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Impact of Domestic Investments on Agricultural Production in Nigeria

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Abstract:- This research investigated the influence of domestic investments on agricultural production in Nigeria, utilizing time series data encompassing Agricultural production, domestic investment, agricultural land, rural population, and inflation rate sourced from World Development Indicator (WDI) and the IMF financial database spanning from 1981 to 2022. The study applied the Accelerator growth model, focusing on the repercussions of investment inflows on agricultural production. The stationarity of the series was assessed using the Phillips-Perron (PP-test) and Augmented Dickey-Fuller (ADF) test, affirming that the series were stationary at levels (I(0)) and some at first differences (I(1)). The ARDL method for cointegration was employed, and the bound test results indicated a long-run relationship among the variables. The inferential results demonstrated that domestic investment had a positive impact on agricultural production in Nigeria. However, this impact was deemed insignificant due to the insufficient amount of domestic savings to drive investments into the country. Additionally, the findings revealed that agricultural land and the rural population, constituting a substantial percentage of the Nigerian population, had a positive and significant effect on agricultural production. On the other hand, the inflation rate exhibited a negative and insignificant impact on agricultural production, aligning with the anticipated expectations. In conclusion, the study recommends an increase in domestic investment from various sources, including households, the public sector, and the government, as it holds both short and long-term significant implications for agricultural production. The generation of capital is advised through the promotion of savings, mobilization, and directed investment in productive sectors of the economy, particularly the agricultural sector.

Keywords:- *Domestic Investments, Agricultural Production, Agricultural Land, Rural Population and Inflation Rate.*

I. INTRODUCTION

The Nigerian economy, both during the colonial era and after gaining independence, was characterized as agrarian due to its heavy reliance on agriculture. Agriculture played a fundamental role in providing food, employment, income for farmers and raw materials for industries. This sector significantly contributed to societal well-being, offering employment opportunities, supplying food for the population, and generating foreign exchange earnings for the government. Moreover, it served as a foundation for the development of other economic sectors, showcasing its crucial interconnection with key areas of the economy. The Nigerian Investment Promotion Council (NIPC) and the liberalization of the foreign exchange market were established as primary policy frameworks to promote domestic investments in agricultural production. Such investments, whether from individuals, government, or corporate entities, were deemed essential due to their relatively low-risk nature, contribution to food security, and potential for profitable financial returns. Additionally, domestic investments in agriculture were recognized as catalysts for economic growth, making efficient use of arable land and fostering increased cultivation (IFC, 2011).

Since gaining independence, the Nigerian government has consistently prioritized the agricultural sector in its development plans, recognizing its crucial role in the country's overall progress. The challenges of inadequate financing in the agricultural sector were addressed by successive administrations through the implementation of various programs and initiatives, such as Operation Feed the Nation (OFN), the Green Revolution (GR), the Agricultural Development Programme (ADP), the National Fertilizer Company of Nigeria (NAFCON), the School-To-Land Program, the River Basin Development Authority (RBDA), the National Accelerated Food Production (NAFP), and the creation of institutions such as the Directorate for Foods, Roads and Rural Infrastructure (DFFRRI) and financial measures like the Agricultural Credit Scheme Fund (ACGSF). These initiatives aimed to enhance agricultural production sufficiency by transforming rural farmers through the application of knowledge and skills across various relevant areas. The predominant goals included job creation, attracting investments in the agricultural sector to boost productivity, and achieving economic diversification, as highlighted in the Agricultural Transformation Agenda (ATA) 2010-2015, Agricultural Promotion Policy (2016-2020), and other related policies (FMARD, 2021). The agricultural sector has remained a key player in the Nigerian economy, contributing significantly to the country's Gross Domestic Product (GDP). According to a World Bank report (2022), the sector's contribution to value added (% of GDP) in Nigeria was 21.1% in 2016, 21.20% in 2018, 24.14% in 2020, and a slight decline to 23.69% in 2022. This decline may be attributed to various factors. Agriculture

encompasses a wide range of human activities, including the primary production of food crops, cash crops, fishing, livestock, and product marketing. In the early 1960s, it contributed around 70% of the gross domestic product, highlighting a period when Nigeria was not only self-sufficient in food crop production but also served as a major crop exporter, providing raw materials for industries (Yakubu & Akanegbu, 2015).

Despite Nigeria's abundance of human and natural resources, a significant challenge looms as 19.4 million Nigerians are at risk of experiencing food insecurity, according to FAO (2022). Additionally, reports indicate that less than half of the country's arable land is currently under cultivation (Seriki, 2022). The cultivation of this land is predominantly carried out by smallholder and traditional farmers utilizing basic production techniques, resulting in low yields. These farmers face numerous constraints, including limited access to modern inputs and credit, deficient infrastructure, inadequate market access, land and environmental degradation, and insufficient research and extension services, among other issues. These challenges can likely be attributed to inadequate domestic investment in the agricultural sector. In light of these circumstances, the study aims to analyze the impact of domestic investments on agricultural production, taking into account the influence of rural population and agricultural land on production output. The study specifically seeks to explore how investments from both the public and private sectors of the economy affect agricultural production.

