

Full Length Research Paper

Capital inflows, manufacturing exports and economic growth in Nigeria: A threshold regression analysis

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The study examined the optimal level of capital inflows for manufacturing exports and economic growth in Nigeria. Annual data from 1981-2017 on foreign direct investment (FDI), foreign portfolio investment (FPI), cross border borrowing CBB (components of capital inflows), financial sector development (FSD), real gross domestic product (RGDP) and manufacturing exports (MEX) were sourced from various issues of the Central Bank of Nigeria (CBN) Statistical Bulletin while data on gross capital formation (GCF) and human capital (HC) were sourced from World Bank Development Indicator (WDI) database. Data collected were analyzed using threshold regression econometric techniques. The results from the optimal level showed that capital inflows (CINF) threshold value of (25.55%) with coefficient of (9.94) annually is the optimal point of capital inflows for Nigeria and the threshold point for manufacturing exports indicates no capital inflows (CINF) threshold value for manufacturing exports in Nigeria. This study concludes that the optimal point of capital inflows for economic growth is 25.55%; any threshold level above this sustainable level, economic growth will be affected negatively in Nigeria but no capital inflows threshold point exist for manufacturing exports and therefore recommends that excessive capital inflows should be avoided in the country so that it does not make administration and management of monetary policy difficult, while the needed capital inflows should be well monitored and channeled into sectors (like manufacturing, agriculture, mining and quarrying etc...) that have absorptive capacity for them.

Key words: Capital, inflows, export, growth, optimal, threshold.

INTRODUCTION

Capital inflow is one of the main sources through which capital deficient countries augment inadequate domestic capital for investment purposes (Nkoro and Furo, 2012). These inflows are indeed transmitted through Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), foreign loans and credits (Cross Border Borrowing) etc... (Obadan, 2004). Essentially, Foreign Direct

Investment is generally the transfer of resources such as capital, technology and management. IMF conceptualized FDI as investment that is made to acquire a lasting interest in an enterprise (at least 10% of voting stock) operating in an economy other than that of the investor whose aim is to have an effective voice in the management of the enterprise (IMF, 2005). It is an

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engine of growth as it provides the much needed capital for investment, increases competition in the host country industries and aids local firms to become more productive by adopting more efficient technologies and investing in human/physical capital (Blostrom et al., 1996). Similarly, FPI is conceptualized as the transfer or acquisition of financial assets by way of investment by resident individuals, enterprises and institutions in one country in securities of another either directly in the assets of the companies or indirectly through financial markets (UNCTAD, 1999). The need for foreign capital to complement domestic resources in the economic growth process has been welcomed as a catalyst of development since it is considered as a central element of the process of economic growth. In the 1960s and 1970s in Nigeria, capital inflows came in the form of Overseas Development Assistance (ODA).

Studies have shown that Nigeria is one of the top recipients of capital inflows in Africa. According to UNCTAD (2007), 70% of capital inflow to West Africa and 11% of Africa's total capital inflows went to Nigeria and Nigeria ranked among the first five recipients of capital inflow in Africa. Also, African Economic Outlook indicated that Nigeria recorded over US\$6.4 billion of both FDI and FPI in 2013; this is second to South Africa (Akanyo and Ajie, 2015).

The manufacturing sector export plays a catalytic role in a modern economy and has many dynamic benefits that are crucial for economic transformation. The manufacturing sector is particularly important in the process of industrialization in terms of an increase in the share of the GDP contribution by it (Rajneesh, 1992). The special interest in the manufacturing sector export in this study stems from the belief that the sector is a potential engine of growth, modernization, industrialization, globalization, creator of skilled jobs and a generator of positive spill over and multiplier effects (Lapova and Szirmai, 2012). The manufacturing sector in Nigeria has evolved overtime and covers a wide range of economic activities such as oil refining, cement, food, beverages and tobacco, textile, apparel and footwear, pulp and paper products, chemical and pharmaceutical products, non-metallic products, plastic and rubber products, electrical and electronics, basic metal, iron and steel, motor vehicles and assembly and other manufacturing sub-sectors (CBN, 2015).

