

## Does Foreign Investment Inflows on Agricultural Sector Affect Development in Nigeria?

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### ABSTRACT

This study examined the effects of foreign investment inflows on agricultural sector development in Nigeria, between 1986-2020. It adopted multiple regression analysis model with the application of Auto Regressive Distributed Lag (ARDL) model, and annual time series data to carry out the analysis of data. Secondary data, sourced from the Central Bank of Nigeria (CBN) statistical bulletin, World Bank national accounts data (2020), Federal office of statistics and other related books were used for this study. Other econometric techniques such as Augmented Dickey Fuller for Unit Roots and Johansen co-integration test were used to validate and compliment the work. The analysis found that foreign direct investment has a positive and significant effect on agricultural gross domestic product in Nigeria while foreign portfolio investment has a negative and no significant effect on agricultural gross domestic product in Nigeria. Also, there was no long-run relationship between foreign investment inflows and agricultural sector development in Nigeria.

**Keywords:** Foreign Direct Inflow, Portfolio Investment, Agricultural Gross Domestic Product, ARDL, ADF.

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### INTRODUCTION

Investors are said to be tempted to invest their funds to diverse financial assets while building their portfolios, based on their expected returns from such investment. Portfolio theory according to [1] is concerned with how an investor, confronted with decisions that must be made under conditions of uncertainty selects an optimum portfolio of risky assets. [2] agrees no less when it posits that one aspect of the rules concerning choice of portfolio is that the investor should maximize the discounted or capitalize value of future returns. The traditional risk and return trade off in investment therefore drives investment options and choices.

On the other hand the hierarchy of needs of man is food, shelter and clothing in that order according to Maslow theory of needs. Human Development Index (HDI), developed by the United Nations also anchors its social and economic

development of countries on food availability, access to health and education. These largely justify the prime attention given to agriculture by nations, developed or developing, thereby given credence to an adage that “a healthy nation is a wealthy nation”.

At inception in the 60s, agriculture took the centre stage of the economy of Nigeria, providing source of raw materials for industries, employment, food for consumption and export to earn foreign exchange. Nigeria, the most populous black nation with over 200 million people was then the reference point for emerging democracies in Africa. But now she is among countries that are perennially at the lowest ebb in achieving the upgrade of the welfare of its citizens. For instance, unemployment in Nigeria hovers around 24% by 2020, rising from about 5.3 % in the year 2006 (HDI, 2021). Nigeria is also seen as the poverty capital of the world,

Not only does agriculture no longer command its prime position in her economy, the mortality rate is at about 34.25 % while life expectancy average around 54.69 % [4]. There is therefore the urgent need for a life support for increased foreign investment inflows in agriculture to serve as the driver for economic development and growth.

Pointedly, this study was an inquisition on the degree to which foreign investment inflow on agricultural sector affected development in Nigeria between 1986 - 2020. The year 1986 was chosen because

that was the period when Babangida administration under pressure from the International Monetary Fund and World Bank, launched the Structural Adjustment Programme, (SAP). An integral part of which programme was the deregulation of the economy that created both risks and opportunities for the economy.

The work is arranged in the following order: section two reviews related literature while section three presents data and methods of analyses. The next to the last section discusses the results and the last section concludes and proffers recommendations.

**METHODOLOGY**

This study adopted multiple regression with the application of Auto Regressive Distributed Lag model (ARDL) to carry out the analysis of data. Secondary data sourced from the Central Bank of Nigeria (CBN) statistical bulletin, World Bank national accounts data (2020), Federal office of statistics and other related books were used for this study. The scope of this study was between 1986 to 2020. Annual time series data was also used to validate and compliment this work. Agriculture

sector development, proxied by (Agricultural Gross domestic Product), served as dependent variables while Foreign investment inflows proxied by foreign direct investment and foreign portfolio investment) served as independent variable respectively. This work is anchored on the model adopted by Okoro (2019) with little modifications. Given the above considerations, we specify the model as follows:

$$Y = \alpha_1 + \sum_{i=1}^p \delta Y_{t-i} + \sum_{i=1}^q \beta_1 X_{t-1} + \sum_{i=1}^q \beta_2 X_{t-1} + \sum_{i=1}^q \beta_3 X_{t-1} + e_t \dots\dots\dots 3.1$$