II. LITERATURE REVIEW

➢ *Conceptual Issues*

Creating a conducive environment for domestic investments in Nigeria is crucial. The conditions for making investments rely on essential public goods, like rural infrastructure (such as roads and electricity), which are beyond the means of farmers and the private sector to provide for their well-being. The World Bank emphasizes distinctions between private and public investments in agriculture. Private investments by farmers involve activities like acquiring farm equipment, planting permanent crops, buying or raising animals, constructing farm buildings, and enhancing their land. On the other hand, public investments encompass tasks like constructing and maintaining rural roads and large-scale irrigation infrastructure. It is important to highlight the government's investment in fewer tangible assets such as legal institutions and markets that contribute to the conducive environment for private investment. These assets yield returns in the form of increased productivity over an extended period (World Bank, 2020). The productive sector of agriculture in Nigeria pertains to the branch of the economy focused on cultivating food and cash crops, along with other activities related to animals and plants, such as grazing, forestry, fishing, and hunting (Boual & José, 2022). Agricultural productivity, defined as the ratio of agricultural output to inputs, is measured by the market value of the final output. Agriculture, in its broadest sense, involves the art and science of crop and livestock production, encompassing technologies associated with soil cultivation, crop and livestock management, as well as processing and marketing activities.

The term "agro-business" was coined to refer to all technologies associated with the overall inputs and outputs of the agricultural industry. Within this framework, agriculture encompasses the full range of commercial endeavors, such as the production and dissemination of industrial farming inputs, the rearing of crops, cattle, and their byproducts on farms, the conversion of raw materials into final products, and the provision of goods in response to consumer demand. The domestication of plants and animals produced food surpluses that enabled the establishment of increasingly densely populated and stratified civilizations, and agriculture played a crucial part in the evolution of human civilization (Ogen, 2003). In theory, agriculture is the methodical planting, raising, and harvesting of plants and animals for the purpose of making food, feed, fiber, and other products. It is the science of utilizing the land for plant and animal cultivation, simplifying nature's food webs and redirecting energy for human and animal consumption (Olorunfemi, 2008).

➢ *Theoretical Literature*

- *Accelerator Theory of Investment*

The theoretical foundation of this study relies on the acceleration theory of investment due to its observed significance in the correlation between production output and investment. The Accelerator principle, developed by J.M. Clark, is an investment theory that elucidates the connection between output and a capital stock by linking it to an increase in demand resulting from income. This economic hypothesis posits that investment expenditure rises when either demand or income experiences an increase. The theory suggests that in situations where there is excess demand compared to supply, companies can either raise prices to decrease demand or augment investment to meet the demand level. The Accelerator theory also contends that companies typically opt to boost production, thereby increasing profits, to maintain their fixed capital-to-output ratio. Regarding the fixed capital-to-output ratio, the theory further explains that if, for instance, one machine was initially required to produce a hundred units and demand increased to two hundred units, an additional investment in another machine would be necessary to meet this heightened demand. In an economically diverse country like Nigeria, various agro-ecological conditions serve as an incentive to exceed domestic demand, prompting firms to respond by increasing their investments.

The Accelerator theory illustrates this relationship by emphasizing that in producing output, whether food items, cars, or clothing, firms aim to utilize their stock of capital (machines, inventories, plants) for the most profitable operation. The acceleration principle is based on the concept that an upswing in demand for agricultural produce, such as food crops, cash crops, and livestock, results in a more substantial increase in demand for producer or capital goods, such as food processing equipment and plants. Net investment contributes to the expansion of the capital stock,

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but this growth is necessary only if the level of output or sales experiences an increase.

- *Harrod-Domar Model of Economic Growth*

Both Harrod and Domar were deeply interested in determining the rate of income growth that would support a stable and uninterrupted functioning of the economy. They attributed a crucial role to investment in the economic growth process, highlighting the dual nature of its impact. Firstly, investment generates income, and secondly, it enhances the productive capacity of the economy by increasing its capital stock, recognized as the "Demand effect" and "Supply effect" of investment, respectively. The model emphasizes that as long as net investment is occurring, both output and real income will continue to grow. Therefore, to maintain a state of full employment equilibrium in the economy consistently, it is imperative for both real income and output to expand at a rate equivalent to the growth of the capital stock's productivity. The model posits that continuous expansion of net investment is necessary for sustaining full employment in the long run (Boual & José, 2022).