Therefore, the interlink or connection between capital inflows and manufacturing exports stems from the fact that, export expansion especially of manufactures promotes specialization which in turn boosts productivity, especially if the country has access to new technologies and better management practices through FDI and other capital inflows. The increased productivity causes a re-allocation of a country's scarce resources to more efficient sectors of the economy and thus causing GDP growth (Fakiyesi and Akpan, 2005). Hence, FDI, FPI and cross border borrowing (CBB) can actually stimulate

investment opportunities, this is because there is available evidence that inflows are associated with growth of manufactured exports in developing economies both at micro and macro levels (Aitken et al., 1997; Berg and Krueger, 2002; Fischer, 1993) thereby bringing about economic growth.

The Nigerian economy has been one of the highest recipients of capital inflows from the rest of the world and Nigeria has enjoyed increased international capital inflows in the last decade (CBN, 2010). However, capital inflow especially FDI is not seen to have improved the manufacturing sector and growth in Nigeria because the manufacturing value added and output has not been encouraging (Adejumo, 2013; Adofu, Taiga and Tijani, 2015), and Nigeria is yet to experience real inclusive economic growth despite the huge amount of both domestic and foreign resources (Iwayemi, 2012). The result may be a product of undervaluation of what constitutes capital inflows. Therefore, the role of capital inflows in the manufacturing export promotion vis-a-vis growth still remains controversial. There are studies on the relationship between capital inflows and economic growth in Nigeria. Some of these studies examined the impact of only one component of capital inflows on growth (Akinlo, 2004; Ewetan and Okodua, 2013; Umoh et al., 2012; Ugwuegbe et al., 2013; Aga, 2014; Mohammed and Mahfuzul, 2016), they failed to look at the impact of various other components of capital inflows on economic growth. What constitute excessive inflows to export and growth has not been determined or researched in the literature especially in Nigeria. Furthermore, studies have examined the relationship between capital inflows and economic growth in Nigeria (Okafor et al., 2016; Olaleye, 2015; Chigbu et al., 2015; Akanyo and Ajie, 2015; Okafor et al., 2015; Adegboye et al., 2014; Obiechina and Ukeje, 2013) and various studies have examined the relationship between manufacturing sector and economic growth in Nigeria (Okon and Saliu, 2017; Adofu et al., 2015; Olorunfemi et al., 2013). These previous studies have ignored the important role manufacturing export can play in the relationship between capital inflows and economic growth. Also, studies have been conducted on capital inflows, export and economic growth in Malaysia (Haseeb et al., 2014; Etale and Etale, 2016), in India (Guru-Gharana, 2012), in South Africa (Gillian, 2011), in Tanzania (Bertha, 2013), in Bangladesh (Mohammed and Mahfuzul, 2016) in Kenya (Kenedy et al., 2014), and in USA (Tasos, 2014). Most of these studies examined either oil export, non-oil export or total exports, without specific emphasis on manufacturing export; given that manufacturing export is fundamental to economic growth. Against this background, the aim of this study therefore, is to find the point or level at which capital inflows become excessive for manufacturing export and economic growth in Nigeria using threshold regression analysis.

LITERATURE REVIEW

In the last decade, a number of studies on the relationship between capital inflows, manufacturing sector and economic growth have emerged. Okafor et al. (2016) investigated the relationship between foreign capital inflows and economic growth in Nigeria for the period 1981-2014. The study employed annual data from CBN statistical bulletin and Toda Yamamoto causality was used to determine the relationship between foreign capital inflow and economic growth. Foreign capital inflows were proxied by FDI, FPI and foreign aid, while economic growth was proxied by GDP. The result revealed that there is bi-directional causality running from GDP to FDI as well as from FDI to GDP but a unidirectional causality from FPI to GDP. Furthermore, the joint causation between all the components of foreign capital inflow indicates that increase in foreign capital causes GDP to increase positively. They recommended that government should design policies and programs to enhance the inflows of foreign capital as this will accelerate the speed of growth in the economy.

