Causality between Agricultural Investments, Inflation and Interest Rates in Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study examined the linkages between agricultural investment (comprising Foreign Direct Investment in agriculture, government investment in agriculture and private sector investment in agriculture), inflation rate and interest rate in Nigeria (1981 – 2020). Data for the study were sourced from Central Bank of Nigeria (CBN) and, Food and Agriculture Organization (FAO), and analyzed using Granger causality tests. Results showed that government investment in agriculture ($p < 0.05$) and private sector investment in agriculture ($p < 0.1$) has significant uni-directional causality to the level of agricultural foreign direct investment in Nigeria. Also there was uni-directional causality from inflation rate to interest rate (significant at 10%). It was recommended that public and private sectors' investment in agriculture should be strategic to attract foreign investments in order to boost the productivity of agriculture in Nigeria.

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1. INTRODUCTION

The burden of growing the agricultural sector of developing economies lies greatly on the government of the country, who is expected to make conscious policies and investments in capital resources for agricultural production and also provide the investment climate for other investors in the sector. One of the key factors influencing agricultural investments in Nigeria is the historical background of the sector. Nigeria has a long history of agricultural production, with the sector playing a crucial role in the country's economy. However, over the years, the sector has faced numerous challenges such as inadequate infrastructure and inconsistent government policies. These challenges have hindered the growth and development of the agricultural sector, leading to a decline in investments. Despite these challenges, Nigeria remains a fertile ground for agricultural investments due to its vast arable land, rich natural resources, and growing population. Agricultural investment in Nigeria is consists of foreign direct investments (cross-boarder investments into Nigeria economy), government/ public sector investments and private sector investments in the agricultural sector.

In the past decades, the trend foreign direct investment (FDI) in Nigeria's agricultural sector has been increasing. In the 1980s, when the country faced economic challenges and low oil prices, FDI in agriculture was relatively limited. Policy reforms and increased government engagements however attracted more foreign investors in the 1990s. As at year 2011, Nigeria received a total foreign investment of $8.9 billion which was about 20% of the total FDI to Africa that year, and these investments were mostly in the oil and gas sub-sector (Bashir & Sunkanmi, 2015). However, the FDI inflow to the agricultural sector in Nigeria between 1976 and 2022 range between 0.37% and 2.46% of the total FDI inflow to Nigeria (Ajuwon & Ogwumike, 2013; National Bureau of Statistics, 2023). This is an indication of the low confidence of foreign investors in Nigeria's agricultural enterprises. This situation might be linked to economic uncertainties, political instability, poor domestic public and private investment in the sector. It is worthy of note that aside the private domestic investors, who are mainly farmers, domestic public investors (primarily national governments) are

the next largest source of investment in agriculture in the low and middle income countries (Lowder *et al.*, 2012).

Furthermore, the impact of inflation and interest rates on agricultural investments in Nigeria cannot be understated. Inflation erodes the purchasing power of investors, leading to decreased profitability and reduced confidence in the agricultural sector. High inflation rates also increase the cost of production, diminishing the overall returns on agricultural investments. Similarly, fluctuating interest rates can significantly. In the last decade, the annual inflation rate in Nigeria, as computed from Central Bank of Nigeria (2023), ranged between 7.22% – 14.67%. These rates are considered too high viz-a-viz US economy which has maintained a long term inflation rates less than 5% (World Bank, 2022). Situations of fluctuations cum high rates of inflation cause instability in the price levels, economic distortions and conservative investments, which in turn translate to reduction in purchasing power, savings, productivity and growth of the agricultural sector, and the Nigerian economy (Akpaeti *et al.,* 2018).

Besides the high cost of borrowing, the willingness of commercial banks' lending to agriculture is quite low, as observed by Abdullahi & Gupta (2022). This situation is based on the premise that farmers are usually unable to meet up with the collateral requirements for loans. Moreso, the banks are profit-oriented as they try to avoid high risk lending. Computations from Central Bank of Nigeria's 2020 Statistical Bulletin on the financial sector showed that credit granted by commercial banks to the agriculture sector was as low as 1.67% of the total credit granted in year 2010. Though, the percentage increased (up to 5.15% in 2020), yet it seemed not very significant to drive the growth and productivity expected in the agriculture sector. Also, computations from the National Bureau of Statistics (2019) corroboratively showed that from 2015 to 2019, banking sector credit to private sector as a percentage of total credit was: agriculture (3.54%), manufacturing (20.43%), oil and gas (20.82%), finance, insurance and capital market (6.29%). The above statistics show that agriculture is highly excluded from bank financing, hence, low investment. However, public investment in agriculture has declined as a result of diversion of resources from investments