- *The Solow Growth Model*

Robert Solow's new classical theory of economic growth, famously known as "The Solow Growth Model," was introduced in 1956. This model, considered an exogenous approach to economics, explores changes in output levels resulting from variations in the growth rates of population, savings, and technological progress. The emphasis of the model lies in capital accumulation within a purely productive economy. According to Solow, growth stems from additional units of capital, labor inputs, and innovative ideas and technology. Solow contends that a continuous increase in capital investment leads to a short-term growth rate boost because of the rising capital-labor ratio. The theory is grounded in the notion of diminishing returns, where the marginal product of additional units of capital may decrease due to diminishing returns. Consequently, the economy adjusts itself back to a long-term growth trajectory, with real GDP expanding at a rate equivalent to the growth of the workforce plus an additional factor accounting for improved productivity (Oloyede, 2014). To make these models amenable for this present study, a review of current empirical studies in this area of thought is imperative.

Ibe (2014) carried out research to evaluate the impact of public sector and bank financing activities on Nigerian agricultural production. The results showed that the nation's agricultural production is greatly impacted by the interaction of government funding for agriculture, commercial bank loans to the agricultural sector, and agricultural product pricing. Consequently, the study underlined the necessity of giving agricultural finance top priority when formulating policy and suggested that banks be encouraged to help agricultural financing organizations.

Osa-Afiana and Kelikume (2015) also carried out a research to examine the impact of credit distribution and banking sector changes on the agricultural sector in Nigeria, using the VECM (Vector Error Correction Model) technique. The findings showed that the performance of Nigeria's agricultural sector was positively impacted by both the banking sector's reforms and the availability of credit for agriculture. The study did discover, however, that the variance decomposition result indicated a negligible and modest influence of credit availability on the agriculture sector. The results indicated that there was little correlation between the pace of agricultural output and the total amount of credit available to the industry. As a result, the study recommended caution in formulating financial policies for the transformation agenda of the agricultural sector to ensure optimal productivity gains.

Matthew and Mordecai (2016) used co-integration and error correction models in their study to evaluate the effect of investment on agricultural output in Nigeria over the years 1981–2014. The results showed that there is a long-term correlation between interest rates in Nigeria, public agricultural spending, commercial bank loans to the agricultural sector, and agricultural production. Though commercial bank loans to the agricultural sector and interest rates had negligible positive effects on agricultural output in Nigeria, the results of the parsimonious error correction model showed that public agricultural expenditure had a significantly negative impact on agricultural output. Furthermore, the research revealed that agricultural productivity quickly adapted to past modifications in government agricultural spending, commercial bank loans to the agricultural industry, and interest rates, with an adjustment rate exceeding 75 percent.

In an attempt to examine the impact of government expenditure on agriculture on agricultural sector output in Nigeria from 1981-2018. Edeh, Chukwudi, and Emmanuel (2020) gathered data from the Central Bank of Nigeria, Statistical Bulletin, and Annual Reports. These included labor force, capital expenditure, recurrent expenditure, agricultural loans, average annual rainfall, interest rate, and economic reforms as functions of agricultural value-added. A long-term connection in the model was shown by the bound test cointegration. Capital expenditure was statistically significant and positively correlated with agricultural production, according to the results of the ARDL model analysis approach. According to the report, governments should work harder and spend more on capital goods in the agriculture sector while keeping a close eye on government procurement. Conversely, for recurrent expenditure, which exhibited a negative relation to agricultural output, the study suggested a reorganization of overhead expenditures in the sector, emphasizing the need for close monitoring and reduction of overhead spending in all government agencies related to agriculture in Nigeria

Otu (2021) conducted a study with the aim of determining the impact of domestic investment on agricultural productivity in Nigeria. The research utilized secondary data and employed the Autoregressive Distributed-Lag (ARDL) with cointegrating bounds test. The study covered the period from 1981 to 2018. The analysis revealed that the impact of domestic investment,

encompassing both human and physical capital, on agricultural productivity in Nigeria was found to be negative and significant. As a recommendation, the study proposed an increase in domestic investment in the agricultural sector to facilitate the desired diversification of the revenue base of the Nigerian economy .

Boual and José did a similar investigation in Catalonia in 2022. Their objective was to evaluate the effect of domestic public investments in agricultural R&D on Catalonia's total factor productivity. Using a supplementary methodology grounded on econometric and accounting methodologies, they investigated the correlation between public spending in agricultural research and development and the rise in productivity between 1985 and 2015. The productivity increased, on average, at a pace less than one percent every year, according to the results. Nonetheless, throughout the first two decades of the analysis, the rise was far quicker. Furthermore, the empirical results show that public agricultural R&D significantly and favorably affects Catalan agricultural productivity. From a cost–benefit perspective, the estimates reveal a high return (15-28%) to R&D investments which has contributed to improve the productivity performance of the agricultural sector in Catalonia.