Olaleye (2015) empirically investigated the impact of capital flows on economic growth in Nigeria. Augmented Dickey Fuller unit root test was employed to check the stationarity properties of the variables. A unique long run equilibrium relationship between economic growth, FDI net flow, trade openness, government expenditure and exchange rate for Nigeria was established. The recursive residual was also adopted to establish the short run dynamics and long run parameters of capital inflows. It is evidently proved that the residuals and Cumulative Sum (CUSUM) of squares stay within 5%. The study shows that by encouraging exports and diversifying to other useful areas will help the economy in terms of improving the real GDP.

Chigbu et al. (2015) examined the impact of capital inflows on economic growth of developing economies; the case of Nigeria, Ghana and India from 1986-2012. This is to ascertain whether the huge inflows of foreign capital in developing economies are transmitted into economic growth. Augmented Dickey Fuller unit root test was employed to evaluate the stationarity of the data, while Johansen co integration test was used to estimate the long run equilibrium relationship among the variables. The causal relationship was tested using Granger causality and OLS method was used to estimate the model. The findings reveal that capital inflows have significant impact on the economic growth of the three countries. The study recommended that an enabling environment should be created in the developing countries to encourage more inflow of foreign investments and workers' remittances.

Okafor et al. (2015), attempts to examine the effect of foreign investment (FDI) and (FPI) inflows on economic growth in Nigeria with a view to ascertaining the better contributor using annual time series data from 1987-

2012. The OLS and the Granger causality procedures were employed, the result displays that both FDI and FPI have positive and significant effect on economic growth though the partial correlation coefficients show that FPI is the better contributor. Based on the result, government should pursue policies that encourage FDI and especially FPI.

Adegboye et al. (2014) examined the dynamic effect of external capital inflow on the Nigerian economy using VECM model to empirically show the dynamic relationship that exists between economic growth and FDI. Using quarterly data from 1981-2012, the results show that the categorization of foreign capital inflows into direct and portfolio has significant relevance in terms of their effects on economic growth in Nigeria. Umoh et al. (2012), investigated the empirical relationship between economic growth and FDI in Nigeria between 1970 and 2008. Their results suggest that there is a positive causal relationship between growth rate and FDI.

Ocharo et al. (2014) investigated the causality between FDI, FPI and Cross-Border interbank borrowing and Economic growth in Kenya. The study found that there was a unidirectional causality from FDI to economic growth and from economic growth to cross border borrowing. The coefficient of FDI as a ratio of GDP was positive and statistically significant but the coefficients of private investment as a ratio of GDP and cross border borrowing as a ratio of GDP were positive and not statistically significant. Following the results, the government of Kenya should work towards an environment that attracts FDI and pursue a high and sustainable economic growth so as to attract cross border inter bank borrowing. Ekienabor et al. (2016) examined the effect of FDI on the manufacturing sector in Nigeria. The model revealed a positive relationship between FDI and each of the variables; manufacturing output, exchange rate and interest rate. FDI has a positive relationship on the manufacturing sector in Nigeria. In addition, there is a positive relationship between exchange rate and manufacturing output in Nigeria. The study recommended that government should step up efforts at attracting FDI by ensuring that investors' confidence is protected.

Adofu et al. (2015) examined the empirical relationship between the manufacturing sector and economic growth in Nigeria from 1990-2013. Using OLS to ascertain the relationship between manufacturing, its components and economic growth; the results show that the output of the manufacturing sector contributed negatively and had an insignificant relationship to real GDP. The exchange rate and interest rate did not contribute to RGDP, the inflation rate contributed positively to RGDP but the insignificant nature of the inflation rate was indicative of the fact that inflation in the Nigerian economy is not properly managed. The study therefore suggests that there should be an increase in government expenditure and proper management of the expenditure on the manufacturing

sector to ensure stable growth in the economy and there should be a reduction in interest rate to encourage more investment in the economy which will boost economic growth of Nigeria. Orji et al. (2015) examined the impact of FDI on the manufacturing sector over the period 1970-2010. The study employed the classical linear regression model and discovered that within the period under review, FDI impacted negatively on the manufacturing sector. Although, the paper found FDI to be negatively related to manufacturing output in Nigeria, this can be reversed if the country receives increased FDI inflows into critical sectors that support the necessary inputs and raw materials needed by the local industries. The study recommended that competitive policies should be enacted by the government that will ensure proper functioning of the markets necessary to attract well targeted foreign investors in Nigeria.

