and to a more robust and comprehensive results of co-integration and granger causality tests.

### 5.1 Descriptive statistics of the variables

**Table 1: Descriptive statistic table**

Statistic	RGDP	FDI	FA	RMC	ED
Mean	379713.7	2.33E+09	1.88E+09	8198750	168499.3
Median	293745.4	1.19E+09	2.86E+08	1933211.	53047.50
Maximum	950114.0	8.84E+09	1.35E+10	69125081	679278.0
Minimum	27365.50	3620.100	12243000	9.700000	256.9500
Std Dev	242583.3	2.78E+09	3.50E+09	13805515	212892.6
Skewness	0.806972	1.175496	2.252292	2.720124	1.068547
Kurtosis	2.684743	2.988185	7.009359	11.86416	2.813517
Jarque Bera	3.943629	8.060645	53.03410	157.7474	6.711173
Probability	0.139204	0.117769	0.000000	0.000000	0.134889

*Source: Computed by the authors using E-views 7.0*

From table 1 above, it can be seen that the first two descriptive statistics that is mean and median are measures of central tendency for all the variables. Remittances has the highest standard deviation (deviation from the mean) while FDI has the lowest standard deviation.

The Jarque Bera is a test for normality of distribution where the null hypothesis is that the distribution of the sample is a normal one. If the probability value of the Jarque Bera test is

significant, then the null hypothesis is rejected and alternative hypothesis is accepted which says that the sample is not normally distributed. If each variables is statistically significant (indicated by a zero), then the series is not normally distributed. Therefore, the farther the probability statistics of a variable to zero, the lower the value of its Jarque Bera statistics and the more normally distributed it is (and vice versa). From the result above the Jarque Bera test shows that the null hypothesis is strongly accepted for all the distribution. Hence, the variables can be described to be normally distributed in the following order (from the highest to the lowest) RGDP, ED, FDI, FA, and RMC.

## 5.2 Unit root test for stationary

The ADF result in table 2 below shows that all the variables are non-stationary at level but became stationary at integration of order one, i.e. 1(1) at both 5 and 10 per cent confidence levels.

**Table 2: ADF Results of the unit root test**

Variables	Order	Included in Test Equation	ADF Test Statistic	Mackinnon Critical Value
RGDP	1(1)	Trend & intercept	-3.614104	5%= -3.552
FDI	1(1)	Trend & intercept	-4.751482	1%= -3.670
FA	1(1)	Trend & intercept	-7.737274	1%= -4.296
RMC	1(1)	Trend & intercept	-4.127826	1%= -3.639
ED	1(1)	Trend & intercept	-3.878218	5%= -3.595

*Source: Authors computation using Eviews*

**Table 3: Philips-Perron Results of the unit root test**

Variable	Order	Included in test equation	ADF Test Statistic	MacKinnon Critical Value
RGDP	1(1)	Trend & intercept	-3.234724	10%= -3.209
FDI	1(1)	Trend & intercept	-4.997729	1%= -4.262
FA	1(1)	Trend & intercept	-2.747879	10%= -2.614
RMC	1(1)	Trend & intercept	-4.232192	1%= -3.639
ED	1(1)	Trend & intercept	-22.885620	1%= -4.262

*Source: Computed by the authors using E-views 7.0*

The table 2 and 3 above shows that all the variables are not stationary at first different but they became stationary after taking the first difference. This can be seen by comparing the observed value (in absolute terms) of the Augmented Dickey Fuller (ADF) test and Phillips-Perrons test statistics with the critical value (in absolute terms) at 1%, 5% and 10% level of significance.

### 5.3 Johansen maximum likelihood test of co-integration

The major aim of this test is to find out if a linear combination of the integration variable is becomes stationary over the long run, if it is, then it means co-integration exists among the variables, this further implies that there exist a long run relationship among the variables. The Johansen co-integration test for the number of co-integration relations or rank using Johansen's maximum Eigen value and trace test. The results are shown on table below.

**Table 4: Johansen co-integration test result**

Number of Co-integrating Equation $H_0$ :	Trace Statistics		Maximum Eigen Value	
	Statistics	0.05 Critical value	Statistics	0.05 Critical value
None	104.6615	60.06141	63.74711	30.43961
At most 1*	40.17496*	40.91441*	24.15921*	29.03813*
At most 2	11.87629	24.27596	9.067510	17.79730
At most 3	2.808776	12.32090	2.808612	11.22480
At most 4	0.000164	4.129906	0.000164	4.129906

*Source: Computed by the authors using E-views 7.0*

The hypotheses are stated below:

***H<sub>0</sub>: There is no co-integrating relationship among the integrated variables.***

***H<sub>1</sub>: there is co-integrating relationship among the integrated variables.***

The two tests produced the same result. The trace test rejected the null hypothesis ( $H_0$ ) that there is no co-integrating relationship between the variables and the test best on the maximum Eigen value also rejected the null hypothesis. They both show that there is one co-integrating equation at the 0.05 level of significance. Since the two tests gave the same result, it shows that there is co-integrating equation. The result of the co-integration test showed that RGDP, FDI, FA, RMC and ED have equilibrium condition which keeps them in proportion to each other in the long run.

The exactly identifying estimate of the Johansen maximum likelihood estimate showing the co-integrating coefficients normalized to RGDP are shown below. They are very useful in understanding the long run relationships among co-integrating variables.