to current expenditure in the form of subsidies, large expenditure incurred on maintenance of existing projects, inordinate delays in completing the project on hand, relatively lower allocation for irrigation, rural infrastructure and research, lack of effective credit support and credit infrastructure in rural areas (Baba, et al*., 2010; Sivagnanam & Murugan, 2016). There are studies on the effects of FDI on agricultural investments, but none available to the researcher has considered the inter-relationships between the various components of total agricultural investment in Nigeria. This study therefore investigated the linkages between the various sources of agricultural investment and the inflation cum interest rates in Nigeria.

1.1 Theoretical Framework

1.1.1 Definition of concepts

Foreign direct investment: Direct investment refers to capital received directly from the investor or through related enterprise to the direct investment enterprise. Dass & Jamal (2018) defined direct investment as the equity investments of private multinational corporations overseas. The multinational corporations are business entities that conduct their business activities in more than one country. A great number of these multinationals are based in countries with high incomes in Europe and America. However, some Asian countries such as China, Japan and Korea have joined the league of multinationals. The Organization for Economic Cooperation and Development, OECD (2008) and Statistical Office of the European Union (Eurostat) (2017) defined FDI as a cross-border investment made by a resident in one economy (the direct investor) with the ultimate intention of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor.

Government (Public Sector) investment in agriculture: Public investment refers to investments by the government. It is the money spent by the government or state on public goods and services such as railway, roads, electricity, portable water, education, health, etc. It is defined as the gross fixed capital formation of the government in the areas of social security, construction of buildings, means of transportation, information Technology infrastructure, ammunitions, etc (National Bank of Belgium, 2017). Välilä & Mehrotra (2005), and

Funke *et al.* (2013) opined that since some private organizations also invest in public infrastructure, only investments which are directly financed by the government's budget can be classified as public investment. Government investment in agriculture, amongst others is seen in areas of irrigation and flood control (Dhas, 2009; Mazibuko *et al.,* 2021). The aim of such expenditure by the government is to provide for its citizens and residents the basic resources and infrastructure which the private sector does not have the capability to deliver, improve the living standard of the people, improve working environment, encourage nature, size and type of private investments in the economy. By devoting resources to the country's needs of physical infrastructure (such as roads, bridges, railways, portable water, airport), innovations, clean energy sources and education, the government (federal, state and local) builds and boosts the country's capital stock (Bivens, 2012; McNichol, 2019).

Private sector investment in agriculture: The private sector represents all profit-oriented businesses, which are not owned and operated by the government. Notwithstanding the size, structure and ownership, the private agricultural sector encompasses the food, agriculture, marketing, financing and insurance sub-sectors. FAO views the private sector to include the farmer organizations, cooperatives, small and medium-scale enterprises, large enterprises, private financial institutions, industry, trade associations and the huge international corporations (Graziano da Silva, 2019), which are involved from production to consumption.

Concept of inflation: Inflation, according to Jhingan (2003), is absolutely a monetary phenomenon that can simply be defined as an increase in the price paid for goods and services. It can also be considered as a decrease in the purchasing power of money. However, understanding the concept of inflation is quite beyond these simple definitions. Inflation is broadly viewed as a state of disequilibrium that occurs when there is a sustained increase in the price level. Nnadi & Falodun (2003) and Oner (2019) described it as an economic situation which exists when prices are rising rapidly and continuously, resulting to fall in the value of money.