Adejumo (2013) examined the relationship between FDI and the manufacturing sector performance in Nigeria from 1970-2009. That is, the effect the presence of multinationals has had in shaping the Nigerian manufacturing industry. Using autoregressive distributed lag technique to determine the relationship between FDI and manufacturing value added, it was discovered that in the long run, FDI investments have had a negative effect on the sub-sector in Nigeria.

Opaluwa et al. (2010) examined the impact of exchange rate fluctuations on the Nigerian manufacturing sector during a twenty (20) year period (1986-2005). The econometric tool of regression was used for the analysis. The finding of this study is that fluctuations in the rate of exchange are not favourable to economic activities in the manufacturing sector. It was discovered that the performance of the manufacturing sector was affected by factors such as high cost of foreign exchange for procuring raw materials and machineries required for production, availability of financial capital, technological underdevelopment, shortage of technical man power and foreign domination.

Ekienabor et al. (2016) reported a positive relationship between FDI and manufacturing sector (output) in Nigeria, but Orji et al. (2015) and Adejumo (2013) reported a different result that FDI impacted negatively on manufacturing sector output and manufacturing value added respectively. The negative results may be because the manufacturing sector was affected by factors such as high cost of foreign exchange for procuring raw materials and machineries required for production, availability of financial capital, technological underdevelopment, shortage of technical man power and foreign domination (MAN, 2007).

METHODOLOGY

Model specification

Given the baseline model below:

$$y_t = \delta + \beta_1 fdi_t + \beta_2 fpi_t + \beta_3 cbb_t + \alpha gcf_t + \pi mexp_t + \psi hc_t + \gamma fsd_t + \mu_t \quad (1)$$

Where, y_t is economic growth measured by $rgdp$, fdi_t is foreign direct investment, fpi_t is foreign private investment, cbb_t is cross border borrowing, gcf_t is gross capital formation, $mexp_t$ manufacturing export, hc_t is human capital, fsd_t is financial sector development and μ is the white noise stochastic or random error term that is independently identically distributed (IID) with zero mean and constant variance, t is time trend.

Apriori expectation, $\beta_1, \beta_2, > 0; \beta_3 < 0; \delta > 0; \pi > 0; \gamma > 0; \psi > 0$

To determine the threshold level of capital inflows on manufacturing export and economic growth, the study made use of threshold regression technique. Threshold regression was popularized by Hansen (1999), as sample-split model in econometric framework which separates individual observations into classes according to the value of variable and perform estimation by minimizing the sum of squared errors. Equation 1 is modified to reflect Threshold regression technique.

$$y_t = \pi + \delta_1 c \inf + \delta_2 D_t (c \inf - K) + \delta_3 Z_{it} + \mu_t \quad (2)$$

$$mexp = \pi + \alpha_1 c \inf + \alpha_2 D_t (c \inf - K) + \alpha_3 Z_{it} + \mu_t \quad (3)$$

Where, y_t represents economic growth, $c \inf$ represents capital inflows, K is the optimal level of capital inflows (threshold level of capital inflows). Z_{it} denotes vector of control variables (GCF, HC, FSD) and μ_t is the error term, δ is the regime intercept. The effect of capital inflows on growth will be δ_1 for low level and δ_2 if opposite is the case that is, high.

The Dummy variable's value varies as follows:

$$D_t = 1 \text{ when } c \inf > K$$

$$D_t = 0 \text{ when } c \inf \leq K$$

D which is a dummy variable that equals to one when capital inflows is beyond the threshold level required and zero if otherwise. The parameter K (threshold level of capital inflows) has a property that the relationship between capital inflows and economic growth that takes into account α_1 which represents low capital inflows and $\alpha_1 + \alpha_2$ represent high capital inflows. The optimal value of K is obtained by comparing the computed value of F statistic with the critical value. This helps us to establish a statistically significant threshold value of capital inflows using real gross domestic product (economic growth) as the dependent variable.

