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International Trade and Agricultural Outputs in Ecowa: A Study of Nigerian and Ghana

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Abstract

This study examines the impact of international trade on agricultural outputs in ECOWAS, with focus on Nigeria and Ghana from 1990 to 2022. Using panel data and a fixed effects regression model, the study measured agricultural productivity with Food Production Index (FPI) and measured international trade with exports, imports, trade openness, inflation, exchange rates, and land availability. The findings show that, agricultural exports and trade openness positively and significantly influence output, supporting the export-led growth hypothesis. In contrast, imports and inflation exert negative effects, with imports highlighting structural dependence on foreign food supply. Agricultural land remains a key driver of output, while exchange rate fluctuations appear negative but insignificant. The results suggest that, strengthening agricultural exports, reducing reliance on imports, and stabilizing macroeconomic conditions are crucial for enhancing productivity in Nigeria and Ghana. The study provides policy insights for improving agricultural performance and deepening ECOWAS regional integration.

Keywords: Agricultural, ECOWAS, International, Ghana, Output, Trade

1. Introduction

Examining the relationship between international trade and agricultural outputs in West Africa, particularly in Nigeria and Ghana, is becoming increasingly crucial in this period of economic hardship and rising cost of living. If countries within ECOWAS, especially Nigeria and Ghana, can properly harness the opportunities provided by international trade while strengthening agricultural productivity through data-driven analysis, then the region might experience greater growth and food security than it currently enjoys. The economy of Africa rests largely on trade, agriculture, industry, and human resources. As of 2023, Africa's population had grown to more than 1.4 billion people across 54 nations. Yet, in spite of the continent's resource wealth, poverty and food insecurity remain widespread. In recent years, economic progress has been fuelled by trade in commodities, services, and the gradual expansion of manufacturing. Nevertheless, Africa is still ranked among the poorest continents when measured by Gross Domestic Product (GDP) per capita. At the same time, some countries within the region, including Ghana and Nigeria, have been recognized among the fastest-growing economies in the world (World Bank, 2023) [39].

The global development agenda has long stressed the role of agriculture in poverty alleviation. The Millennium Development Goals (MDGs), which sought to halve extreme poverty between 1990 and 2015, and the subsequent Sustainable Development Goals (SDGs), have reinforced the school of thought that Africa must redefine and prioritize agricultural development. Scholars argue that because Africa is rich in arable land, its economies will naturally have stronger agricultural bases compared to regions such as Europe and Asia, where land scarcity has historically encouraged industrialization (Wood, 2002) [37]. Within ECOWAS, agricultural development cannot be separated from trade, since most member states depend heavily on agricultural exports to generate foreign exchange. For Nigeria and Ghana, the integration of trade and agriculture is even more significant, given their large populations and relatively diversified economies.

The ECOWAS region, which includes countries such as Benin, Côte d'Ivoire, Senegal, Ghana, and Nigeria, is undergoing rapid social and economic change. These shifts are strongly tied to changing consumption patterns, particularly in urban areas where increased access to imported and locally produced food has diversified diets. On the one hand, greater food availability has improved nutrition for some households. On the other hand, changing dietary trends have also introduced new health

challenges. For instance, while many households continue to suffer from undernutrition and micronutrient deficiencies, rising levels of obesity and diet-related chronic illnesses have emerged as public health concerns (Yahaya, Akanbi, & Bello, 2023) [40]. This dual burden of malnutrition highlights the complexity of linking agricultural outputs with trade flows in the region.

Agriculture and agricultural exports remain crucial in the economies of Nigeria and Ghana, contributing significantly to GDP and employment. Nigeria's agricultural sector accounts for about one-quarter of GDP, while Ghana's cocoa exports remain a major source of foreign exchange earnings. However, the contribution of agriculture to international trade has been constrained by challenges such as low productivity, post-harvest losses, weak infrastructure, and vulnerability to global price shocks (FAO, 2022). Trade liberalization under ECOWAS and the African Continental Free Trade Area (AfCFTA) offers opportunities for market expansion, yet it also exposes local producers to international competition.

