

MACROECONOMIC IMPACT OF AGRICULTURAL FINANCING REFORMS: A COMPUTABLE GENERAL EQUILIBRIUM ANALYSIS OF NIGERIA

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ABSTRACT**Purpose-** The study analyzed the macroeconomic impact of agricultural financing reforms: a computable general equilibrium analysis of Nigeria. Specifically, the study evaluated the macroeconomic impact of the agricultural financing reforms on economic growth, and agricultural output.**Methodology-** This study employed time series data from secondary sources such as the Central Bank of Nigeria (CBN), the National Bureau of Statistics' (NBS) in conjunction with the World Bank Living Standard Measurement Study (LSMS) and Information from the Nigerian Living Standard Survey for 2019 was used to obtain shares of household income and expenditure which covered the period 2010-2022. Applying the economy-wide methodology of Computer General Equilibrium model on reformatted upgraded Social Accounting Matrix for Nigeria, Simulation Designs, and t- test.**Findings-** The study finds that agricultural financing reforms through a decrease in interest rates on agricultural loans by 10% and 8% have positive significant impact on economic growth. The results of the study also reveal that agricultural financing reforms through a decrease in interest rates on agricultural loans by 10% and 8% have positive significant impact on agricultural output.**Conclusion-** The two policy scenarios (10% and 8% reduction in interest rate on agricultural loans) were simulated and the results for both cases indicated that all the macroeconomic indicators increased significantly due to the policy options.**Keywords:** Macroeconomic impact, agricultural financing reforms, computable general equilibrium analysis, economic growth, Nigeria.**JEL Codes:** A11, B23, B41, C53, E47**1. INTRODUCTION**

Agriculture serves as a panacea in the development of an economy and is renowned in the annals of developed and developing economies. Agriculture is the foundation of economic development and an avenue for eradication of poverty (Sertoglu, Ugural and Bekun, 2017). It acts as an impetus that quickens the drive of basic change and economic diversification, empowering nations to completely use their factor enrichment, depending less on import of farm products or raw materials for its economic growth, development, and sustainability (Ademola et al., 2013).

Despite these enormous potentials, the sector still grapples to meet her obligations given the concurrent supply-demand gap in food production. It is impossible to over stress the role of capital in agriculture, much the same as in the industrial and service sectors, given that it serves as a stimulant to production. However, it has been shown that public expenditure on agriculture is inadequate to achieve the goal of the Government's agricultural policies (IFPRI, 2008).

Reforms are a necessary aspect of every organization's or system's evolution. The Nigerian government had accepted financial sector improvements as part of its monetary change program. Various governments aimed to alter the financial sector and ease its contact with the agriculture sector through this change initiative (Omankhanlen, 2012). In this study, two policy scenarios were developed and tested. Given that agricultural finance changes are strongly tied to output, these possibilities entail lowering the base-year share of farm loan interest rates by a significant amount. The two scenarios are as follows: (1) a 10% reduction in the interest rate on agricultural loans in accordance with the CBN's interest draw-back policy. (2) An 8% reduction in the interest rate on agricultural loans in accordance with the single-digit interest rate policy. The Federal Government of Nigeria (FGN) developed and implemented several agricultural financial reforms through the Central Bank of Nigeria (CBN) in recognition of its importance to the Nigerian economy. These reforms all aimed at ensuring that finance is available to improve the real sectors, particularly the agricultural sector, leading to development and economic growth, among other things. The financial sector is undoubtedly a pertinent segment of every economy and is central in the development of the Agricultural sector. Inconsistencies in financial policies may be an impediment to domestic crop production, farmers' welfare, and attainment of food self-sufficiency (Feridun et al. 2006) and (Nwanze et al., 2006). Decision-making and planning become extremely unclear, putting investments at risk, resulting in revenue losses for producers, worsening their welfare status and plunging them deeper into poverty. Consumers' incomes, on the other hand, are impacted since they pay up to four times the global price for imported food under high tariff regimes, worsening their welfare and poor status (Griswold, 2006). According to the National Bureau of Statistics (NBS), over 69 percent of Nigerians are poor, showing a lack of welfare and well-being. Public policy must increase social welfare, which necessitates addressing the question of how these policies affect the wellbeing of persons in that society (Slesnick, 1998). Computable General Equilibrium (CGE) models are a class of economic models that use real-world data to predict how an economy will react to changes in policy, technology, or external factors. CGE models are appropriate whenever it is necessary to estimate the impact of changes in one part of the study, such as agricultural finance reforms and economic growth, on the rest. In a single term, the Nigerian government had the ability to drive its economy forward through banking sector reform (Onoja et al., 2011). However, considering the reforms of the past two decades, the Nigerian financial system has been unable to fulfil its potential as a stimulant to economic growth and development. The lack of research results explaining the magnitude of the effects of financial reforms on the agricultural sector in Nigeria which details the constraints on the acceptable policy derivation and implementation of Nigeria's agricultural finance policy, has made the need for this study to become apparent. Such research becomes even more relevant when one considers the discoveries of Manyong et al. (2004) which displayed the pace of growth of the quantity of credits guaranteed by ACGSF to agriculture showing high nominal growth rates but a negative real growth rate. The critical role of agricultural financing in promoting agricultural growth and development cannot be overstated. Olomola (2017) asserts that the agricultural credit guarantee scheme is usually viewed as a successful policy instrument for enhancing agricultural commodities production and distribution. Credit finance, according to Rahji (2010), is more than a resource like labor, land, equipment, and raw materials. Obansa and Madueke (2013) explored the impact of agriculture finance on Nigerian economic growth and determined that causality exists in both directions between economic growth and agriculture financing, as well as between economic growth and agricultural growth. Additionally, the study suggests that foreign direct private loan, share capital, foreign direct investment, and development stocks will be more productive financing options for investment. Additionally, when multilateral loans, domestic savings, Treasury bills, government development aid, foreign direct investment, and development stock are used to support the capital-output ratio, it becomes more appropriate. The study concluded that agricultural-led economic growth requires the continuation of credible pro-investment macroeconomic policies, as well as the possibility of a debt-equity swap. Similarly, Ullah et al. (2002) asserts that credit affects farmers' access to all available resources. As a result, implementing suitable macroeconomic policies and facilitating institutional financing for agricultural growth has the potential to support agricultural development by increasing the sector's contribution to employment, income, and foreign exchange creation (Olomola, 2017).