Measurement of variables and sources of data

In order to find the point or level at which capital inflows become excessive for export and growth in Nigeria, this study used Annual secondary data from 1981-2017 on FDI, FPI, cross border borrowing CBB (components of capital inflows), financial sector development (FSD), real gross domestic product (RGDP) and manufacturing exports (MEX) and Capital (K) variable which is an indicator for capturing the role that capital stock plays in the growth process (It was measured by Gross Capital Formation (GCF) as a ratio of GDP) were sourced from various issues of the Central Bank

Table 1. Augmented Dickey-Fuller (ADF) unit root test.

Variable	Level	1 st Difference	Order of integration
LNRGDP	0.0972	-3.2292**	I(1)
LNFDI	-2.7141***	-7.2727*	I(1)
LNFPPI	-5.6116*	-6.3324	I(0)
LNCBB	-5.7763*	-9.9875	I(0)
GCF	-4.5449**	-5.0847	I(0)
LNMEXP	-1.2509	-7.8269**	I(1)
LNHC	0.6116	-5.6277**	I(1)
FSD	-0.6058	-5.2589*	I(1)
CINF	-3.0285**	-9.0889	I(0)

Note: * ** *** denotes 1, 5 and 10% levels of significance respectively

The Mackinnon critical values for the ADF tests with constant for 1, 5, and 10% levels of significance are -3.646342, -2.954021, and -2.615817, respectively.

Source: Author's Compilation using Eviews 9.

of Nigeria (CBN) Statistical Bulletin while data on gross capital formation and human capital were sourced from World Bank World Development Indicator (WDI) database.

DATA ANALYSIS AND DISCUSSION

Unit root test

This study employs the Augmented Dickey Fuller (ADF) and the Phillips Perron (PP) (Tables 1 and 2) tests to check the unit root properties of the variables included in the model estimation. The results of the ADF and PP tests in Tables 1 and 2 show that LNFPPI, LNCBB and GCF were stationary at levels I(0), while LNRGDP, LNFDI, LNMEXP, LNHC and FSD were stationary at first difference I(1).

The sustainable level of capital inflows for manufacturing exports and economic growth in Nigeria: Threshold regression analysis

The task of identifying a precise level of capital inflows which have implications for economic growth involves estimating the threshold level of capital inflows beyond which it begins to have a positive or negative effect on economic growth in Nigeria. The optimal threshold is the level or point at which there is a break point. The estimation of the regression model in Equations 2 and 3 is carried out and the summary of the threshold results for the variables examined are presented in Tables 3 to 5 and Tables 6 to 8, respectively.

Tables 3 to 5 show the computed threshold specification test in relation to the Bai-Perron (Econometric Journal, 2003) critical values according to Bai-Perron critical values with threshold test of three regimes, at 5% level of significance. Since the F-statistics is greater than the critical values, therefore, we can conclude that the computed value of F-statistic (18.9) is

greater than the critical value of (10.3) bound at 5% level of significance. This helps to establish a statistically significant threshold value of (25.5%) for Capital Inflow (CINF) using economic growth (RGDP) as dependent variable. Therefore, the optimal point of CINF for economic growth in Nigeria and there are three regimes established in the threshold. The three regimes are statistically significant at 5% level. Using threshold point established by the 1st regime, the threshold level of CINF at (25.55%) means that this level of CINF is the break-even level of CINF above which CINF has a negative impact on economic growth in Nigeria. Therefore, the result showed that CINF threshold value of (25.55%) with coefficient of (9.94) annually is the optimal point of CINF for Nigeria based on the data spanning from 1981-2017 since CINF rates are higher than this calculated threshold level negatively affects economic growth in Nigeria. Meanwhile, for CINF rates less than the threshold level as reported in the first regime, CINF does not hinder and has an insignificant effect on economic growth in Nigeria. That is, for CINF levels less than optimal, the effect is insignificant but as CINF passes the threshold as reported in the 2nd regime, the effect becomes strongly significant and negative on economic growth in Nigeria (Tables 3 to 5 for details).