Concept of interest rate: Interest is used to refer to the sum or money charged on borrowers

for the use of another person's money or financial capital. At the microeconomic level, CBN Research Department (2016), and Nzotta (2004) noted that interest serves several functions. Firstly, Interest is the reward for capital. Since financial assets/ capital are considered productive, they are rewarded with interest. Capital funds play complementary role to other factors of production in the production process, hence should be compensated accordingly. Secondly, it serves as the compensation to money savers who give up their present consumption. This sacrifice made for funds to be available and utilized by those who need it deserves to be compensated for. Higher rates of interest encourage savers to make available idle financial resources to the fund users for investment (Davis & Emerenini, 2015). Thirdly, there is the risk that when funds are loaned out, they would not be repaid or there could be delay in repayment. Interest is therefore charged to cushion this risk on the side of savers. Interest rate also is a major macroeconomic tool used by the government in managing the economy. Firstly, it is believed that domestic output can be varied by changing the rates of interest, and by changing the monetary policy at one time, government can vary the rate of interest obtainable in an economy (Reserve Bank of Australia, 2023). For instance, an increase in money supply results to lower interest rate, which stimulates investment. Conversely, a decrease in money supply raises the interest rate thereby constricting investment. Here, interest rate has an inverse relationship with level of investment in the economy (Mushtag & Siddiqui, 2016). Secondly, interest rates guide the efficient allocation of resource in the economy. Projects/ investments with rates of return that are above the interest rate are favoured rather than investments with lower rates of return.

1.2 Theoretical Literature Review

Accelerator theory of investment: The acceleration principle of investment refers to the relationship that exists between increase in total output and income, and the additional investment made as such output and income increase. It is observed that a firm's decision to embark on new investment depends on the demand for its product (Kumar & Zhang, 2018). Thus, any variable (such as increase in per capita income) that stimulates an increase in consumer demand will also induce investment in capital goods which will in turn influence the production of such goods. Since, investment is induced by variations in income or consumption, it is denoted as induced investment. According to Samuelson (1976), the acceleration requires that consumption has to keep increasing in order for investment to increase or at least, stand still. It is noted then that investment are more sensitive than sales. To keep investment from declining, there should not be a fall in the growth rate of sales. This is because the acceleration principle works in both directions. Succinctly, it could be said that the acceleration principle explains why the increase in national income and output often result in a more than proportionate increase in investment spending and why the amount of investment depends not on the absolute level of business activity but on whether that level is increasing or decreasing (Abu-Lila, 2021).

The loanable fund theory of interest (Neo-Classical Theory of Interest): The principal economists that contributed to the development of this theory include Wicksell, Bertil Ohlin, Robertson, Myrdal, Lindahl, Viner, etc. These theorists stated that interest rate is determined by the supply and demand of loanable fund, and the interest rate represents the price of the credit. For equilibrium to be maintained, any change in the demand for or supply of fund will result to a change in the interest rate. The proponents of this theory saw interplay of monetary and non-monetary forces in the determination of the rate of interest. This theory suggests that monetary forces such as hoarding and dishoarding of money, money created by banks, monetary loans for consumption purposes do not just determine the rate of interest; other real forces such as productivity of capital, thriftiness, waiting and time-preference also play significant role (Ahuja, 2013). Palfreman & Ford (1984) as cited in Nzotta (2004) opined that "the loanable fund theory of interest rate determination states that the prevailing rates of interest at any one time represents an equilibrium price at which the demand for credit from those who prefer to have the goods now, will equal the supply of loanable funds to those who prefer to have the interest". That is to say, it is the equilibrium price which the fund borrowers are willing to pay to have the credit, and at which the savers are willing to give out their financial capital for future gain. Notably, "the classical theory of interest rate indicates that the order of causality among savings, interest rate and investment, runs from savings to interest rate, interest rate to savings and investment; and investment to interest rate" (Chuba & Ebhotemhen, 2019).

Businessmen demand for loan is for investments in capital goods and building up of inventories. Inasmuch as such borrowings are interest-elastic, there is always a comparison of the interest with the expected return on the investment to ensure that the loan and its articulated interest charges will be settled by the profit from the investment. Hence, the rate of interest for investment borrowing must be less than (or at most equal to) the internal rate of return of the investment. As the interest rate falls, businessmen find it more profitable to increase their borrowing