This study aimed to answer two research questions: firstly, what is the impact of agricultural financing reforms on economic growth in Nigeria, and secondly, what impact does agricultural financing reform have on agricultural output in Nigeria? The main objective of this research was to examine the macroeconomic impact of agricultural financing reforms in Nigeria. To achieve this goal, the study aimed to determine the impact of agricultural financing reforms on economic growth in Nigeria and evaluate the impact of agricultural financing reforms on agricultural output in Nigeria. The study was guided by two null hypotheses, which are as follows: H_{01} : Agricultural financial reforms do not have a significant impact on economic growth in Nigeria, and H_{02} : Agricultural financial reforms do not have a significant impact on agricultural output in Nigeria. These hypotheses were used to test the relationship between agricultural financing reforms and economic growth as well as agricultural output in Nigeria.

This paper will continue as follows. The second section is a review of the relevant literature. The third section discusses the study's methodology. The fourth section describes the data analysis procedure and specifies the Computable General Equilibrium (CGE) model. The final section concludes with a summary of the results, discussions of the findings, and recommendations for the country's relevant authorities.

2. LITERATURE REVIEW

2.1. Review of Agricultural Financing Reforms in Nigeria

The Federal Government of Nigeria (FGN) developed and implemented several agricultural financial reforms through the Central Bank of Nigeria (CBN) in recognition of its importance to the Nigerian economy. The preceding schemes are as follows:

The Regulatory Era (1952-1991) and Agricultural Development

A couple of agricultural financial sector reforms occurred during this time period in the economy. The 1952 banking ordinance, the 1973 establishment of the Nigerian Agricultural and Cooperative Bank, the establishment of rural banking in 1977, and the establishment of the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977 all contributed to commercial banks bearing less risk when extending credit to farmers (Nsikak & Udoh., 2015).

The Nigerian Agricultural and Cooperative Bank (NACB)

The Nigerian Agricultural and Cooperative Bank was established in 1973 as an agricultural development bank with the mission of assisting in the growth and development of agriculture through credit extension. Its broad objectives were "To aid in encouraging agricultural production and rural development, as well as improving the quality of life of Nigeria's rural population and making the country self-sufficient in food production," (Ajakaiye, 1985).

The Rural Banking Programme

The Rural Banking Programme was established in July 1977 in response to the recommendations of the Okigbo Financial Review Commission in 1976. The program's goals include the improvement of rural banking habits, the mobilization of savings and their use for productive businesses in rural areas, the development of agriculture and agro-based industries, the reduction of youth migration to cities, and the attainment of the national goal of food self-sufficiency. (Acha & Acha 2012).

Mandatory Sectoral Allocation to Agriculture

Under this scheme, Commercial and merchant banks were required to lend a minimum of 6% of their loan portfolio to agriculture, which was eventually increased to 12%. In order to boost agricultural export trade, the government implemented a trade strategy in 1973 that abolished export taxes on designated export crops. Imports of food, agricultural machinery, and equipment have been liberalized. (Okafor, 2020).