Abidemi and Rasak (2022) looked into how Nigerian agriculture production was affected by investments made in rural structural transformation. The study used Structural Auto Regression (SVAR) as its approach. The study's model has six variables: education spending (EXPE), health expenditure (EXPH), electricity expenditure (EXPEL), telecommunication expenditure (EXPTC), roads and construction expenditure (EXPRC), and agriculture expenditure (EXPA). Only the spending on agriculture (out of the six explanatory factors) was shown to be adversely associated to agricultural production; the other five variables showed positive relationships. The researcher's recommendations included the need to build decent, accessible roads, supply power and internet connection, and establish social amenities like clinics and health centers for remote communities. This will act as motivating factors in curbing rural-urban migration, and by extension improve the lots of agricultural productivity in Nigeria.

Some researchers were limited to the impact of mostly financial expenditures on agricultural production such as; commercial bank credits to farmers, government financial allocation to agriculture, average annual rainfall, interest rate, government policy reforms and investments on R&D. The model of this study specified agricultural production measured by agricultural value added to GDP as a proxy to domestic investments, the model also recognized the role of agricultural land, rural population and inflation on agricultural production in Nigeria.

III. METHODOLOGY

➢ *Sources of Data*

Time series data spanning 41 years, from 1981 to 2022, were gathered for the study. The data sources included the World Development Indicator (WDI), Central Bank of Nigeria Statistical Bulletin (various volumes), and the National Bureau of Statistics.

➢ *Formulation and Specification of the Model:*

Drawing from the theoretical framework elucidated earlier and integrating domestic investment into the agricultural sector in Nigeria, the study formulates a functional relationship between agricultural production and domestic investments as follows:

$$AGPROD = f(DKF, AGL, RUP, INF) \quad (1)$$

In the process of estimation, parameters and stochastic term "μ" are incorporated into the model to take care of variables that may influence the dependent variable but are not included in the model. Hence, equation 2 could be transformed as follows

$$AGPROD_t = \alpha 0 + \alpha 1 DKF_t + \alpha 2\ AGL_t + \alpha 3\ RUP_t + \alpha 4\ INF_t + \mu_t \quad (2)$$

To enhance the estimation of equation 3.2 using Autoregressive distributive lag model ARDL, it is transformed into a log-linear form by taking the natural log of some variables thus;

$$LnAGPROD_t = \alpha 0 + \alpha 1 \ln DKF_t + \alpha 2\ \ln AGL_t + \alpha 3\ \ln RUP_t + \alpha 4\ INF_t + \mu_t \quad (3)$$

Ln = natural logarithms
α0 = autonomous component of agricultural production
α1 – α4 = parameter estimates
AGPROD = agricultural production (measured by agricultural value added to GDP).
DKF = Domestic capital formation
AGL = Agricultural land measured by agricultural land as percentage of total land area
RUP = Rural population as percentage of total population (measured by growth in rural population)
INF= Inflation rate
μ_t = Disturbance term.

➢ *Apriori Expectation*

α1, α2, α3 and α4 are elasticities of domestic capital formation to agricultural sector, agricultural land, rural population and inflation rate in Nigeria. Hence, α1>0, α2>0, α3>0, and α4 <0.

➢ *Methods of Data Analysis*

To obtain the parameters of the aforementioned model adequately and assess the stationarity status of the series, we utilized the Augmented Dickey Fuller (ADF) and Phillip-Perron procedures. Subsequently, the Autoregressive Distributed Lag (ARDL) model was employed due to its

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robustness in analyzing short-run coefficients and long-run dynamics, as well as its ability to accommodate series with different orders of integration. Simultaneously, diagnostic and stability tests, encompassing assessments for serial correlation, heteroscedasticity, normality, specification error correction, Cumulative Sum (CUSUM), and Cumulative Sum Square (CUSUMQ), were conducted to ensure adherence to the assumptions of ordinary least squares Regression Analysis.

IV. EMPIRICAL RESULT AND DISCUSSION OF MAJOR FINDINGS

Table 1 Unit Root Test (Test of Stationary)

Variable	ADF Test for Unit Root				Phillip Perron (PP) Test for Unit Root			
	ADF test statistics	Test Critical Value		I(d)	Phillip Perron (PP) Adj. t-Stat	Test Critical Value		I(d)
		(5%)	10%			(5%)	10%	
D(AGPROD)	-7.256	-3.533	-3.198	I(1)	-7.955	-3.529	-3.1961	I(1)
D(DKF)	-6.395	-3.521	-3.194	I(0)	-8.033	-3.523	-3.192	I(0)
D(AGL)	-4.442	-2.889	-2.582	I(1)	-11.764	-2.885	-2.579	I(1)
D(RUP)	-5.137	-3.557	-3.212	I(0)	-6.641	-3.693	-2.606	I(0)
INF	-2.959	-2.350	-2.606	I(0)	-9.161	-2.936	-2.606	I(1)