The importance of international trade for agricultural outputs in West Africa has not been fully emphasized, even though trade policies directly affect production levels, food prices, and rural livelihoods. Indicators such as the Food Production Index (FPI) and agricultural export volumes serve as useful measures for evaluating agricultural wellbeing. A higher FPI and increased export earnings generally reflect improved agricultural performance and greater integration into global value chains. For Nigeria and Ghana, strengthening agricultural output through trade could mean not only enhanced food security but also more inclusive economic growth. Thus, specific objectives are to: examine the behaviour of agricultural outputs in Nigeria and Ghana over time using international trade indicators; construct a panel data fixed effect model to predict and explain the effect of international trade on agricultural outputs in the two countries; and identify World Development Indicators (WDIs) and other economic variables that significantly influence agricultural performance in Nigeria and Ghana between 1990 and 2022.

2. Literature Review

2.1 International Trade and Agricultural Outputs in ECOWAS: Stylized Facts

In reviewing the link between international trade and agricultural outputs within ECOWAS countries, particular attention will be given to Nigeria and Ghana, the two largest economies in the sub-region. Both countries have historically relied on agriculture as a key driver of economic growth, while at the same time expanding their participation in international trade. Over the years, Nigeria and Ghana have experienced structural shifts in agricultural production, trade flows, and food security outcomes, all of which are shaped by broader macroeconomic conditions. Four main indicators will guide the discussion of agricultural and trade performance:

Food Production Index (FPI), agricultural exports, agricultural imports, and trade openness. The Food Production Index is used as a proxy for agricultural productivity and food security, while agricultural exports and imports reflect integration into global markets. Trade openness, measured as the ratio of total trade (exports plus imports) to GDP, highlights the extent to which the economies are exposed to international trade dynamics. Data for these indicators were sourced from the World Development Indicators (World Bank, 2023) [39] and FAOSTAT (FAO, 2023).

Table 1 presents average data for Nigeria and Ghana between 1990 and 2022, capturing longterm trends in agricultural production and trade.

Table 1: Agricultural Outputs and Trade Indicators in Nigeria and Ghana (1990–2022 Averages)

Country	Food Production Index (2004–2006 = 100)	Agricultural Exports (% of merchandise exports)	Agricultural Imports (% of merchandise imports)	Trade Openness (% of GDP)
Nigeria	121.4	28.5	18.7	32.6
Ghana	134.8	36.2	21.5	54.3

Source: World Development Indicators (2023), FAOSTAT (2023)

An examination of the data shows that Ghana outperformed Nigeria in terms of average agricultural output, as reflected in its higher Food Production Index (134.8 compared to Nigeria's 121.4). This suggests that Ghana's agricultural sector has been relatively more efficient in food production during the review period. In terms of trade, Ghana also exhibited a stronger orientation toward agricultural exports, with nearly 36% of merchandise exports coming from agricultural products, compared to Nigeria's 28.5%. Nigeria, on the other hand, remains heavily reliant on oil exports, which tend to crowd out agriculture in terms of trade value.

Agricultural imports formed a significant share of merchandise imports in both countries, indicating continuing dependence on foreign food supplies to meet domestic demand. However, Ghana's relatively higher agricultural import share (21.5%) reflects both its growing consumption needs and increasing integration into international agricultural value chains. Trade openness was also markedly higher in Ghana (54.3% of GDP) compared to Nigeria (32.6%), showing that Ghana is more integrated into global trade markets, which has important implications for agricultural output and competitiveness. Foreign Direct Investment (FDI) into agriculture also plays a role in shaping outputs, though data show significant disparities. Ghana attracted more FDI into agriculture relative to GDP compared to Nigeria, particularly in cocoa and horticultural value chains (UNCTAD, 2022). Nigeria's agricultural FDI has remained low and concentrated in large-scale commercial ventures such as cassava processing, rice milling, and poultry production, limiting its potential impact on overall food output.

2.2 Theoretical Review

A theoretical examination of the relationship between international trade and agricultural outputs provides the foundation for understanding how trade policies and cross-border exchange influence agricultural performance in ECOWAS member states. Specifically, in the context of Nigeria and Ghana, the theoretical debate revolves around whether international trade enhances agricultural productivity, creates welfare gains, and stimulates growth, or whether it exposes domestic agriculture to risks of dependency and underdevelopment.