Structural Adjustment Programme

As the country's economic troubles, which have plagued it since the early 1980s, became increasingly apparent, including stalled growth, growing inflation, unemployment, food shortages, and accumulating external indebtedness. The government initiated the Structural Adjustment Program (SAP) in July 1986, which included economic and financial liberalization as a key component. SAP was created, according to (Olomola 1994), to restructure and diversify the economy's productive base, achieve fiscal balance of payment stability, maximize the private sector's intense growth potential, and put the economy on a steady and balanced growth path. The restructuring of the fiscal sector, as well as the liberalization of financial institution and market supervision and regulation, are two important gaps in this program.

The Agricultural Credit Guarantee Scheme

The Agricultural Credit Guarantee Scheme Fund (ACGSF) was a policy tool used by the Nigerian government to encourage farmers to take out loans. The program was founded by Decree No. 20 of 1977, although it only became operational in 1978. Its purpose was to provide bank loans to farmers for agricultural output and agro-allied processing (Nwosu and Oguoma 2010).

The Liberalized Regulation Era (2000 – 2005)

From 2000 to 2005, there was a period of liberalized regulation with universal roles, which saw the merger of commercial and investment banking. It resulted in the creation of a financial supermarket for both wholesalers and retailers and provided a wide range of financial services. Under the universal banking system, deposits can be made into current, savings, or other accounts, and checks can be paid out or collected.

The Regimented Regulation/Consolidation (2005-2009)

This reform, which began in 2004, was spurred by the need to strengthen banks. The policy objective from the start was to expand banks and position them to play critical roles in driving economic development across all sectors. Bank capital bases were increased from N2 billion to a minimum of N25 billion as a result of the mergers and acquisitions, lowering the number of banks from 89 to 25 in 2005 and subsequently to 24 in 2006. (Eyo & Elejo 2019).

The Nigeria Incentive Based Risk Sharing System for Agricultural Lending

The Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL Plc.) is a non-bank financial institution with a market capitalization of \$500 million and is solely owned by the Central Bank of Nigeria (CBN). Its goal is to help financiers and investors redefine, dimension, measure, re-price, and share agribusiness-related credit risk. Through its five (5) strategic pillars, NIRSAL aims to increase the flow of affordable finance and investments into the agricultural sector by de-risking the agribusiness finance value chain, fixing agricultural value chains, building long-term capacity, and institutionalizing agricultural lending incentives. (Polycarp 2020).

NIRSAL Microfinance Bank (NMFb)

The NIRSAL Microfinance bank was incorporated in 2019 as a private Limited Company and commenced operations in 2020 following the issuance of license by the Central Bank of Nigeria to operate as a national microfinance bank in the same year. The bank is owned by the Bankers Committee, NIRSAL PLC and NIPOST. The bank was designed to effectively administer intervention funds for Agricultural and other small informal businesses under the Agribusiness Small and Medium Enterprise Investment Scheme (AGSMEIS), improve access to intervention funds for SME's and farmers and address the challenges militating against the AGSMEIS initiative. (Mikugi & Bagudu 2020).

2.2. Agricultural Finance and Economic Growth in Nigeria

Peasant small holder farmers dominate agricultural activity in Nigeria, accounting for over 90% of farm holdings in the country. These farmers typically use traditional farming practices and produce mostly for sustenance. Government interventions have been shaped by the need to provide inputs and other support to peasant farmers to boost productivity and facilitate the transition to mechanized agricultural practices, while commercial farmers have benefited from credit facilities, input subsidies, capacity building initiatives, and export incentives. FMARD (2016). Agriculture has remained a growth driver in Nigeria, despite the fact that its pace of growth has continually fallen over time. Between 2000 and 2005, the sector increased by 15.9% (although this high figure can be attributable to the massive rise of 55.9% in 2002, without which it would have grown at 6.0%). However, between 2006 and 2010, and 2011 and 2016, it grew at 6.5 and 4.1 percent, respectively. Similarly, the industry has remained prominent in Nigeria's economy, owing in part to its contribution to GDP in terms of value added and the proportion of the population employed in the sector, which is estimated to be around 50% of Nigerians. Between 2000 and 2005, the sector provided 36.3 percent of total GDP value added. Its average contribution, on the other hand, has steadily fallen over time, falling to 31.7 percent in 2006-2010 and 21.3 percent in 2011-2016 (World Bank, 2017).