Source: Researcher computation, 2023

The run results of the ADF and PP as shown on Table 3 with constant unit roots test reveals the results of the following, AGPROD and RUP variables are stationary after first differencing DKF, AGL and INF attained stationary at level I(0) under both ADF test while INF also became stationary after first differencing under philip perron unit root test approach . From the run of ADF-test and PP results one can deduce that this estimations have obtained the condition for conducting ARDL estimation. Therefore the variables are not integrated of the same order. Hence, the used of the bounds testing approach as in Pesaren, Shin & Smith (2001) was employed.

Table 2 Descriptive Statistics Results

	AGPROD	DKF	AGL	GRP	INF
Mean	22.88138	8.85E+12	68.74353	1.436977	18.94904
Median	22.23471	8.42E+12	72.66814	1.443949	12.87658
Maximum	36.96508	1.58E+13	76.25421	2.486120	72.83550
Minimum	12.24041	5.66E+12	0.000000	0.787065	5.388008
Std. Dev.	4.589772	2.08E+12	12.74005	0.386697	16.65935
Skewness	0.440302	0.963535	-4.093434	0.270002	1.854175
Kurtosis	4.732787	4.378585	21.95891	2.816175	5.306552
Jarque-Bera	6.454107	9.590747	728.5447	0.555885	32.58139
Probability	0.039674	0.008268	0.000000	0.757340	0.000000

Source: Authors' analysis using e-view 10 output

The descriptive statistics presented in table 2 illustrate the aggregate averages, including mean, median, and measures of spread and variation such as standard deviation. Skewness, indicating the degree of symmetry, reveals that AGPROD, DKF, and GRP exhibit positive skewness. Kurtosis, representing the peakedness of observations, shows values above 3 for AGPROD, DKF, AGL, and INF, indicating leptokurtic distributions. While these skewness and kurtosis values suggest a departure from normality, they do not significantly undermine the dataset's suitability for the analysis at hand. Agricultural production as a percentage of value added to GDP averaged 22.88% during the reviewed period, ranging from 12.240% in 1981 to 36.97% in 2002, with a median value of 22.235% and a standard deviation of 4.589. Domestic investments, measured by Domestic Capital Formation as a percentage of GDP, averaged 8.85 billion and varied between 5.66 billion in 1987 and 1.58 trillion in 1981. The median value was 8.42%, with a standard deviation of 2.08. These figures indicate a peak in domestic capital formation in Nigeria in the early 1980s, followed by a decline after the structural adjustment policy of 1986.

Agricultural land use in Nigeria remained high in 2022, constituting 76.25% of the total land area, with a mean of 68.74 and a standard deviation of 12.74. The average inflation rate during the study period was 18.95, significantly exceeding the inflation-growth relationship threshold suggested by previous studies. The minimum inflation recorded was 5.38% in 2007, while the maximum was 72.83% in 1995. Gross capital formation as a percentage of GDP was notably low at 7.05% in 1995, potentially influenced by the high inflation rate that year. The median inflation and standard deviation were 12.87% and 16.65, respectively.

- *Determination of Optimal Lag Length*

To select the lag length for the model, we used vector autoregressive (VAR) lag order selection criteria. From the results in table 3, it was clear that the best lag for the model was 2 based on the minimum value of **AIC (**76.89963***).**

Table 3 Optimal Lag Length Result

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-1527.775	NA	7.47e+28	80.67235	80.88782	80.74901
1	-1435.201	155.9129	2.16e+27	77.11586	78.40869*	77.57584*
2	-1406.093	41.36454*	1.87e+27*	76.89963*	79.26982	77.74293
3	-1381.917	27.99352	2.37e+27	76.94299	80.39054	78.16960

Source: Authors Computation Output of E-views 10 (2023)
* indicates lag order selected by the criterion

➢ *The Bound Test Results for Co-Integration*

The ARDL- bound test result for co integration as shown in Table 3. The Wald test (F-statistic) test and the joint null hypothesis reveals that the null hypothesis of no long run relationship should be rejected if the value of F-statistics is greater than the upper bound critical value at 5%. therefore, the F-statistic of the bound test as compared to the lower bound ,I(0), and upper bound critical values I(1), stood as a yardstick to reject the null hypothesis of no co integration. Conversely, if the test statistic falls below the lower critical values than the null hypothesis cannot be rejected.

Table 4 Result of ARDL Long Run form and Bounds for Co-Integration

Null Hypothesis: No long-run relationships exist		
Test Statistic	**Value**	**K**
F-statistic	5.425046	4
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: Authors computation using E-views 10 (2023)

At 5% significance level, the F-Statistic of 5.425046 is above both the lower bound I(0) which is 2.56 and the value of upper bound I(1) which is 3.49 thus we reject the null hypothesis. Therefore, the result in table 4 indicates that there is a long run relationship between the variables.