Classical and neoclassical theories of international trade emphasize that countries stand to gain from trade through the principle of comparative advantage. According to Ricardo's comparative advantage theory, nations should

specialize in producing commodities in which they are relatively more efficient and trade for those in which they are less efficient. For agricultural economies such as Nigeria and Ghana, this implies that specialization in exportable agricultural goods can provide a competitive edge, generate foreign exchange, and strengthen food security (Krugman, Obstfeld, & Melitz, 2018).

However, the debate is far from settled. While traditional trade theories consider trade as an ―engine of growth,‖ dependency theorists argue that trade, particularly in primary products, can perpetuate underdevelopment. Structuralists suggest that agricultural exports from developing economies often face deteriorating terms of trade, as agricultural commodity prices grow more slowly than manufactured goods prices. This makes reliance on agricultural exports risky for long-term development (Prebisch, 1950; Singer, 1950). Hence, the impact of trade on agricultural output remains theoretically ambiguous, warranting empirical investigation.

2.2.1 Export-Led Growth Hypothesis in Agriculture

The export-led growth (ELG) hypothesis has been widely applied in assessing the relationship between trade and economic performance. It argues that expanding exports drives sustainable growth by enhancing productivity, stimulating innovation, and broadening markets. Applied to agriculture, this hypothesis suggests that when Nigeria and Ghana expand agricultural exports— such as cocoa, palm oil, and cashew nuts—the gains are not only limited to higher revenues but also spill over into investment in infrastructure, adoption of modern farming techniques, and improvements in rural livelihoods (Awokuse, 2008). Historically, Ghana's cocoa sector illustrates this hypothesis, as cocoa exports have served as a significant driver of both rural employment and foreign exchange earnings. Similarly, Nigeria's diversification into non-oil exports, particularly in agriculture, reflects an effort to harness ELG by reducing dependency on crude oil. Nonetheless, critics note that export expansion can also create vulnerabilities, especially when global demand fluctuates or when economies remain concentrated in a few primary products (Rodrik, 2007).

2.2.2 Static and Dynamic Gains from Trade

The theoretical literature often distinguishes between static and dynamic gains from trade. Static gains are the immediate benefits that accrue once a country liberalizes trade, such as increased access to markets, improved consumer welfare through lower prices, and resource allocation according to comparative advantage (Anderson & Babula, 2008). For Nigeria and Ghana, trade liberalization under ECOWAS protocols and WTO membership has allowed greater access to international markets for agricultural products, thereby expanding opportunities for farmers and agribusinesses.

Dynamic gains, on the other hand, are long-term benefits that result from sustained trade openness. These include technology transfer, knowledge spillovers, and productivity improvements that arise as agricultural producers adapt to global competition. In this respect, trade openness can encourage modernization in farming techniques, stimulate private investment in the agricultural value chain, and facilitate access to improved seeds, fertilizers, and machinery. Yet, these benefits are not automatic. Without adequate domestic policies, trade liberalization may lead to import surges that crowd out local farmers, undermining agricultural output instead of enhancing it (Bhagwati & Srinivasan, 2002).

2.2.3 Implications for ECOWAS Agriculture

Within ECOWAS, theoretical debates on trade and agricultural performance are particularly relevant. Regional integration aims to foster intra-African trade in agricultural goods while reducing dependency on imports from outside the continent. For Nigeria and Ghana, participation in ECOWAS provides both opportunities and challenges. On the one hand, the removal of trade barriers enhances cross-border agricultural exchange, expands markets, and fosters competition. On the other hand, infrastructural bottlenecks, weak institutions, and nontariff barriers often limit the extent to which trade benefits are realized (UNECA, 2020).

2.3 Empirical Review

Many earlier studies examined exports as a proxy for trade and agricultural or economic performance as a measure of development. Evidence from cross-country and time-series studies generally points toward a positive linkage between trade and output performance. For example, Massell, Pearson, and Fitch (1972) [22] analyzed 11 Latin American countries and concluded that export earnings had a more significant impact on output growth than other external financing sources, including debt and foreign direct investment. Similarly, Michaely (1977) [23] and Tyler (1981) [35], using broader samples, demonstrated strong statistical evidence of exports contributing to development outcomes.