One of the goals of most government agricultural policies or programs has been to increase the country's self-sufficiency, lower the share of imported food, and boost the export of agricultural goods. The ratio of agricultural raw material exports as a percentage of overall merchandise exports increased steadily from 2000 to 2016, as shown in Table 1. Its market share increased from a meager 0.1 percent in 2000-2005 to 1.0 and 4.3 percent in 2006-2010 and 2011-2016, respectively. However, significant improvements in lowering the share of agricultural raw materials imports in total merchandise imports at the start of the period under study were reversed by the conclusion of the year. Adamgbe et al (2020). Ayeomoni & Aladejana (2016) examined the relationship between agricultural credit and economic growth in Nigeria and observed a short- and long-run relationship between agricultural credit and economic growth. Additionally, they noted that the agricultural sector of a country cannot be understated because it has been and will continue to be a source of food for the general population as well as a solid source of revenue to encourage economic development. Despite having the resources to generate its own food, Nigeria imports a large portion of its food from the worldwide market (Noko, 2016a). Nigeria has become economically and politically unstable because of such importation, which has resulted in a falling standard of life for its rural and urban households, who spend most of their incomes on food. The agriculture sector's transformation will put the country on the road to food security, as productivity rises, imported inflation falls, and foreign exchange savings rise, resulting in economic stability. Food security will encourage the development of agro-allied businesses to add value to agricultural products for export. Not only would this increase the value of raw resources, but it will also result in large-scale employment and foreign exchange earnings. This will also determine the rate at which industrialization takes place. When this occurs, the agricultural sector will meet the industries' labor demands. Furthermore, because most people work in the rural agricultural sector, a large portion of domestic consumption occurs there. This population provides a vast market for industrial products as their income rises. Umeji (2019).

2.3. Agricultural Finance and Agricultural Output in Nigeria

Agriculture output in Nigeria was studied by Iganiga and Unemhilin (2011), who looked at the impact of federal government agricultural expenditure and other agricultural output variables. To calculate GDP growth, a Cobb Douglas Growth Model was used, which included commercial credits for agriculture as well as a consumer price index and an annual average rainfall as well as a population growth rate and food importation. According to their findings, federal government spending on capital projects

was linked to agricultural output. Multiple regression analysis was utilized by Izuchukwu (2011) to examine the agriculture sector's role in Nigeria's economic growth. They found a positive correlation between GDP and domestic savings, government spending on agriculture, and foreign direct investment between 1986 and 2007. According to the findings, 81 percent of the fluctuation in GDP may be attributed to domestic savings, public spending, and foreign direct investment.

3. METHODOLOGY

Creswell (2017) described research design as the plan used to generate answers to the various research problems by the researcher. Mohajan (2018) in agreement with Creswell (2017) also defined research design as a specific plan set out by a researcher to obtain information from research participants and research tools. This study is designed to examine the macroeconomic implications of agricultural financing reforms on the economic growth and agricultural output of Nigeria; it is descriptive in nature and will therefore employ the descriptive research design.

The study was conducted in Nigeria. In the Gulf of Guinea in Western Africa, the country has a total land area of 923 768 km² (356 669 sqm), ranking it as the world's 32nd largest country by land area. Located between 40 and 140 degrees' north latitude and 20 to 150 degrees' east longitude, Nigeria is a country in West Africa

This study employed time series data from secondary sources such as the Central Bank of Nigeria (CBN) database and other relevant entities; including the updated Social Accounting Matrix (SAM) derived from the 2006 Input-Output Table; (ii) the Central Bank of Nigeria's (2019) sectoral output data; and (iii) the National Bureau of Statistics' (NBS) Year 2019 household income and expenditure data for Nigeria in conjunction with the World Bank Living Standard Measurement Study (LSMS).

4. METHOD OF DATA ANALYSIS

4.1. Specifying CGE Model

Based on the work of Dervis *et al.* (1982) and its adaptation to Nigeria by Olofin *et al.* (2003) and Obi-Egbedi *et al.* (2012), the CGE structure was modeled to suit the objectives of this study. All Cobb Douglas and Leontief types were used, and the Constant Elasticity of Substitution (CES) functions were used. As shown in Equation 1, each sector's output comprises value-added, which is the product of two main inputs: labor and capital.

$$XV = \alpha_i LAB_i^\alpha CAP_i^{(1-\alpha)} \quad (1)$$

As a result, Equations 2 and 3 can also be used to calculate labor and capital in each sector.

$$LAB_i = \alpha_i PV_t \frac{X_t}{W} \quad (2)$$

$$CAP_i = (1 - \alpha_i) PV_t \frac{X_t}{PK_i} \quad (3)$$

PV_t, X_t, W, PK_i are the price value-added, domestic output, current wage rate in the economy, and capital price in sector I respectively.