1.3 Empirical Literature

There have been several researches on the influence of FDI on total domestic investment. Evidences from various countries suggested that FDI exhibit negative influence on commitment of local investors, others said there was neutral effect. Mišun & Tomšk(2002) estimated the effect of FDI on domestic investment in Czech Republic, Hungary and Poland using a model of total investment where from the point of view of the countries, FDI was treated as exogenous variable. The results showed that from 1990–2000, there was a crowding-out effect of domestic investment as a result of FDI inflow in Poland. This implies that there was a noticed reduction in domestic investment with the presence of FDI. Hence, as the amount of FDI inflow increased in certain sectors of the economy, there was continued significant reduction in the total domestic investment in the same sector. However, for the time period of 1990–2000 in Hungary and 1993-2000 in Czech Republic, there was a crowding-in effect. Here, FDI possibly played a leading role in investment in sectors of concern to the economy, breaking boundaries and limitations that hindered domestic investment. Total domestic investment therefore increased for the economies. Similarly, Bilal *et al.,* (2021) studied the effects of FDI on domestic investments in western Balkans (made up of 11 countries, namely; Bulgaria, Croatia Czechia, Estonia, Hungary, Lativa, Lithuania, Poland, Romania, Slovakia and Slovania), using data from 1994 to 2018. The results showed that FDI exerted a positive and significant impact on domestic investments within the region such that per unit percent increase in FDI increased the domestic investment by 0.34%. The result is corroborates with the findings of Ijirshar *et al.,*(2019), who studied the growth-differential effects of domestic investments and FDI in Africa, using 41 selected African countries (1970 to 2017). The result of this study established a 1% statistically significant positive relationship between FDI and domestic investment in Africa. This implied that FDI inflow had a crowding-in effect on Africa, meaning that the inflow of FDI attracted more domestic investments.

Agosin & Machado (2005) studied the effect of FDI on developing countries of the world that spread across Africa, Asia and Latin America for a time period of 1971–2000. Twelve countries were studied in each of the developing regions. The results indicated that in all the three regions, the least was a neutral effect of FDI on domestic investment. For several periods, FDI displaced domestic investment, making the latter to crowd-out, especially as seen in the Latin America. Using data obtained from 50 countries over a period of 1970-2004, Wang (2010) found out that an inward flow of FDI had a positive cumulative effect on the total domestic investment of the host country, but the contemporaneous effect was negative. The contemporaneous and cumulative effects of FDI inflow on less developed countries (LDCs) were neutral and positive, but for developed countries, same were negative and neutral. This means that on year-to-year basis, domestic investment reduced as a result of increased inflow of foreign capital, however, the total investment continued to increase.

In their study of the effect of FDI of the domestic investment in the Yangtze River Delta region of China (2000-2008), Wu et al.(2010), using the Cobb-Douglas production function and Thoro-Swan growth model reported that there was a strong correlation between FDI and economic development of the region. More jobs were created with inflow of FDI, and the efficiency of the labour resources also increased. The study concluded that FDI in the region has a crowding-in effect on the economic development of that region with each unit of FDI attracting 2.42 units of domestic investment. Within the Nigerian context, Aigheyisi (2017) studied the effect of FDI on domestic investment in Nigeria using economic data from 1981 to 2015. The Granger causality did not establish any short run causality between FDI and domestic investment. On the long run, however, the effect on FDI on domestic investment was positive but not statistically significant. Since FDI inflow could not predict domestic investment in Nigeria, despite the fact that Nigeria is a choice destination for FDI, the researcher blamed this situation on inadequate inflow to the key sectors of the economy.

Domestic investment required the harnessing of local resources for economic growth. These resources are usually spread across different sectors of the economy, and the development of these resources results to holistic economic growth and development. Having seen that FDI inflow has influence on domestic investment, and with inconsistent (and sometime unfavourable) evidences from various countries, it is therefore notable that there is need for strong economic policies targeted at enhancing the effect of FDI on domestic investment, especially in developing countries.

Several reports have it that government spending on agriculture in sub-Saharan Africa lags behind other regions, and the effectiveness of the expenditures are further reduced by subsidy programs and transfers that tend to benefit elites to the detriment of poor people and the agricultural sector itself (World Bank, 2017). For instance, for the decade 1991-2000, the total agricultural expenditure as a percentage of total government spending for countries in Africa were as follows: Nigeria (0.74), Cote d'Ivoire (1.46), Togo (1.78), Cameroon (2.01), Ghana (2.57) respectively; Morocco (3.29), Tunisia (5.76), Ethiopia (6.55), Egypt (6.85) respectively; and Zimbabwe (1.70), Botswana (4.29), Zambia (5.08) respectively.