$\sum_{i=1}^p$  = speed of adjustment parameter

Where;

Y = Dependent variable

$X_1, X_2, X_3, \dots, X_n$  = the explanatory or independent variables

$\beta_1, \beta_2, \beta_3$  and  $\delta, \dots, \beta_n$  = the coefficient of the parameter estimate or the slope

e = Error or disturbance term

t = Time

**In relating this to the study;**

$$AGDP = \beta_0 + \sum_{i=1}^q \beta_1 FDI + \sum_{i=1}^q \beta_{3i} FPI_{t-1} + \sum_{i=1}^q \beta_{4i} EXRT_{t-1} + \varepsilon \dots\dots\dots 3.2$$

Relating to econometric form and the variables log linearised, it will appear thus;

$$LAGDP = \beta_0 + \sum_{i=1}^p \beta_{1i} LFDI + \sum_{i=1}^p \beta_{3i} LFPI + \sum_{i=1}^p \beta_{4i} LEXRT + \epsilon \quad \text{--- 3.3}$$

Where:

LFDI = Foreign Direct Investment  
 LFPI = Foreign Portfolio Investment  
 LAGDP = Agricultural Gross domestic product  
 (EXRT) = Exchange Rate---- Control variable  
 $\beta_0$  = Intercept

$\beta_1 - \beta_4$  = short-run dynamic Coefficients of the model's adjustment long-run equilibrium

$\sum_{i=1}^p$  = speed of adjustment parameter

$\epsilon$  = error term.

A priori expectation: It is expected that  $\beta_1 - \beta_3 > 0$

### Test of Hypotheses

#### Hypothesis One:

- $H_{01}$ : Foreign Direct Investment have a positive and significant effect on Gross domestic product of Nigeria
- $H_{a1}$ : Foreign Direct Investment does not have positive and significant effect on Gross domestic product of Nigeria

The model expressed in the hypothesis is represented as follows

$$\Delta AGDP_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta AGDP_{t-1} + \sum_{i=1}^p \beta_{2i} \Delta LFDI_{t-1} + \sum_{i=1}^p \beta_{3i} \Delta LFPI_{t-1} + \sum_{i=1}^p \beta_{4i} \Delta LEXRT_{t-1} + \lambda ECT_{t-1} + \epsilon_t \quad \text{---3.4}$$

#### Decision Rule

The decision rule is based on a 5% probability value and is stated as follows:

$$H_0: \theta = \theta_0 \text{ versus } H_a: \theta \neq \theta_0$$

### Hypothesis two

- $H_{02}$ : Foreign Portfolio Investment does not have a positive and significant effect on Gross domestic product of Nigeria

- $H_{a2}$ : Foreign Portfolio Investment have a positive and significant effect on Gross domestic product of Nigeria

The model expressed in the hypothesis is represented as follows:

$$\Delta AGDP_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta AGDP_{t-1} + \sum_{i=1}^p \beta_{2i} \Delta LFPI_{t-1} + \sum_{i=1}^p \beta_{3i} \Delta LFDI_{t-1} + \sum_{i=1}^p \beta_{4i} \Delta LEXRT_{t-1} + \epsilon_t \quad \text{---3.5}$$

Relating to econometric form and the variables log linearised, it will appear thus;

$$\Delta LAGDP_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta LAGDP_{t-1} + \sum_{i=1}^p \beta_{2i} \Delta LFDI_{t-1} + \sum_{i=1}^p \beta_{3i} \Delta LFPI_{t-1} + \sum_{i=1}^p \beta_{4i} \Delta LEXRT_{t-1} + \epsilon_t \quad \text{---3.6}$$

Where:

LFPI = Foreign Portfolio Investment

LAGDP = Agricultural Gross domestic product

LFDI = Foreign direct Investment

LEXRT = Exchange Rate---- (Control variable)

$\beta_0$  = Intercept

$\beta_1 - \beta_4$  = short-run dynamic Coefficients of the model's adjustment long-run equilibrium.