The household income function is written as follows:

$$HHY_h = \sum hfy_lshi(LAB_i W) + \sum hfy_kshi CAP_i PK_i (1 - depr_i) \quad (4)$$

where HHY_h is the household income of household h (rich or poor), is a function of labor supplied at the ruling wage rate (W) and capital stock (K) of the households at the ruling price of capital (PK) and depreciation rate (depr_i), and hfy_{lshi} is the share factor income from labor received by household i and hfy_{kshi} is the share factor income from capital received by household i. Households spend their money on items produced by the sectors, including rival commodities imported from other countries. Imports and domestic demand, on the other hand, are believed to be imperfect substitutes under the Armington assumption (Armington, 1969). Hence, the quantity of composite commodity *i* consumed by household *h* is given by

$$HEXPQ_{(h,i)} = \frac{hexp_{shi} * HHY_h}{PQ_i} \quad (5)$$

Where $HEXPQ_{(h,i)}$ is the quantity of composite commodity *i* consumed by household *h*, $hexp_{shi}$ is the expenditure share for household h on goods from sector I and PQ_i is the price of a composite commodity sector I and $hexp_{shi}$ as defined earlier. Each household maximizes a Cobb–Douglas utility function subject to their income, thus the household utility function is given by

$$HHU_h = \sum hexp_{shi} \log HEXPQ_{hi} \quad (6)$$

where HHU_h is household utility, $hexp_{shi}$ and are as defined. Household savings are defined as the difference between household income and expenditure, but total household savings are calculated by adding the savings of all households together.

$$SAV_h = HHY_h - \sum hexp_{shi} HHY_h \tag{7}$$

$$HSAV = \sum SAV_h \tag{8}$$

Where SAV_h and $HSAV$ are household savings and total households’ savings respectively and the Agricultural loan disbursement function is given as:

$$AGRLOANEX_{AGR} = GSEC * \frac{GRTOT}{P_{AGR}} \tag{9}$$

Where $AGRLOANEX_{AGR}$ is Agricultural loan disbursement due to reforms, $GSEC_{AGR}$ is government sectoral consumption, $GRTOT$ is government total revenue and P_{AGR} is the price of the composite agricultural commodity (domestically produced and imported).

4.2. Simulation Design

To achieve the objectives of the study, two policy scenarios were formulated and simulated in this study. These scenarios involve reducing the base-year share of agriculture loan interest rate by some magnitude, given that financial reforms in agriculture are directly related to output. The two scenarios include:

- (1) 10 percent decrease in the interest rate on agriculture loan in line with the Interest draw-back policy of the CBN.
- (2) 8 percent decrease in the interest rate on agriculture loan in line with single-digit interest rate policy

The evaluation of the effect of decreases in the interest rate on agriculture loans on households’ welfare regarding utility gained or lost will be analyzed using the Hicksian Equivalent. Following Obi-Egbedi *et al.* (2012) and Philip and Iorember (2017). The Hicksian Equivalent Variation (EV) is given as:

$$EV^h = \left[\frac{U_n^h - U_0^h}{U_0^h} \right] Y_0^h \tag{10}$$

Where,

Y_0^h = Income of household h before the policy change,

U_0^h = Utility of household h before the policy change,

U_n^h = Utility of household h after policy change, and

EV^h = Equivalent Variation of household h.

A policy is said to affect households if the calculated value of the equivalent variation (Hicks in a coefficient) is greater than zero. o (i.e., if $EV > 0$). The higher the value of the equivalent variation, the more impactful the policy is to the households (Phillip and Iorember, 2017).

5. RESULTS

Macroeconomic Impact of Increase in Agricultural Financing through 10 Percent Decrease in Interest Rate

In order to ascertain the impact of increase in agricultural financing on the macroeconomic variables of economic growth, household income and household welfare in Nigeria, scenario one (10 percent decrease in the interest rate on agriculture loan) was simulated and the results are presented in Table 1.

Table 1: Simulation One (10% decrease in interest rate)

	Baseline Impact (₦ Billion)	Simulatec Impact (₦ Billion)	Percentage Change (%)
Economic Growth	10,744.90	11,832.75	10.12
Agricultural Output	3,328.182	3,764.33	13.10

Result in Table 1 shows that, the macroeconomic variable of economic growth increase from ₦10,744.90 to ₦11,832.75 representing 10.12% due to increase in agricultural financing through 10% reduction in interest rate on agricultural loans. Also evident in Table 1, the results indicated that agricultural output increased from ₦3,328 to ₦3,764 which is about 13.10 percentage increase as a result of increase in agricultural financing through 10% reduction in interest rate on agricultural loans. Furthermore, for all the indicators, the results showed a positive increase suggesting that a policy of 10% reduction in interest rate on agricultural loans have significant positive impact on the macroeconomic variables.

Macroeconomic Impact of Increase in Agricultural Financing through 8 Percent Decrease in Interest Rate

In order to ascertain the impact of increase in agricultural financing on the macroeconomic variables of economic growth, and agricultural output, scenario one (8 percent decrease in the interest rate on agriculture loan) was simulated and the results are presented in Table 2.