Table 5 Autoregressive Distributed Lag (ARDL) Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGAGPROD(-1)	0.772151	0.124422	6.205913	0.0000
LOGAGPROD(-2)	0.294020	0.137554	-2.137484	0.0408
LOGDKF	0.124247	0.082500	-1.506022	0.1425
LOGAGL	1.263576	0.345508	3.657156	0.0010
LOGGRP	-0.619702	0.164216	-3.773702	0.0007
LOGGRP(-1)	0.850707	0.165410	5.143011	0.0000
INF	-7.61E-06	0.000831	-0.009166	0.9927
R^2	0.857790		Durbin-Watson stat	1.724404
Adjusted R-square	0.824608		Prob(F-statistic)	0.000000
F-statistic	25.85091			

Source: Authors Computation Output of E-views 10 (2023)

Table 3 Contains the ARDL results for Agricultural Production AGPROD (-2) and Domestic Investment (DKF). The computed coefficient of AGPROD (-1) stood at 0.772151 implies that a percentage point increase in previous years AGPROD (-1), lead to 29% increase in the current year agricultural production in Nigeria. The result is statistically significant based on the probability values at 5%. It also revealed that one percent increase Domestic capital formation (DKF) will lead to 12% increase in agricultural production in Nigeria. This is consistent with theoretical expectation of the study however statistically insignificant based on the probability values at 5%. The finding agreed with Edeh, Chukwudi, and Emmanuel (2020), however at variance with the findings of Otu, (2021) on the impact of domestic investment, both in human and physical capital, on agricultural production in Nigeria was negative and significant. Adewale, Lawal, Aberu, and Toriola, (2022) used farmer's credit by banks under ACGSF on agricultural productivity to examine the effect of domestic investment on agricultural production, their findings exerts a significant positive effect on agricultural output.

The coefficient of AGL (1.263576) showed that 1% increase in agricultural land lead to 1.26% increase in agricultural production. This is also consistent with the

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theoretical expectation of the study. The value is statistically significant based on the probability (0.0208) values at 5%. Furthermore, it was noted that less than 50 percent of the country's cultivable agricultural land is under cultivation (Seriki, 2022). Even then, smallholder and traditional farmers who use primary production techniques, with resultant low yields, cultivate most of this land.

The values of computed coefficient of RUP(-2) stood at 0.850707 this implies that 1% increase in rural population will leads to 85% increase in agricultural production in Nigeria. And is statistically significant based on the probability values at 5%. These findings revealed that rural population has played a significant role in the sustainability of agricultural production. This has also confirmed the works of Sunday (2021), he found that agricultural land had significant positive relationship with the rural population expansion he noted that the demand to feed the teaming population requires increase in agricultural land. Therefore, agricultural land has direct relation to agricultural production in Nigeria.

The coefficient of inflation rate INF (1) revealed negative result (-7.61E-06) and insignificant effect on agricultural production with a probability (0.9927) this implies that one percent increase in inflation rate will lead to 7.6% decrease in agricultural production in absolute term.

The F-statistics value of the study that 25.85091, measures the joint significant of the parameter estimates was found to be statistically significant at 5 % level. This indicated by the corresponding probability of (0.000000). In conclusion all the variables were jointly and statistically significant in influencing agricultural production in Nigeria. The R^2 values of 0.857790 (86%) implies that 86% total variation in agricultural production was explained by domestic investment, agricultural land, rural population and inflation in Nigeria. Coincidently, the adjusted R^2 value of 0.824608 was found also to be high after adjustment for the degree of freedom. This implies the model is fit and reliable for policy making which indicated that agricultural production was significantly explained by domestic investment, agricultural land, rural population and other variables. Lastly, the Durbin Watson Statistics of 1.724404 which signifies the absence of serial autocorrelation in the series. Further confirmation of the autocorrelation test was conducted using serial correlation LM test.

Table 6 ARDL Cointegrating and Long Run Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDKF	0.241159	0.160146	-1.505873	0.1422
LNGRP	0.419863	0.131081	3.203093	0.0031
LNAGL	2.406707	0.389425	6.180150	0.0000
INF	0.000078	0.001588	0.049374	0.9609
C	-0.120064	4.757263	-0.025238	0.9800
CointEq(-1)*	-0.415189	0.063305	-6.558504	0.0000

Source: Authors Computation Output of E-views 10 (2023)

The result in table 6 shows the result of ECM, the current level of domestic investment in the agricultural production is positive both in the short run and in the long run, this revealed that the result didn't deviates from the apriori expectation. The coefficient of the lagged error correction term (ECM) of -0.529605 suggests that the convergence of the model to long run equilibrium occurs at a speed of approximately 53% percent. This implies that 53% per cent of impulses that occur will be corrected before next year and the correction of the existing disequilibrium will take within a very short time. This alludes to the fast equilibrating speed of the estimated model**.** This results further indicates domestic investment, agricultural land, rural population and inflation adjustment term equilibrium in the dynamic model is possible. Bannerjee, Dalado & Mestre in Apanisile and Okunlola (2014) posited this as an evidence of a stable short term relationship. The coefficient of error correction term of (-0.529605) implies that deviations from the sort term agricultural production output rate of the variables would adjust quickly in the long run.