Furthermore, Tables 6 to 8 present the threshold point for CINF and MEX in Nigeria. For the relationship between CINF and Manufacturing Exports, the result indicates no CINF threshold value for the Manufacturing Exports in Nigeria. Also, the sequential F statistic determined threshold is zero (0) and shows no significance at 5% level since F statistic (3.076) is less than the critical level (8.58).

CONCLUSION AND POLICY RECOMMENDATION

This study concludes that the optimal point of capital inflows for economic growth is 25.55% and any threshold

Table 2. Phillips Perron (PP) unit root test.

Variable	Level	1st Difference	Order of integration
LNRGDP	1.2122	-3.0445	I(1)
LNFDI	-2.6808***	-7.4009*	I(1)
LNFPPI	-8.6083*	-21.5892	I(0)
LNCBB	-5.7762**	-31.9149	I(0)
GCF	-4.5449*	-3.7781	I(0)
LNMEXP	-1.2158	-7.8269**	I(1)
LNHC	-0.4789	-7.6354**	I(1)
FSD	-0.6905	-5.3248	I(1)
CINF	-3.0434**	-9.1615	I(0)

Note: * ** *** denotes 1, 5 and 10% levels of significance respectively.

The Mackinnon critical values for the PP tests with constant for 1, 5, and 10% levels of significance are -3.646342, -2.954021, and -2.615817, respectively.

Source: Author's Compilation using Eviews 9.

Table 3. CINF threshold point estimate for RGDP.

Variable	Coefficient	Std. Error	t-statistic	Prob.
CINF < 25.555---16 obs				
C	9.94	0.096	102.79	0.00
25.<= CINF < 26.9359---15 obs				
C	10.66	0.099	106.75	0.00
26.9359 <= CINF---5 obs				
C	9.79	0.172	56.60	0.00

Dependent Variable; LNRGDP

Threshold variable: CINF

Threshold values used; 25.555

Source: Author's compilation, using Eviews 9.

Table 4. Threshold specification summary.

Threshold variable	CINF
Estimated number of thresholds	2
Method	Bai-Perron of L+1 vs. L sequentially determined thresholds
Maximum number of thresholds	5
Threshold data values	25.55, 26.93
Adjacent data values	25.13, 26.90
Threshold values used	25.55, 26.93

Source: Author's compilation, using Eviews 9.

Table 5. Current threshold calculations.

Threshold test	F -statistic	Scaled F - statistic	Critical value**
0 vs. 1*	9.870045	9.870045	8.58
1 vs. 2*	18.98982	18.98982	10.13
2 vs. 3	7.287411	7.287411	11.14

Sequential F-statistic determined thresholds: 2

*Significant at the 0.05 level.

Source: Author's compilation, using Eviews 9.

Table 6. CINF threshold point estimate for MEXP.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.544761	0.555550	13.58071	0.0000

Dependent variable: LNMEXP

Threshold variable: CINF

No thresholds selected

Source: Author's compilation, using Eviews 9.

Table 7. Threshold specification summary.

Threshold variable	CINF
Estimated number of thresholds	0
Method	Bai-Perron
Maximum number of thresholds	5

Table 8. F-statistic determined thresholds: 0.

Threshold test	F-statistic	Scaled F-statistic	Critical value**
0 vs. 1	3.076938	3.076938	8.58

Source: Author's compilation, using Eviews 9.

level above this sustainable level will affect economic growth negatively in Nigeria; but no capital inflows threshold point exist for manufacturing exports and therefore recommends that excessive capital inflows should be avoided in the country so that it does not make administration and management of monetary policy difficult, while the needed capital inflows should be well monitored and channeled into sectors (like manufacturing, agriculture, mining and quarrying e.t.c.) that have absorptive capacity for them.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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