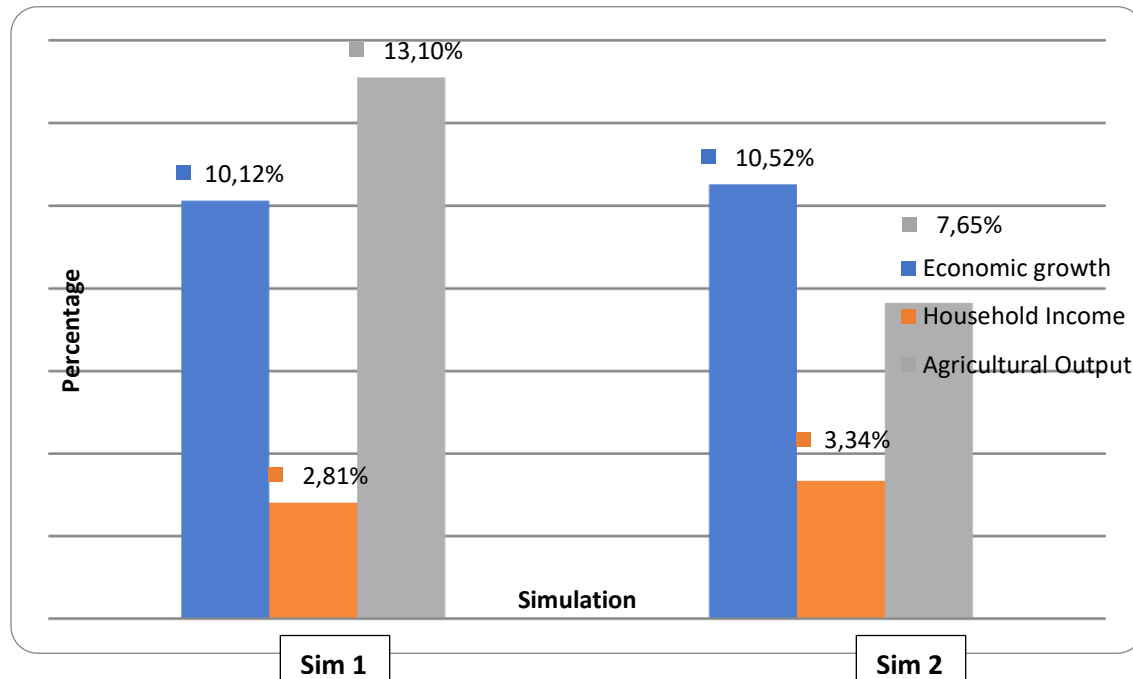
Table 2: Simulation Two (8% decrease in interest rate)

	Baseline Impact (₦'Billion)	Simulated Impact (₦'Billion)	Percentage (%) Change
Economic Growth	10,744.90	11,874.99	10.52
Agricultural Output	3,328.182	3,582.87	7.65

Result in Table 2 reveal that, economic growth increase from ₦10,744.90 to ₦ 11,874.99 representing 10.52% due to increase in agricultural financing through 8% decrease in interest rate on agricultural loans. Further, the results divulge that agricultural output increased from ₦3,328.18 to ₦3,582.87 which is about 7.65 percentage increase as a result of increase in agricultural financing through 8% decrease in interest rate on agricultural loans.

To further buttress the findings, the results of simulation one (SIM 1) and simulation two (SIM 2) is presented on Figure 1. For SIM 1, Figure 1 shows that the impact of the policy (10% decrease in interest rate on agricultural loans) has highest impact on agricultural output, followed by economic growth and then household income. While for SIM 2, Figure 1 indicates that the policy (8% reduction in interest rate on agricultural loan) has highest impact on economic growth, followed by agricultural output and then household income.

Figure 1: Percentage Change in the Macroeconomic Indicators due to Simulation One and Simulation Two



Diagnostic and Sensitivity Checks

To determine the robustness and reliability of the simulations results, the study employed two diagnostics and sensitivity checks; to evaluate if the model has been able to replicate the benchmark or initial equilibrium, and to verify the non-violation of the Walras law which states that the Walras variable must be approximately zero. In the first case, the results indicated that the baseline simulations replicated the benchmark equilibrium, and in the second case, the results showed that the values of the Walras variable for both the baseline simulation and the counterfactual simulations are approximately zero as required. These suggest that the model has goodness of fit and has performed well; hence, the findings of the study are robust and reliable.

Test of Hypotheses

For hypotheses one, and two, the decision rule is to reject the null hypothesis (H_0) if a policy option has greater than 5% impact on the macroeconomic economic variables. Otherwise, do not reject H_0 .

All two hypotheses were tested using the results in Tables 1 and 2 as well as Figure 1.