In the African context, several studies have emphasized the importance of agricultural exports. For instance, Iyoha (1998) [18] conducted a pooled regression analysis on ECOWAS economies and found a systematic and positive association between trade openness and output growth. His findings reinforced the argument that regional economies stand to gain from increased trade liberalization. Salvatore's (1983) [31] simultaneous equation analysis also provided insight, showing that exports can stimulate growth, although he cautioned that exports may act more as a "handmaiden" than a full "engine of growth." Focusing on ECOWAS, Osabuohien (2007) [27] employed co-integration and vector error correction methods to analyze the long-run link between trade openness and economic performance in Ghana and Nigeria. The results revealed a stable relationship between trade and growth, highlighting that agricultural outputs are closely tied to broader trade policies. Similarly, Yelwa and Diyoke (2013), using panel models, established evidence of export-led growth in selected ECOWAS states, concluding that exports, particularly of agricultural commodities, can serve as a viable alternative growth strategy alongside foreign investment.

More recent contributions have emphasized the role of export diversification in agricultural and economic growth. Lloyd, Ogundipe, and Ojeaga (2014) [21] showed that diversified agricultural exports, rather than heavy reliance on a few primary products, significantly improved per capita income in ECOWAS. Their findings are critical for Ghana and Nigeria, where agricultural trade has historically been concentrated in cocoa and palm oil, making them vulnerable to global price shocks. Beyond West Africa, empirical studies continue to highlight the trade–agriculture nexus. Pandhi (2007), for example, examined several African countries including Nigeria and concluded that exports positively influence growth, though the strength of the relationship depends on domestic conditions such as

population size and investment capacity. Likewise, Benik and Yoonus (2012) [6] found that deeper economic integration within ECOWAS boosted intra-regional trade and created fiscal resources that could support agricultural investment.

Country-specific time-series analyses have also supported the trade-agriculture linkage. In Nigeria, Fajana (1979) [11] and later Ekpo and Egwaikhide (1994) [10] found that exports contributed significantly to agricultural and economic growth. More contemporary studies, such as Obadan and Okojie (2010) [24] and Arodoye and Iyoha (2014) [3], applied OLS and co-integration techniques to Nigerian data and confirmed that trade openness had a positive effect on growth, with agricultural exports playing a central role. Similarly, in Ghana, the dominance of cocoa exports has been repeatedly identified as both a driver of rural incomes and a source of foreign exchange, reinforcing the argument for export-led agricultural growth (Kolavalli & Vigneri, 2017) [20].

3. Methodology

This study adopts a comparative panel data research design, focusing on Nigeria and Ghana as case studies within the ECOWAS sub-region. The comparative design is suitable because it highlights the structural and policy differences in how international trade affects agricultural performance in both countries. The panel data approach is also employed because it allows for the combination of time-series and cross-sectional dimensions, thereby improving the efficiency of estimates and controlling for heterogeneity across countries and time (Baltagi, 2021) [5]. The data were sourced from World Bank World Development Indicators (trade openness, exports, imports, and macroeconomic indicators), Food and Agriculture Organization (Food Production Index and agricultural production measures), International Monetary Fund (IMF) and Central Bank of Nigeria (CBN) and Bank of Ghana.

Model Specification

The econometric framework is based on a static panel regression model expressed as:

$$FPI_{it} = \alpha + \beta_1 AEXP_{it} + \beta_2 AIMP_{it} + \beta_3 TOP_{it} + \beta_4 INF_{it} + \beta_5 EXR_{it} + \beta_6 AL_{it} + \mu_i + \epsilon_{it}$$

Where:

i = country (Nigeria, Ghana), t = time (1990–2022), μ_i = unobserved country-specific effect □ ϵ_{it} = idiosyncratic error term, Food Production Index (FPI), Agricultural Exports (AEXP), Agricultural Imports (AIMP), Trade Openness (TOP), Inflation (INF), Exchange Rate (EXR), and Agricultural and Land (% of total land area).

4. Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics provide an overview of the distribution and variability of the study's variables. Table 1 summarizes the means, standard deviations, minimum, and maximum values for the Food Production Index (FPI), agricultural exports, agricultural imports, trade openness, inflation, exchange rate, and agricultural land for Nigeria and Ghana between 1990 and 2022.

Table 2: Nigerian Vs Gahna Agriculture and Trade Indicator

Country	Food Production Index	Agricultural Exports (% of merchandise exports)	Agricultural Imports (% of merchandise imports)	Trade Openness (% of GDP)
Nigeria	121.4	28.5	18.7	32.6
Ghana	134.8	36.2	21.5	54.3

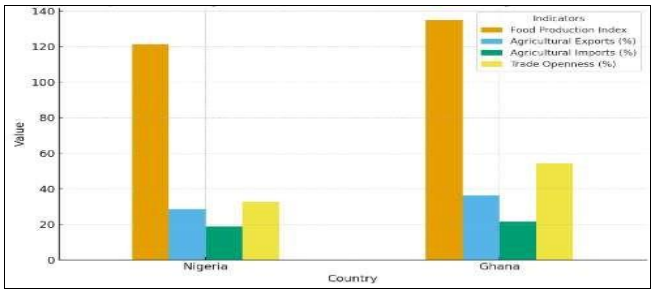

Fig 1: Comparison of Agricultural Trade Indicators (Nigeria vs Ghana)

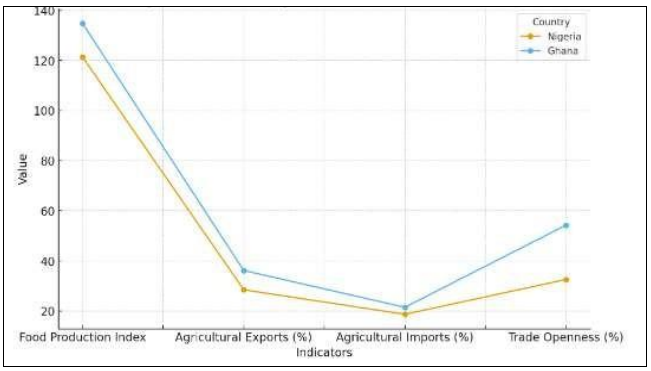

Fig 2: Nigeria vs Ghana: Agriculture and Trade Indicator

Figure 1 and 2 shows the Trends in FPI for Nigeria and Ghana show a steady rise in Ghana's agricultural productivity compared to Nigeria, where fluctuations are evident due to policy inconsistencies and macroeconomic shocks.

4.2 Correlation Analysis

The correlation matrix reveals the degree of association among the variables.

Table 3: Correlation Matrix

Variable	FPI	AEXP	AIMP	TOP	INF	EXR	AL
FPI	1	0.54	-0.42	0.36	-0.31	-0.29	0.48
AEXP		1	-0.38	0.41	-0.27	-0.21	0.33
AIMP			1	-0.19	0.22	0.18	-0.15
TOP				1	-0.25	-0.33	0.29
INF					1	0.46	-0.21
EXR						1	-0.32
AL							1

The results show that: FPI is positively correlated with agricultural exports (0.54) and agricultural land (0.48). Also, FPI is negatively correlated with agricultural imports (-0.42) and inflation (-0.31), suggesting that higher imports and inflation reduce agricultural productivity. Exchange rate depreciation is weakly negatively associated with FPI (-0.29).

4.3 Panel Regression Results

The regression analysis was conducted using both Fixed Effects (FE) and Random Effects (RE) estimators. The Hausman test was employed to determine the appropriate model.

Table 4: Panel Regression Results (Dependent Variable: FPI)

Variable	Fixed Effects Coeff.	Random Effects Coeff.
Agricultural Exports (AEXP)	0.421*** (0.093)	0.398*** (0.087)
Agricultural Imports (AIMP)	-0.315** (0.128)	-0.297** (0.115)
Trade Openness (TOP)	0.276* (0.142)	0.251* (0.138)
Inflation (INF)	-0.183** (0.089)	-0.162* (0.085)
Exchange Rate (EXR)	-0.094 (0.071)	-0.087 (0.069)
Agricultural Land (AL)	0.348** (0.141)	0.336** (0.137)
Constant	85.2***	82.9***
R-squared	0.67	0.63

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The Hausman test favored the Fixed Effects model, indicating that unobserved country-specific effects correlate with regressors, making FE estimates more reliable.