**Table 5: Normalized co-integrating coefficients**

Variables	RGDP	FDI	FA	RMC	ED
Coefficients	1.000000	0.020494	0.000882	0.159999	-18.26818
Standard Error		(0.000978)	(7.8005)	(0.01698)	(1.9494)
t. statistic		2.09550	0.0001130	9.42279	9.67727

*Source: computed by the authors using E-views 7.0*

The co-efficient of estimate can be interpreted in terms of long run elasticity and t-statistic to determine the statistical significance of each variable. Based on the rule of thumb, a variable is said to be statistically significant if the absolute value of its t-statistic is approximately 2 or above. From table 5 it can be seen that FDI, external debt and remittances are all elastic in relation to RGDP, meaning that in the long run, a change in these variables will cause a more than proportionate change in RGDP and the t-elastic of the variables show that the coefficients are statistically significant except for foreign aid.

#### 5.4 Error correction model (ECM)

The ECM coefficient is known as the speed of adjustment factor, it tells how fast the system adjusts to restore equilibrium. It captures the reconciliation of the variables over time from the period of disequilibrium to the equilibrium. The result of the error correction model (ECM) is shown in the table below and the basic criteria for analysing ECM is:

1. The ECM must lie between 0 and 1
2. It must be negative for it to be meaningful

If it is positive there is no error connection and it diverges and the t-statistics must be significant.

**Table 6: ECM Result**

Variables	ECM(-1)	T-statistic
RGDP	-0.791795	-3.29248
FDI	-0.120231	-0.59427
FA	-0.258487	-1.58144
RMC	-0.352812	-1.19230
ED	-1.542957	-6.17310

*Source: Computed by the Authors using E-views 7.0*

The speed of adjustment co-efficient for RGDP is -0.791795. The ECM is correctly signed and in terms of magnitude it lies between 0 and 1. This significance supports co-integration and as it shows there exists a long run steady equilibrium between RGDP and the explanatory variables. Precisely the error correction model in this equation means that about 79.17 per cent of error generated between each period are correlated in subsequent periods. This result is sizeable and also significant judging from the value of the t-statistics (-3.29248).

#### 5.5 Granger causality test

**Table 7: Results of Granger Causality test**

Null Hypothesis:	Obs.	F-Statistic	Prob.
FDI does not Granger Cause RGDP	43	5.33693	0.0109
RGDP does not Granger Cause FDI		0.18753	0.8300
FA does not Granger Cause RGDP	43	2.16194	0.1339
RGDP does not Granger Cause FA		13.7744	7.E-05
RMC does not Granger Cause RGDP	43	1.10720	0.3445
RGDP does not Granger Cause RMC		1.34291	0.2774
ED does not Granger Cause RGDP	43	41.0433	5.E-09
RGDP does not Granger Cause ED		2.04897	0.1478

*Source: computed by the authors using E-views*

The granger causality in the table above shows the direction of causality between the variables. Therefore, the f-statistics was used to measure the causality at 0.05 level of significant. The result shows a unidirectional causality between the variables indicating that the causality runs from FDI to RGDP, RGDP to FA and ED to RGDP. This can be interpreted to mean that there is causal relationship between foreign direct investment, foreign aid, external debt and real gross domestic product proxy for economic growth. Moreover, from the result it can be seen that there exist no causality between remittances and real GDP in Nigeria for the period reviewed.

## **6. Conclusion and recommendations**

This study is designed to empirically examine the causal relationship between external capital inflows and economic growth using time series data spanning from 1980 to 2014. The result of the stationarity test presented in table 2 and 3 above shows that all the variables (RGDP, FDI, Foreign aid, remittances and external debt) are non-stationary at level both became stationary after taking the first difference using both the ADF and PP tests. The co-integration result depicts a long run relationship between foreign capital inflow components and RGDP (economic growth) in Nigeria under the study period. Therefore, an error correction was used to determine the speed of adjustment from short run disequilibrium to long run equilibrium. From the result of the analysis, the error correction term has a statistically significant coefficient with the appropriate negative sign and value below zero. The model also reveals that all the variables are statistically significant except foreign aid.

Again, granger causality result reveals a causal link between the external capital components with the exception of remittances and economic growth proxy for real GDP. Therefore, the results support foreign capital inflows-led economic growth hypothesis which is in line with numerous empirical studies like Nkoro and Uko (2013), Fambon (2013), Orji (2014) among other studies.

The policy implication that can be drawn from the above findings is that all the foreign capital components used in the study are very important sources of capital for Nigeria to finance its underdeveloped infrastructural base and pave way for growth and development of the country. Besides that, foreign capital inflows will help in setting a turning point for the progressive structural transformation of the country's economy from largely oil based economy to a growing and diversified economy with expanding industrial, service and agricultural sector, capable of creating job opportunities, reducing poverty and above overall development of Nigerian economy. But, this can only be appreciated if the following recommendations are appropriate taken into consideration. They include:

- a. Government should encourage the recipients of foreign capital and foreign investors to channel such funds to productive sectors that can create job opportunities and a virile economic environment.
- b. Government should create an enabling environment and macroeconomic stability that will attract more foreign capital inflows.
- c. Domestic savings and investment should also be encouraged through adopting appropriate and favourable fiscal and monetary policies.
- d. Lastly, there is also the need to strengthen the existing economic and political institutions in order to make them effective and efficient. The issue of insecurity need to be urgently addressed especially north-east and oil rich regions where bombers, pipeline vandalers, kidnappers and arm robbers have sent away many foreign investors in the country.

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