2. RESEARCH METHODOLOGY

Data for this study were sourced from the Statistical bulletins of the Central Bank of Nigeria (CBN) and, Food and Agriculture Organization (FAO) for 1981 to 2020. The effects of FDI, inflation rate and interest rate on public and private investments in agriculture were analyzed using the pairwise Granger causality to determine the dynamic relationships that exist between interacting variables. The first step to this was the unit root test to ascertain the stationarity status of each variable of the model. The Vector Autoregressive Regression model was specified thus:

$$GIA_t = \alpha_0 + \alpha_1 \sum_{i=1}^{j} GIA_{t-j} + \alpha_2 \sum_{i=1}^{j} FDI_{t-j} + U_t \qquad \text{eqn. (1)}$$

$$FDI_t = \beta_0 + \beta_1 \sum_{i=1}^{j} FDI_{t-j} + \beta_2 \sum_{i=1}^{j} GIA_{t-j} + V_t \qquad \text{eqn. (2)}$$

Also,

$$PIA_t = \alpha_0 + \alpha_1 \sum_{i=1}^{j} PIA_{t-j} + \alpha_2 \sum_{i=1}^{j} FDI_{t-j} + U_t \qquad \text{eqn. (3)}$$

$$FDI_t = \beta_0 + \beta_1 \sum_{i=1}^{j} FDI_{t-j} + \beta_2 \sum_{i=1}^{j} PIA_{t-j} + V_t \qquad \text{eqn. (4)}$$

Where,

GIA_t = Government Investment in Agriculture in year t (proxies as total government expenditure on agriculture in ₦billion).

PIA_t = Private Investment in Agriculture in year t (proxied as total volume of credit to agricultural sector by the commercial banks and other formal credit institutions in ₦billion).

FDI_t = Foreign Direct Investment in year t ($ billion).

$$GIA_t = \alpha_0 + \alpha_1 \sum_{i=1}^{j} GIA_{t-j} + \alpha_2 \sum_{i=1}^{j} IF_{t-j} + U_t \qquad \text{eqn. (5)}$$

$$IF_t = \beta_0 + \beta_1 \sum_{i=1}^{j} IF_{t-j} + \beta_2 \sum_{i=1}^{j} GIA_{t-j} + V_t \qquad \text{eqn. (6)}$$

Also,

$$PIA_t = \alpha_0 + \alpha_1 \sum_{i=1}^{j} PIA_{t-j} + \alpha_2 \sum_{i=1}^{j} IF_{t-j} + U_t \qquad \text{eqn. (7)}$$

$$IF_t = \beta_0 + \beta_1 \sum_{i=1}^{j} IF_{t-j} + \beta_2 \sum_{i=1}^{j} PIA_{t-j} + V_t \qquad \text{eqn. (8)}$$

and,

$$GIA_t = \alpha_0 + \alpha_1 \sum_{i=1}^{j} GIA_{t-j} + \alpha_2 \sum_{i=1}^{j} IR_{t-j} + U_t \qquad \text{eqn. (9)}$$

$$IR_t = \beta_0 + \beta_1 \sum_{i=1}^{j} IR_{t-j} + \beta_2 \sum_{i=1}^{j} GIA_{t-j} + V_t \qquad \text{eqn. (10)}$$

Also,

$$PIA_t = \alpha_0 + \alpha_1\sum_{i=1}^{j} \quad PIA_{t-j} + \alpha_2\sum_{i=1}^{j} \quad IR_{t-j} + U_t \qquad \text{eqn. (11)}$$

$$IR_t = \beta_0 + \beta_1\sum_{i=1}^{j} \quad IR_{t-j} + \beta_2\sum_{i=1}^{j} \quad PIA_{t-j} + V_t \qquad \text{eqn. (12)}$$

Acceptance or rejection of the null hypotheses was based on their probability values. Hypotheses with probability values less than 0.01, 0.05 and 0.1 were judged to be significant at 1%, 5% and 10% respectively, hence rejected. This decision rule was applied to equations 1 to 12.

3. RESULTS AND DISCUSSION

The unit root test results are summarized in Table 1, while the VAR Lag Order selection criteria is presented in Table 2.

In Table 1, it is seen that inflation rate (IF) was stationarity at level, while other variables (FDI, IR, GIA and PIA) were stationary at first differencing. Table 2 shows that the lag order selected (as presented in Table 2) for this VAR is 1 as indicated by the asterisks (*). Therefore it is said that this VAR model is of order 1. Furthermore, the stability of the model was tested using the inverse root characteristic polynomial as shown in Fig. 1.