$\sum_{i=1}^p$  = speed of adjustment parameter

ECT =error correction term

### Hypothesis three

- $H_{03}$ : there is a long- run relationship between Foreign Investment Inflows and macroeconomic performance of Nigeria
- $H_{03}$ : there is no long- run relationship between Foreign Investment Inflows and macroeconomic performance of Nigeria

The model expressed in the hypothesis is represented as follows

$$\Delta AGDP_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \lambda \Delta AGDP_{t-1} + \sum_{i=1}^q \beta_{2i} \Delta FDI_{t-1} + \sum_{i=1}^q \beta_{3i} \Delta FPI_{t-1} + \sum_{i=1}^q \beta_{4i} \Delta EXRT_{t-1} + \lambda ECT_{t-1}$$

Relating to econometric form and the variables log linearised, it will appear thus;

$$\Delta LAGDP_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta LGDP_{t-1} + \sum_{i=1}^q \beta_{2i} \Delta LFDI_{t-1} + \sum_{i=1}^q \beta_{3i} \Delta LFPI_{t-1} + \sum_{i=1}^q \beta_{4i} \Delta LEXRT_{t-1} + \lambda ECT_{t-1} + \varepsilon_t \text{----3.7}$$

Where:

LFDI = Foreign Direct Investment  
LAGDP = Agricultural Gross domestic product

LFPI = Foreign Portfolio Investment

LEXRT = Exchange Rate ---- (Control variable)

$\Delta$  = change in

$\beta_0$  = Intercept

$\beta_1 - \beta_4$  = short-run dynamic Coefficients of the model's adjustment long-run equilibrium

$\sum_{i=1}^p$  = speed of adjustment parameter

$\varepsilon$  = error term.

## PRESENTATION AND ANALYSIS OF DATA

### Data Presentation

Table 1: this table shows the time series data of the study which are annual frequency format of FDI, FPI, AGDP, and EXRT

Year	LAGDP(000N)	LFDI	LFPI	LEXRT
1986	2,986,835.38	193,214,900	86,633,230	1.75
1987	2,891,672.33	610,552,100	1,084,153,000	4.02
1988	3,174,567.62	378,667,100	575,715,100	4.54
1989	3,325,947.09	1,884,250,000	219,831,400	7.36
1990	3,464,716.26	587,882,900	197,148,100	8.04
1991	3,590,837.44	712,373,400	61,109,600	9.91
1992	3,674,792.83	896,641,300	1,884,268,000	17.30
1993	3,743,665.81	1,345,369,000	17,780,310	22.07
1994	3,839,675.45	1,959,220,000	27,141,300	22.00
1995	3,977,381.94	335,842,200	25,583,640	21.90
1996	4,133,548.21	499,276,800	54,088,510	21.88
1997	4,305,679.63	469,577,000	20,321,020	21.89
1998	4,475,241.38	299,566,700	2,363,116	21.89
1999	4,703,643.68	1,004,916,000	11,013,870	92.34
2000	4,840,971.20	1,140,168,000	502,264,900	101.70
2001	5,024,542.11	1,190,619,000	831,771,600	111.23
2002	7,817,084.50	1,874,071,000	133,938,000	120.58
2003	8,364,832.10	2,005,354,000	182,894,100	129.22
2004	8,888,573.40	1,874,061,000	177,818,900	132.89
2005	9,516,991.54	4,967,899,000	487,949,800	131.27
2006	10,222,474.98	4,534,735,000	1,288,019,000	128.65
2007	10,958,469.13	5,168,340,000	799,673,000	125.81
2008	11,645,370.98	7,144,051,000	3,402,404,000	118.55