Hypothesis 1: Since the percentage change in economic growth is greater than 5% due to agricultural financing reforms (simulations one and two), the study rejects the null hypothesis and conclude that agricultural financing reforms have significant impact on economic growth in Nigeria.

Hypothesis 2: Since the percentage change in agricultural output is greater than 5% due to agricultural financing reforms (simulations one and two), the study rejects the null hypothesis and conclude that agricultural financing reforms has significant impact on agricultural output in Nigeria.

6. CONCLUSION

The discussion of the findings of the study is in line with the objectives and hypotheses of the study. Regarding economic growth, the study confirmed that agricultural financing reforms have significant impact on economic growth. This suggests that reducing the interest rate charged on agricultural loans as a measure of agricultural financial reforms will increase access to finance for investment in agriculture. And since agriculture is a major contributor to economic growth, increase in its output would ultimately result to increase in economic growth. This finding is consistent with the study of Dim and Ezenekwe (2013); Ademola *et al.* (2013); Iorember and Jelilov (2018) who established that increase in agricultural financing results to improvement in economic growth. With respect to agricultural output, the study established that agricultural financing reforms through reduction in agricultural loans interest rate can lead to enhancement in agricultural output. A reduction in interest rate on agricultural loans implies a decrease in the cost of investable capital which will in turn lead to increase in agricultural output. Agricultural financing reforms through reduction in agricultural loans may lead to increase in agricultural output, it does not determine the prices of agricultural produce. In fact, prices of agricultural produce may decline when the supply is high. This study is in line with the study of Ademola (2019).

The study investigated the impact of an increase in agricultural financing on macroeconomic aggregates such as economic growth, agricultural output and household welfare in Nigeria using a computable general equilibrium model. To achieve the objectives of the study, two policy scenarios (10% and 8% reduction in interest rate on agricultural loans) were simulated and the results for both cases indicated that all the macroeconomic indicators increased significantly due to the policy options.

Based on the findings of the study which indicate that agricultural financing reforms have a positive significant impact on macroeconomic aggregates of economic growth, agricultural output and household welfare, the study recommends the implementation of the policy scenarios that lead to this conclusion. That is, a 10 percent or 8 percent reduction in interest rate on agricultural loans in line with the interest draw-back policy of the CBN.

REFERENCES

- Acha Ikechukwu, A., & Acha, I. (2012). Microfinance banking in Nigeria: Problems and prospects. *International Journal of Finance and Accounting*, 1(5), 106-111.
- Adamgbe, E. T., Belonwu, M. C., Ochu, E. R., & Okafor, I. I. (2020). Analysis of the Impact of Central Bank of Nigeria's Agricultural Intervention Funds on the Economy. *Economic and Financial Review*, 58(1), 57-80.
- Ademola, A. E. (2019). Impact of agricultural financing on Nigeria economy. *Asian Journal of Agricultural Extension, Economics & Sociology*, 31(2), 1-13.
- Ademola, I. S., Olaleye, S. O., Olusuyi, A. E., & Edun, F. (2013). Government expenditure on agricultural sector and economic growth in Nigeria (1981–2010). *IOSR Journal of Humanities and Social Science*, 8(4), 62-67.