The VAR model satisfied the stability condition since no root lied outside the unit circle, as seen in Fig. 1. Thus the model was certified adequate. Therefore, the Granger Causality test was conducted, and the results presented in Table 3.

Table 1. Results of Unit Root Test for Foreign Direct Investment (FDI), Inflation rate (IF), Interest Rates (IR)GovernmentInvestment in Agriculture (GIA) and Private sector Investment in Agriculture (PIA)

Variable	Level		First Difference		Stationarity
	Constant	Constant with Trend	Constant	Constant with Trend	
lnFDI	0.967192	3.102526**	0.177036***	0.315230***	I(1)
lnIF	2.084687***	2.405768***	-	-	I(0)
lnIR	0.816487*	1.029941	0.027809**	0.102273***	I(1)
lnGIA	0.370199	0.253753	0.390800***	0.816479***	I(1)
lnPIA	0.257121	0.149379	0.221556***	0.277267	I(1)

Source: Computations from Eviews 10

Table 2. VAR lag order selection criteria for FDI, IF, IR, GIA and PIA

Endogenous variables: LNFDI LNGIA LNIF LNIR LNPIA						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-178.8003	NA	0.025061	10.50287	10.72507	10.57957
1	-73.73364	174.1104*	0.000263*	5.927637*	7.260792*	6.387842*
2	-64.14205	13.15419	0.000695	6.808117	9.252235	7.651826
3	-41.81666	24.23899	0.001046	6.960952	10.51603	8.188166
4	-19.81222	17.60355	0.002186	7.132127	11.79817	8.742845
5	18.66407	19.78780	0.003388	6.362053	12.13906	8.356275

 * indicates lag order selected by the criterion
 LR: sequential modified LR test statistic (each test at 5% level)
 FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion
 HQ: Hannan-Quinn information criterion
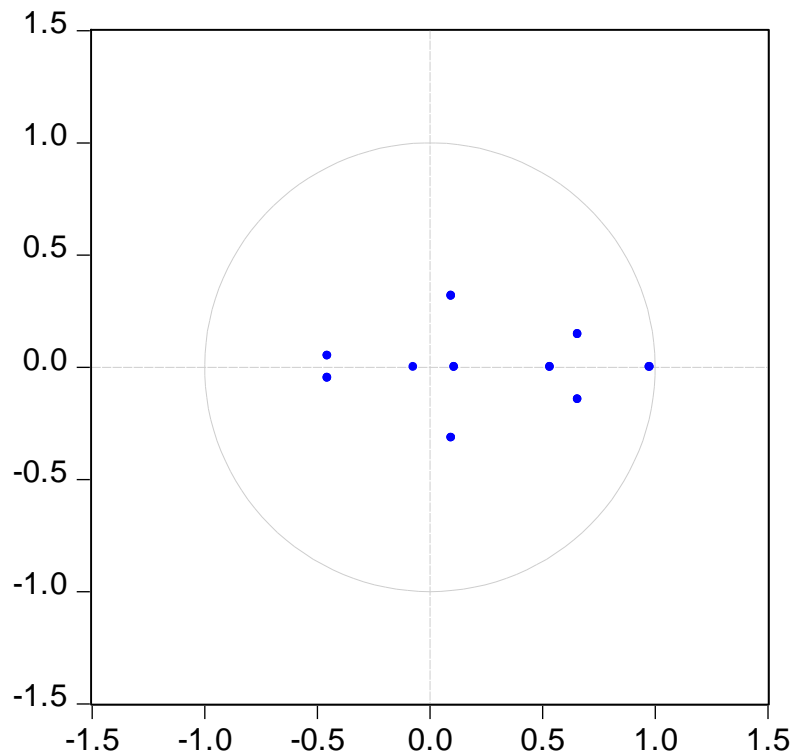
Inverse Roots of AR Characteristic Polynomial

Fig. 1. Inverse roots of autoregressive characteristic polynomial

Table 3. Pairwise granger causality for foreign direct investment, inflation and interest rates on public and private agricultural investment