2009	12,330,325.55	7,029,619,000	45,254,700	148.90
2010	13,048,892.80	5,114,515,000	2,586,444,000	150.30
2011	13,429,378.77	8,024,349,000	3,540,339,000	153.86
2012	14,329,705.62	5,539,805,000	14,992,460,000	157.50
2013	14,750,523.21	4,335,436,000	10,320,960,000	157.31
2014	15,380,389.34	3,079,534,000	1,843,623,000	158.55
2015	15,952,220.14	1,628,965,000	858,700,700	192.44
2016	16,607,337.33	3,143,695,000	1,710,266,000	253.49
2017	17,179,495.29	2,216,822,000	8,523,537,000	305.79
2018	17,544,147.74	616,625,600	12,547,830,000	306.08
2019	17,958,889.58	2,310,699,000	13,744,907,000	307.02
2020	18,003,555.44	5,786,000,000	7,980,663,000	358.8

**Source:** CBN Statistical Bulletin and World Bank Report (2021)

Where;

LFDI = Foreign Direct Investment  
 LFPI = Foreign Portfolio Investment  
 LAGDP = Gross Domestic Product  
 EXTR = Exchange Rate

Table 4.1 contains the two types of foreign investment inflow and Agricultural gross domestic product as collected from the CBN Bulletin and World Bank national accounts data covering from 1986 to 2020. The data is a set of annualized time series required for the empirical analyses that would apply the models as specified in chapter three which would answer the

research questions and test the hypotheses

#### Preliminary Tests

A key preliminary test in this study is the Augmented Dickey-Fuller (ADF) unit root test. The ADF unit root test is very necessary since it would enable us to ascertain the stationarity of our series and therefore guide us on the appropriate estimation technique to apply. In addition, we conducted the descriptive statistics with the sole aim of understanding the statistical characteristics and trends of our series.

#### Descriptive Statistics

	LEXRT	LFDI	LFPI	LAGDP
Mean	4.087202	21.21644	19.91941	15.81900
Median	4.792313	21.35138	20.17112	15.93955
Maximum	5.882765	22.80575	23.43081	16.70608
Minimum	0.559616	19.07931	14.67549	14.87735
Std. Dev.	1.439928	1.036343	2.303239	0.655078
Skewness	-0.790330	-0.222003	-0.262090	-0.012756
Kurtosis	2.473628	1.989312	2.216862	1.364021
Jarque-Bera	4.047681	1.777169	1.295102	3.904073
Probability	0.132147	0.411237	0.523326	0.141985
Sum	143.0521	742.5754	697.1792	553.6651
Sum Sq. Dev.	70.49535	36.51623	180.3670	14.59034

Observations	35	35	35	35
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Source: E-views 9 output, 2021

Descriptive statistics in Table 4.2 shows that Agricultural Gross domestic product (AGDP) attained a mean of 15.81900 between 1986 and 2020 having a highest level at 16.70608 and lowest at 14.87735. Foreign Direct investment (FDI) stood on a mean of 21.21644 at a maximum 22.80575 and minimum of 19.07931 over the period. Foreign Portfolio Investment (FPI) attained a mean of 19.91941 having a Maximum of 23.43081 and a Minimum of 14.67549, Exchange rate (EXTR) attained a mean of 4.087202 having a Maximum of 5.882765 and a Minimum of 0.559616. We observed from the results that our variables, is normally distributed ( $p >$

0.05) and is statistically different from zero. The normality in the variable description are based on the skeweness of the variables all the variables were negatively skewed ( $S < 0$ ). The results in Tables 4.2 indicate that probability value of the Jarque-Bera (J-B) statistics for the dependent variable is greater than 5% conventional level of significance hence, entails that we cannot reject the null hypothesis that our variables are normally distributed. However, if p-value of the J-B statistics of the variable is greater than 5% significant level thereby indicating that the identified series are normally distributed.