➢ *Serial Correlation Test*

Under the test for serial correlation the residual test adopted the Breusch-Godfrey serial correlation linear method. The null hypothesis of no serial correlation in the residual was accepted. The insignificant value of the observed R-squared probability at 5 per cent significant level used as the statistical yardstick.

Table 7 Result of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.371230	Prob. F(2,28)	0.6932
Obs*R-squared	0.981596	Prob. Chi-Square(2)	0.6121

Source: Authors Computation Output of E-views 10 (2023)

The result of Breusch-Godfrey Serial Correlation LM Test shows that the probability values of F-statistics and observed Obs*R-squared are greater than 0.05 probability value at 5% level of significance. Therefore, the null hypothesis of no serial correlation in the residual was accepted.

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➢ *Heteroskedasticity Breusch-Pagan-Godfrey*

Similar to the preceding residual test, the Breusch-Pagan-Godfrey Heteroscedasticity test was employed with a maximum lag of 2 was selected. This signifies the acceptance of the null hypothesis of residual being homoscedastic.

Table 8 Result of Heteroskedasticity Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.612763	Prob. F(7,30)	0.7409
Obs*R-squared	4.753517	Prob. Chi-Square(7)	0.6900
Scaled explained SS	2.939441	Prob. Chi-Square(7)	0.8905

Source: Authors Computation Output of E-views 10 (2023)

The result of Heteroskedasticity Test: Conditional Heteroscedasticity ARCH-test shows that the probability values of F-statistics and observed Obs*R-squared are greater than 0.05 probability value at 5% level of significance. Therefore, the null hypothesis of no Heteroskedasticity in the residual was accepted, that means the residuals are homoscedastic because the probability of F-statistics (0.9585) and Obs*R-squared (0.9550) are both greater than 0.05%.

➢ *Stability of Model Parameters*

The statistical analysis of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares and recursive residuals (CUSUMSQ) was conducted to assess the stability of the model parameters. The first test looked into systematic changes in the calculated coefficients, whereas the second test looked into abrupt and unintentional changes in the coefficients' stability. Given that both graphs fell inside the crucial zone, the CUSUM and CUSUMSQ plots (refer to Figures 4.1 and 4.2) both showed stability in the coefficients across the sample period.

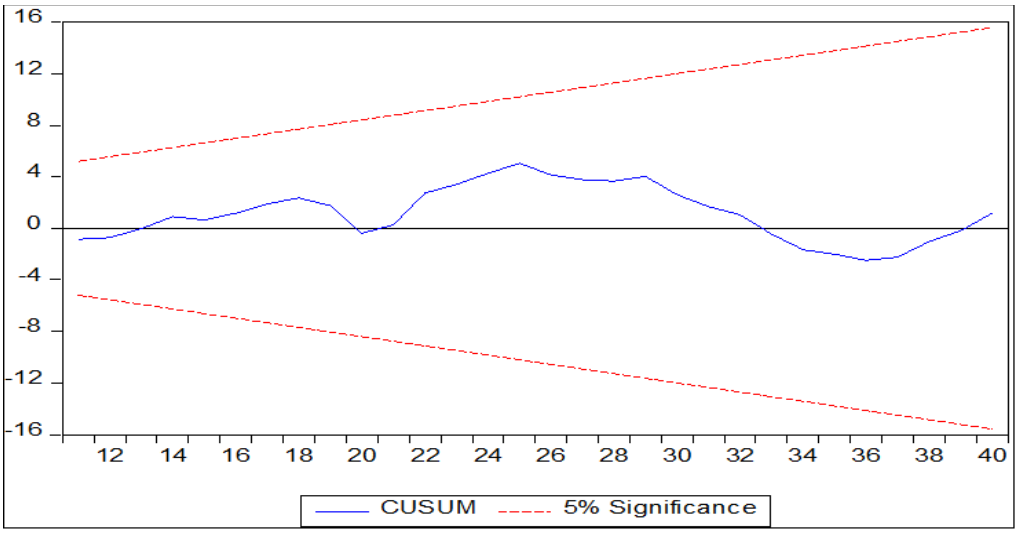

Fig 1 Cumulative Sum of Recursive Residual (CUSUM)

