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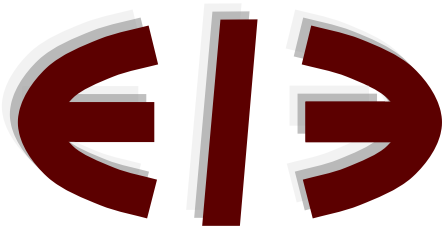

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Impact of trade liberalization on Ghana's Agricultural Sector

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Abstract

The study sought to analyse the impact of trade liberalization on Ghana's agricultural sector. This study's research design, which is secondary quantitative, was chosen. The study used econometric methods such as multivariate regression analysis, Bounds test etc to analyse the data. According to the study's findings, trade liberalization which comprises of flexible exchange rate (REXR), Export and Import price ratio (EP/IP), Agricultural Capital Formation (ACF), Foreign Investment in Agricultural Sector (FIA) and Agricultural Degree of Openness (ADO) haven't really improved agricultural performance in Ghana from 1993-2022. In contrast, globalization has favourably impacted technology, infrastructural development, growth, and living standards in other developing Asian nations including India, China, Lebanon etc through the promotion of foreign direct investments (Siddiqui and Ahmed, 2017). Due to the limited absorption of technology, poor infrastructure and overdependence on other countries in Ghana, globalization may not have an impact on sustainable agriculture. The negative interactions between Ghanaian Agricultural performance, Agricultural exports and imports price ratio, Real Exchange Rate, might have accounted for Ghana's continuous decline in agriculture performance instead of having a positive impact.

Keywords: agriculture, trade liberalization, real exchange rate
JEL Classification: F10

1. Introduction

The process of removing or reducing barriers to commerce is known as trade liberalization (Hamad et al., 2014). This could entail the lowering or eliminating of tariffs, the elimination or expansion of import quotas, the removal of multiple exchange rates, and the elimination of the need for administrative approvals for imports or foreign exchange allotments (Hart et al., 2015). The Uruguay Round, which ran from 1986 to 1990, saw a more dramatic liberalization of agriculture (Josling et al., 1994). Agriculture commerce is now not only receiving more

attention, but it is also being seen as the engine for equality and growth on a worldwide scale (De Silva et al., 2013). Global trade will encourage growth in a sector that is closely related to poverty and hunger by opening new markets and addressing inefficiencies brought on by excessive levels of protection in agriculture (Ojeyinka and Adegboye, 2017). Others contend that the primary goal of agricultural trade is to foster the circumstances that will allow most the world's poorest people to take advantage of the countless opportunities to enhance their incomes and lead healthier lives. (Cuesta et al., 2015). In 2015, the World Bank predicted that more fast growth brought on by a worldwide relaxation of trade barriers may lower poverty rates by as much as 13% (Anderson, 2022). To put it plainly, 300 million people could be rescued from poverty.

The agriculture industry needs to address inefficiencies if efficiency and total factor performance (TFP) growth are to be promoted (Food and Agriculture Organisation (FAO, 2017). The Sustainable Development Goal 2 directs the global community to eradicate hunger, increase food security, boost nutrition, and support sustainable agriculture (United Nations Development Programme (UNDP, 2017). To achieve this, agricultural performance must double while trade restrictions, market distortions, and inefficiencies are addressed and prevented (UNDP, 2017). A formal commitment to agricultural trade liberalization is made in the World Trade Organization (WTO, 1994) Agreement on Agriculture (AoA), which was published. Eliminating ingrained production and distribution inefficiencies in the agricultural industry is the main goal of AoA (Blandford, 2015). Sub-Saharan Africa remains a net importer of vital agricultural goods despite greater trade liberalization (FAO, 2017).

Africa faces the issue of feeding a population that is expanding faster than economic expansion (FAO et al., 2012). According to the Global Harvest Initiative (GHI, 2018), to meet the demand of roughly 10 billion people in 2050, annual global agricultural performance growth of 1.75%, up from the current 1.66%, is necessary. Demand increase is primarily occurring in developing nations. According to (GHI, 2018), Sub-Saharan Africa's rate of agricultural production growth fell to 1.24% in 2017 from 1.5% and 1.31% in 2015 and 2016, respectively. The need to investigate how agricultural trade liberalization might help eliminate inefficiency in agriculture takes centre stage in the aftermath of the anomaly of greater trade in agriculture and low performance growth. While the relationship between trade liberalization and TFP growth has received a lot of attention, the relationship between trade liberalization and efficiency has garnered far less. International commerce, according to (Shu and Steinwender, 2019), accelerates the rate of technology transfer and innovation, promoting TFP growth. (Hart et al., 2015), on the other hand, argued that there are no sane hypotheses linking trade policy to technical inefficiency.