### Table 2 Unit Root Test Results

#### Summary of Unit Root Test

Variables	ADF-Stat	5% critical value	P-value	Inference
<b>LFDI</b>	-3.768106	-2.960411	0.0077	I(1)
<b>LFPI</b>	-4.735921	-2.963972	0.0007	I(1)
<b>LAGDP</b>	-5.502878	-2.954021	0.0001	I(1)
<b>LEXRT</b>	-6.026945	-2.954021	0.0000	I(1)

Source: Author’s compilation 2021

The result of the unit root test in table 4.3 reveals the presence of stationarity at 5% critical level Moreover, all our variables are not integrated of the same order. In other words, all the variables attained stationarity at first difference I(1). In both instances, it is apparent that the calculated ADF value more negative than critical values for all the variables tested, which confirms that our series has no unit

root. Moreover, to confirm the reliability of this result, the p-value of the calculated ADF values for each of the variables is less than 5% level of significance. Given that there is a one order of integration, we are guided to check for co-integration using Johansen Co-integration Test in other to determine if the variables have a short-run or long-run relationship.

### Co-integration Test Table

#### Johansen Co-integration

Date: 08/15/21 Time: 17:09  
 Sample (adjusted): 1988 2020  
 Included observations: 33 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: LAGDP LFDI LFPI LEXRT

Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)

Hypothesize d	No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None		0.520874	47.09113	47.85613	0.0589
At most 1		0.343913	22.80998	29.79707	0.2555
At most 2		0.163176	8.901729	15.49471	0.3745
At most 3		0.087537	3.023062	3.841466	0.0821

Trace test indicates no cointegration at the 0.05 level

Source: E-views 9 output, 2021

**Test of Hypotheses**

The hypotheses stated earlier in this study were tested to test using the ARDL regression technique. Given that this study is basically an impact study, the ARDL technique will, among other things, enable

us ascertain both the direction and magnitude of effect between the dependent variables and the regressors. In order to achieve this aim, the following steps will be taken.

**ARDL regression Model Estimation Results**

Dependent Variable: LAGDP  
 Method: ARDL  
 Date: 08/15/21 Time: 17:33  
 Sample (adjusted): 1990 2020  
 Included observations: 31 after adjustments  
 Maximum dependent lags: 4 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (4 lags, automatic): LFDI LFPI LEXRT  
 Fixed regressors: C  
 Number of models evaluated: 500  
 Selected Model: ARDL(1, 2, 0, 4)

Variable	Coefficien t	Std. Error	t-Statistic	Prob.*
LAGDP(-1)	0.876587	0.047379	18.50155	0.0000
LFDI(-2)	0.025758	0.012311	2.092379	0.0494
LFPI	-0.008967	0.005560	-1.612745	0.1225
LEXRT(-4)	-0.187019	0.027145	-6.889494	0.0000
C	1.116726	0.616173	1.812357	0.0850
R-squared	0.997685	Mean dependent var	15.93194	
Adjusted R-squared	0.996527	S.D. dependent var	0.608797	
S.E. of regression	0.035877	Akaike info criterion	-	

			3.546001
			-
Sum squared resid	0.025744	Schwarz criterion	3.037167
			-
Log likelihood	65.96301	Hannan-Quinn criter.	3.380133
F-statistic	861.8267	Durbin-Watson stat	1.546610
Prob(F-statistic)	0.000000		

Source: E-view 9 output, 2021

### Decision rule

The decision rule is based on a 5% probability value and is stated as follows:

$$H_0: \theta = \theta_0 \text{ versus } H_a: \theta \neq \theta_0$$

The above, model presents the result derived from the ARDL test, the value of the R squared is 0.997685, this means that 99% of the dependent variable AGDP is explained by the independent variables in the model. R squared is 99% indicating a good fit for the model.