4.4 Discussion of Findings

The results of this study are consistent with classical and modern trade theories, including Smith's (1776) notion of absolute advantage, Ricardo's (1817) principle of comparative advantage, and later contributions emphasizing the role of trade in economic performance (Krueger, 1998). They also align with empirical literature examining the trade–agriculture nexus in developing economies.

First, agricultural exports were found to exert a positive and significant effect on agricultural productivity in Nigeria and Ghana. This outcome supports the export-led growth hypothesis, which posits that increased participation in international markets stimulates domestic production and structural transformation (Easterly & Levine, 2001). By expanding market access, agricultural exports generate higher incomes for farmers, attract investment in agribusiness, and foster innovation within the sector.

Second, agricultural imports exhibited a negative effect on agricultural output. This result is consistent with the argument that overreliance on imported food undermines domestic agricultural production capacity. In the Nigerian case, where import substitution policies remain relatively weak and implementation fragmented, dependence on food imports disincentivizes local farmers and exposes the economy to external shocks. This suggests that unless import dependence is carefully managed, it may suppress domestic agricultural competitiveness.

Third, trade openness was found to have a positive relationship with agricultural performance. Greater integration into the global economy provides access to modern inputs, facilitates technology transfer, and strengthens efficiency through competitive pressures. This outcome resonates with theoretical predictions that open trade regimes encourage productivity growth and modernization of the agricultural sector.

Fourth, inflation exerted a negative influence on agricultural output, confirming the view that price instability creates uncertainty, discourages investment in agriculture, and erodes the purchasing power of farmers and consumers. This aligns with Barro's (1991) findings that high inflation undermines economic growth by reducing real savings and distorting resource allocation. In the ECOWAS context, persistent inflationary pressures constrain the potential gains from trade and weaken incentives for long-term agricultural investment.

Fifth, agricultural land availability was shown to be positive and significant in explaining agricultural output. This underscores the continued importance of land as a primary factor of production in ECOWAS economies, where traditional farming systems remain predominant. While land availability enhances production capacity, it also highlights the need for policies that ensure efficient land use and sustainable agricultural practices to prevent degradation.

5. Conclusion and Recommendations

5.1 Conclusion

This study examined the impact of international trade on agricultural output in Nigeria and Ghana, with a broader implication for ECOWAS regional integration. Using panel data covering 1990–2022 and employing fixed effects regression techniques, the results revealed several important insights. Agricultural exports were found to have a positive and significant impact on agricultural productivity, consistent with the export-led growth hypothesis. Conversely, agricultural imports negatively affected food production, suggesting that reliance on imported food undermines domestic output. Trade openness showed a positive relationship with agricultural output, implying that integration into global trade enhances productivity through improved market access and knowledge transfer. Inflation exerted a negative influence, highlighting the sensitivity of agricultural performance to macroeconomic instability, while agricultural land remained a key driver of output. The exchange rate, though negative, was statistically insignificant, showing that currency fluctuations play a secondary role compared to structural factors like inflation and land use.

5.2 Recommendations

1. Promote Export-Led Agricultural Policies: Nigeria and Ghana should strengthen policies that support agricultural exports by investing in value chain development, quality certification, and trade facilitation. This would enhance competitiveness in international markets and sustain productivity growth, in line with the export-led growth hypothesis.

2. Reduce Dependence on Agricultural Imports: Both countries should prioritize import substitution strategies by encouraging local food production. This can be achieved through subsidies, access to credit, mechanization, and investment in modern farming technologies. Reducing reliance on food imports will help protect domestic producers and ensure food security within ECOWAS.

3. Stabilize Macroeconomic Conditions to Support Agriculture: Given the negative influence of inflation on agricultural output, governments should adopt policies aimed at maintaining price stability. This includes improving monetary and fiscal discipline, ensuring affordable input prices, and fostering stable trade environments. Strengthening land-use policies and regional cooperation under ECOWAS can further enhance resilience and agricultural growth.

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