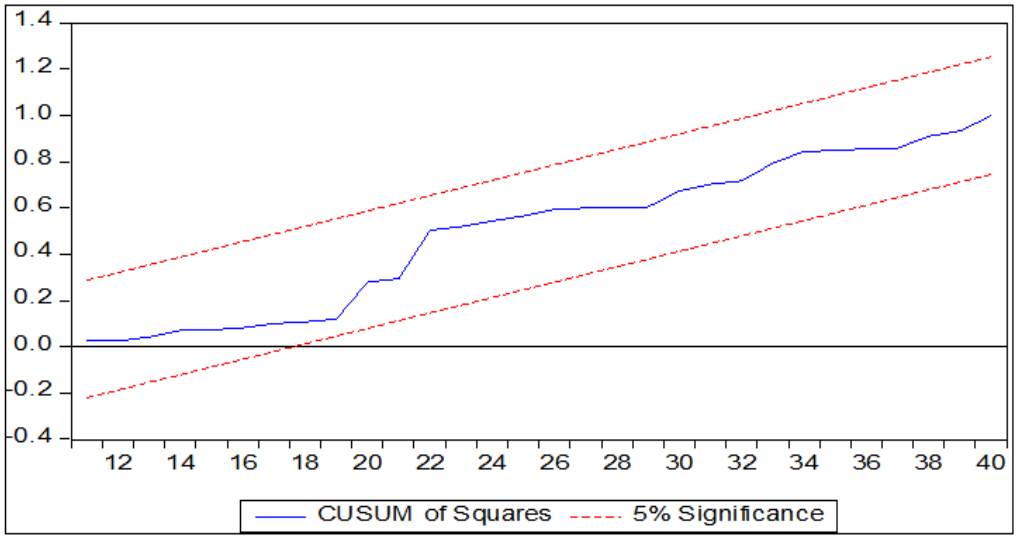

Fig 2 Cumulative Sum of Squares (CUSUMSQ)

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Figure 1 and 2 indicates the underlying ARDL equation passes the diagnostic test. the stability of the long-run coefficient, alongside with the short-run dynamics of the estimated ARDL model were confirmed with the tests of Cusum and Cusum square as indicated by the blue lines falling within the 5% bounded lines. This implies the model will converge in the long run and is dynamically stable at the start and end period.

V. CONCLUSION AND POLICY RECOMMENDATIONS

➢ *Conclusion*

The research examined the impact of domestic investments on agricultural production in Nigeria from 1981 to 2022. The study employed data on Agricultural value added to GDP as a measure of Agricultural production and Domestic capital formation also proxies domestic investment, other variables include agricultural land rural population measured by growth in rural population and inflation rate. From the inferential results, it is pertinent to submit that domestic investment though recorded a positive impact on agricultural production in Nigeria; its impact was insignificant because of the infinitesimal amount of domestic savings to drive investments into Nigeria between the periods under review. The results also revealed that agricultural land and rural population which constitute the larger percentage of Nigerian population have positive and significant impact on agricultural production in Nigeria, inflation rate recorded a negative and insignificant impact on agricultural production and also conforms to Apriori expectations. Conclusively, it will be proven statistically accurate and reliable to deduce that domestic investments had an insignificant impact on agricultural production in Nigeria. Bound test approach embedded in the ARDL was carried out confirming a long run relationship among all the variables. It further unveils that their errors correction terms was significant for adjustment annually for agricultural production in Nigeria to be significant.

➢ *Recommendations*

On the basis of the findings on the impact of domestic investment on agricultural production in Nigeria following recommendation are made.

- Since, domestic investment and agricultural production are issues of national concern therefore, the finding of the study revealed positive however insignificant impact of domestic investment on agricultural production in Nigeria. The findings recommend that, increase domestic investment from the physical assets by household, public and government sector will have a long run significant impact; capital should be generated through promoting savings, mobilizing and directing savings to investment in production sector of the economy such as agricultural sector. This is because the findings of this research revealed that the coefficient of agricultural land and rural population had positive and significant impact on agricultural production. Therefore, increasing investment in agriculture will propel rural population to cultivate a vast agricultural land and enhance agricultural production in Nigeria. Furthermore, the coefficient of inflation rate shows that inflation impacts agricultural production negatively, this means that inflation tends to increase the cost of farming also drives small holder farmer out of the production. Policy makers should ensure a moderate inflation rate that will not discourage farmers from cultivating the gift of nature in Nigeria
- The study also recommend that government should exercise more effort to improve the wellbeing of farmers because, the findings of this study revealed rural population exerted positive and significant impact on agricultural production in both short and long run in Nigeria. The rural populations is mostly smallholder farmers and are still constrained by many problems, including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, inadequate research and extension services among other.

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