The value of the constant is 1.116726, therefore, when the independent variables are equated to zero, AGDP will increase by 1.116726 percentage points. The F-value (861.8267), with a probability value  $0.000000 < 0.05$  is an indicative that the overall regression is significant. The Durbin Watson statistics (DW) approximate value of 1.546610 shows signs of no serial auto-correlation having a value greater than the R-squared

### Test of Hypothesis One

Hypothesis one is restated in null and alternate form thus:

- $H_0$ : Foreign Direct Investment have a positive and significant effect on Agricultural Gross domestic product of Nigeria
- $H_1$ : Foreign Direct Investment does not have a positive and significant effect on Agricultural Gross domestic product of Nigeria

Based on table above 2, it can be observed that FDI has positive but significant effect on Nigeria's AGDP. This was explained by

the positive coefficient value (0.025758) of FDI and its corresponding probability value (0.0494), which is less than 0.05 significant levels. Thus, we reject the null hypothesis and accept the alternate which states that Foreign Direct Investment have a positive and significant effect on Agricultural Gross domestic product of Nigeria

### Test of Hypothesis Two

Hypothesis one is restated in null and alternate form thus:

- $H_0$ : Foreign Portfolio Investment have a positive and significant effect on Agricultural Gross domestic product of Nigeria
- $H_1$ : Foreign Portfolio Investment does not have a positive and significant effect on Agricultural Gross domestic product of Nigeria

Based on table 3 above, it can be observed that FPI have negative but no significant effect on Nigeria's AGDP. This was explained by the negative coefficient value (-0.008967) of FPI and its corresponding probability value (0.1225), which is greater than 0.05 significant levels. Thus, we reject the alternate hypothesis and accept the null which states that Foreign Portfolio Investment have a negative and no significant effect on Agricultural Gross domestic product of Nigeria.

### Test of Hypothesis Three

Hypothesis one is restated in null and alternate form thus:

- $H_{03}$ : there is a long- run relationship between Foreign Investment Inflows and Agricultural sector development in Nigeria



- $H_{03}$ : there is no long- run relationship between Foreign Investment Inflows and Agricultural sector development in Nigeria

Based on table 4 above, it can be observed that all the P-values in the trace Johansen co-integration test are greater than 0.05, thus we conclude that there is no Co-integration. That is, there is no long-run relationship, thus we accept the null hypothesis which states that there is no long- run relationship between Foreign Investment Inflows and Agricultural sector development in Nigeria and reject the alternative.

#### **Discussion of findings**

These findings were made in line with the test of hypotheses and discussed according to these objectives.

#### **Objective one: Ascertain the effect of Foreign Direct Investment on the Agricultural Gross Domestic Product (AGDP) of Nigeria.**

The results of our estimation revealed that FDI has positive and significant effect on Nigeria's AGDP. This was explained by the positive coefficient value (0.025758) of FDI

#### **Summary of Findings**

The study found that:

- i) Foreign direct investment have a positive and significant effect on agricultural gross domestic product of Nigeria
- ii) Foreign portfolio investment has a negative and no significant effect on agricultural gross domestic product of Nigeria.

and its corresponding probability value (0.0494), which is less than 0.05 significant levels.

#### **Objective two: Determine the effect of the Foreign Portfolio Investment on the Agricultural Gross Domestic Product (AGDP) of Nigeria.**

The results of our estimation revealed FPI have a negative and no significant effect on Nigeria's AGDP. This was explained by the negative coefficient value (-0.008967) of FPI and its corresponding probability value (0.1225), which is greater than 0.05 significant levels

#### **Objective three: Investigate the existence of a long- run relationship between Foreign Investment Inflows, and Agricultural sector development in Nigeria.**

The results of our estimation revealed that all the P-values in the trace Johansen co-integration test are greater than 0.05, thus we conclude that there is no Co-integration. That is, there is no long-run relationship.

#### **SUMMARY OF FINDINGS AND CONCLUSION**

- iii) There is no long- run relationship between foreign investment inflows and agricultural sector development in Nigeria

#### **Conclusion**

From the results obtained, it is clear that foreign investment inflows on agricultural sector positively and significantly affected development in Nigeria.

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