- Ayeomoni, I. O., & Aladejana, S. A. (2016). Agricultural credit and economic growth nexus. Evidence from Nigeria. *International Journal of Academic Research in Accounting, Finance and Management Science*, 6(2), 146-158.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Dim, C., & Ezenekwe, U. (2013). Does agriculture matter for economic development? Empirical evidence from Nigeria. *Journal of finance and economics*, 1(1), 61-77.
- Feridun, M., Ayadi, F. S., & Balouga, J. (2006). Impact of trade liberalization on the environment in developing countries: the case of Nigeria. *Journal of Developing Societies*, 22(1), 39-56.
- FMARD Nigeria Federal Ministry of Agriculture and Rural Development. (2016). *The Agriculture Promotion Policy (2016–2020): Building on the Successes of the ATA, Closing Key Gaps*. Abuja: FMARD.
- Griswold, D. T. (2006). Grain Drain: The hidden cost of US rice subsidies. *Cato Institute Trade Briefing Paper Series*, (25). Trade Briefing Paper no. 25 November 11th, 2006, CATO, United States.
- Iganiga, B. O., & Unemhilin, D. O. (2011). The impact of federal government agricultural expenditure on agricultural output in Nigeria. *Journal of Economics*, 2(2), 81-88.
- International Food Policy Research Institute (IFPRI) (2008). *Agricultural Public Spending in Nigeria*. IFPRI Discussion Paper 00789. Available at <http://www.ifpri.cgiar.org>
- Irembe, P. T., & Jelilov, G. (2018). Computable general equilibrium analysis of increase in government agricultural expenditure on household welfare in Nigeria. *African Development Review*, 30(4), 362-371.
- Izuchukwu, O. O. (2011). Analysis of the contribution of agricultural sector on the Nigerian economic development. *World Review of Business Research*, 1(1), 191-200.
- Manyong, V. M., Ikpi, A., & Olayemi, J. K. (2004). *Agriculture in Nigeria: identifying opportunities for increased commercialization and investment: summary report*. Ibadan, Nigeria: IITA, (p. 28).
- Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People*, 7(1), 23-48.
- Mikugi, I. A., & Bagudu, H. D. (2020). Assessment of the Role of Nirsal Microfinance Bank in Promoting Agricultural, Small and Medium Enterprise in Bida Metropolis. *Journal of Management Science & Entrepreneurship*, 7(20), 887-899.
- Noko, E. J. (2016). Economic recession in Nigeria: Causes and solution. Available at <http://educainfo.com/economicrecession-Nigeria/> (Accessed April 14, 2022).
- Nsikak, A.A., & Udoh E.J. (2015). The Determinants of Rural Poverty in Nigeria. *International Journal of Agricultural Management & Development*, 3, 141-151.
- Nwanze, K.F, Mohapatra, S., Kormawa, P., Keya, S. & Bruce-Oliver, S. (2006). Rice development in Sub-Saharan Africa. *Journal of the Science of Food and Agriculture*; 86, 675–677.
- Nwosu, F. O., Oguoma, N. N. O., Ben-Chendo, N. G., & Henri-Ukoha, A. (2010). The agricultural credit guarantee scheme: its roles, problems and prospects in Nigeria's quest for agricultural development. *Researcher*, 2(2), 87-90.
- Obansa, S.A.J., & I.M., Madueke (2013). Agricultural financing and economic growth in Nigeria. *European Scientific Journal*, 9(1), 168– 204.
- Obi-Egbedi, O., Okoruwa, V.O., Aminu A., & Yusuf, S. (2012). Effect of rice trade policy on household welfare in Nigeria. *European Journal of Business and Management*; 4(8), 160–70.
- Okafor, C. A. (2020). Commercial banks credit and agricultural development in Nigeria. *International Journal of Business & Law Research*, 8(3), 89-99.
- Olofin, S. O., Adenikinju, A., & Iwayemi, A. (2003). A computable general equilibrium analysis of Nigeria's trade competitiveness. *CEAR Research Paper*, (2001/01).
- Olomola, A. S. (1994). Changes in rural and agricultural credit policies in the structural adjustment in Nigeria. *Quarterly Journal of International Agriculture*, 33(1), 23-34.
- Olomola, A. S. (2017). *Ending rural hunger in Nigeria: Mapping needs and actions for food and nutrition security*. Final research report submitted to the Brookings Institution, Washington DC, USA.
- Onoja, A. O., Onu, M. E., & Ajodo-Ohiemi, S. (2011). Contributions of financial sector reforms and credit supply to Nigerian agricultural sector (1978-2009). *CBN Journal of Applied Statistics*, 2(2), 83-98.
- Omankhanlen, A. E. (2012). The financial sector reforms and their effect on the Nigerian economy. *Economy Transdisciplinarity Cognition*, 15(2), 45-57.

- Philip, A., & Iorember, P. T. (2017). Macroeconomic and household welfare impact of increase in minimum wage in Nigeria: A computable general equilibrium model. *American Journal of Economics*, 7(5), 249-258.
- Polycarp, I. M. (2018). Enhancing institutional lending to the agricultural sector by derisking the value chain: the case of Nigerian Incentive Based Risk Sharing System for Agricultural Lending (NIRSAL). *Bullion*, 42(1), 3-16.
- Ullah, A., Mahmood, N., Zeb, A., & Kächele, H. (2020). Factors determining farmers' access to and sources of credit: evidence from the rain-fed zone of Pakistan. *Agriculture*, 10(12), 586-599.
- Umeji, G. (2019). Diversification of the Nigerian economy through agricultural sector transformation. *SAU Journal of Management and Social Science*, 4(1&2). 4(1-2), 233 – 240.
- Rahji, A. M. (2010). Gender impacts of farm household resource allocation on agricultural commercialization in Oyo state, Nigeria. *ASSET: An International Journal (Series C)*, 2(1), 1-15.
- Sertoglu, K., Ugural, S., & Bekun, F. V. (2017). The contribution of agricultural sector on economic growth of Nigeria. *International Journal of Economics and Financial Issues*, 7(1), 547-552.
- Slesnick, D. T. (1998). Empirical approaches to the measurement of welfare. *Journal of Economic Literature*, 36(4), 2108-2165.
- World Bank. World Development Report 2017: Governance and the Law: World Bank, 2017. <http://www.worldbank.org/en/publication/wdr2017> (cited 10 Nov 2017).