Pairwise Granger Causality Tests (Null Hypothesis):	Obs	F-Statistic	Probability	Decision
lnGIA does not Granger Cause lnFDI	38	4.23701	0.0230	Rejected
lnFDI does not Granger Cause lnGIA		0.44000	0.6478	Accepted
lnIF does not Granger Cause lnFDI	38	0.02884	0.9716	Accepted
lnFDI does not Granger Cause lnIF		0.82595	0.4467	Accepted
lnIR does not Granger Cause lnFDI	38	1.03415	0.3668	Accepted
lnFDI does not Granger Cause lnIR		0.46911	0.6297	Accepted
lnPIA does not Granger Cause lnFDI	38	2.47488	0.0997	Rejected
lnFDI does not Granger Cause lnPIA		0.34344	0.7118	Accepted
lnIF does not Granger Cause lnGIA	38	1.81327	0.1790	Accepted
lnGIA does not Granger Cause lnIF		1.27655	0.2924	Accepted
lnIR does not Granger Cause lnGIA	38	0.43578	0.6504	Accepted
lnGIA does not Granger Cause lnIR		0.41244	0.6654	Accepted
lnPIA does not Granger Cause lnGIA	38	0.79666	0.4593	Accepted
lnGIA does not Granger Cause lnPIA		0.67665	0.5152	Accepted
lnIR does not Granger Cause lnIF	38	0.47908	0.6236	Accepted
lnIF does not Granger Cause lnIR		2.61043	0.0886	Rejected
lnPIA does not Granger Cause lnIF	38	2.09446	0.1392	Accepted
lnIF does not Granger Cause lnPIA		0.16309	0.8502	Accepted
lnPIA does not Granger Cause lnIR	38	0.48728	0.6186	Accepted
lnIR does not Granger Cause lnPIA		0.62648	0.5407	Accepted

Source: Author's computation from Eviews 10

From Table 3, the null hypothesis was rejected at 5% (p < 0.05) that GIA does not Granger cause FDI. Therefore the alternative hypothesis was accepted that government investment in agriculture Granger Cause foreign direct investment. This means that increase in government spending on agriculture resulted to corresponding increase in FDI inflow. This result is consistent with the finding of Othman et al*.,* (2018)that public expenditure of a developing country promotes FDI inflow into that country. It could therefore be said that government investment instilled confidence in the foreign investors to channel their investments into agriculture. By strategically investing in human capital, infrastructure, economic stability and sound policy framework, domestic market accessibility, public goods and environmental sustainability, governments can create an environment that attracts and sustains FDI inflows, promoting economic growth and development.The null hypothesis that PIA does not Granger cause FDI was rejected at 10% level (p < 0.1). This otherwise means that there is a causality relationship from private agricultural investment to FDI. This agrees with the earlier findings of Ndikumana & Verick (2008) that the impact of private domestic investment on FDI is stronger and more robust than the reverse relation. This suggested that increased domestic private investment results to high returns to capital, and this is usually a point of attraction to foreign investors. It therefore implies that enhancing incentives for domestic private investment will increase the competitiveness in the sector and encourage the foreigners to invest in the local economy. It is therefore understood here that both the public and private investments in agriculture motivate foreign investments.

The hypothesis that IF does not granger cause IR was rejected at 10% (p < 0.1) indicating that inflation rate actually has influence on the interest rate obtainable in the economy. This implies that a rise in inflation rate is followed by rise in interest rate. This underscores the use of bank lending rate by monetary authorities to curb inflation (CBN, 2023).

There were no causality relationships established between FDI and IR and between FDI and IF. Is simply means that the domestic rates of inflation and interest do not drive foreign investment in agriculture in Nigeria. Typically, investment is profit-driven, and at every level of inflation and interest rates, investors would always seek to profit from their investments. Similar situation was also observed where no causality was established between GIA and IF, GIA and IR, PIA and IF, and PIA and IR. Though studies may have shown several relationships between the variables, there were no significant causalities existing between them.

4. CONCLUSION AND RECOMMENDATION

This study established that there existed relationships between foreign direct investment (on one hand) and public and private sectors' investments in agriculture on the other hand. It is concluded that increased government spending and private sector investment in the agricultural sector stimulated the flow of foreign direct investment into the country. This was so because investors usually study the trend of events to find the best areas to make their commitments. Moreso, this study affirmed the interest rate as a policy tool employed to tame inflation rate. It is therefore recommended that the Nigerian government identify and set her food security priorities right, and provide the necessary conditions that will encourage both private domestic and foreign investments. This would boost food production, increase agricultural productivity, raise incomes and solve her hunger and poverty problems.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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