However, (Miljkovic et al., 2013) offered a justification for why trade liberalization can be counterproductive to technical efficacy. They contend that the ensuing increase in exporters' income acts as a disincentive to invest as much in technology, which could lower efficiency. Studies in the past have been reluctant to conduct empirical investigations on if, how, and how much traditional international trade transmission channels affect technical efficiency. This is true even if improvements in TFP measurement, particularly those made by the Malmquist-Data Envelopment Analysis (DEA) and the Stochastic Frontier Analysis (SFA), have made it possible to separate it into two parts: technical efficiency and technical change, with the latter being predominate. (Wang and Ho, 2010) made more advancements that have made it possible to look at external factors influencing technical inefficiency. Despite this, research like those by (Skully and Rakotoarisoa, 2013) and (Hong et al., 2016) continue to concentrate on the direct effects of agricultural trade liberalization on TFP increase.

Over the years, developing nations, particularly those in Africa, have seen a consistent influx of financial resources from advanced economies (Osabohien et al., 2021a; Adegboye et al., 2021). The term "foreign direct investment" (FDI) can be used to describe this influx of economic resources. In order to fully or partially own economic interests in nations other than their own, a government or organization must decide to do so (Adegboye et al., 2021). This may take the form of a brand-new setup or the acquisition of current ones. This type of investment enables investors to reach businesses outside of their own nations (Osabohien et al., 2021b). FDI is recognized to offer non-debt servicing foreign exchange, create employment, improve foreign relations, impact knowledge transfer, imitation, and licensing agreements, as well as increase trade openness, which are all important for economic development (Forster & Toth, 2015; Matthew et al., 2021).

According to (Jaiblai and Shenai, 2019), factors including a higher level of openness, economies with superior infrastructure, and depreciated local currencies among others have been found to attract FDI, particularly in Sub-Saharan Africa [SSA]. Commerce openness is the state of having no restrictions on commerce caused by tariffs or other governmental trade barriers. It may also take the shape of a system with lower tariffs. To promote economic growth and development, developing nations liberalize their trade policies (Eiji, 2017). Africa and its subregions have responded to the critical need for the continent's all-inclusive growth by correcting a few regional and continental economic linkages. For instance, the African Continental Free Trade Area (AfCFTA) is tasked with fostering regional cooperation on the continent in order to ensure that the primary sector, which serves as the foundation of her economy, is well-positioned to compete on the world stage.

Additionally, the New Partnership for African Development (NEPAD) was established to draw foreign direct investment (FDI) to the continent in order to close the $564 billion yearly resource gap required to eradicate extreme poverty from Africa (Aderemi et al., 2021). Almost every region of the continent has a Regional Economic Community (REC) of some kind. The Economic Community of West African States (ECOWAS) is the region's own REC for the West African Subregion. ECOWAS was established largely to promote trade within the subregion by lowering trade obstacles. Over the past ten years, FDI to the continent has increased by 11% to US$46 billion. According to the United Nations Conference on Trade and Development (UNCTD, 2019), the West African subregion had a loss of 15% to US$9.6 billion, with Nigeria and Ghana leading the losers with 43% to US$2 billion and 8% to US$3 billion, respectively.

This is despite the fact that her abundance of natural resources has been identified as one of the major factors influencing FDI (Anyanwu and Nadege, 2015). The continent exports a majority of its primary goods, which come from agriculture and mining. Agriculture not only makes up the majority of her exports, but it also creates jobs, ensures food security, and alleviates poverty (Osabuohien and Efobi, 2011). The ECOWAS Trade Liberalization Scheme (ETLS) and ECOWAS Regional Agricultural Program (ERAP) were formed in 1990 and 1995, respectively, to ensure that the region thrives in agricultural trading. Goal 2 of the Sustainable Development Goals, which aims to end hunger, ensure food security, improve nutrition, and promote sustainable agriculture, is one of the objectives of this (Bamiro, 2018).

As part of the World Bank and IMF's reform and adjustment program, Ghana adopted the trade liberalization strategy (Sakyi et al., 2015). The liberalization policy aimed to open up the market, boost competition, and boost performance in domestic industries in order to promote economic growth. The goal of the liberalization strategy was to increase output, notably in the export agriculture sector, while also reducing the difference between the official and parallel currency rates (Tamini et al., 2010). This was done by providing foreign exchange to reduce import constriction. In the beginning, different exchange rates were used to encourage agricultural exports. The lacklustre performance of the foreign trade sector was another factor in the implementation of the trade liberalization strategy (McCorriston et al., 2013). Foreign exchange liberalization, import liberalization, and export diversification were all included in the liberalization program (Awunyo-Vitor and Sackey, 2018). In 1989, the usage of import licenses was removed along with the abolition of import quantity limitations. On the export front, changes were made in 1991 to remove the requirement for non-traditional exporters to turn over their foreign exchange receipts to the Bank of Ghana, however the rule continued to apply to revenues for agricultural products (Immurana et al., 2013). Import quantities have

been steadily rising throughout the liberalization period. Thus, the study analyses the impact of trade liberalization on Ghana's agriculture sector.

1.2 Specific objectives

1. To determine the impact of trade liberalization on Ghana's agricultural performance (AGDP).
2. To determine the impact of trade liberalization on Ghana's agricultural export sub-sector.
3. Make recommendations on trade policy that could be designed to improve agricultural performance and agricultural export performance.

2. Methodology

2.1 Research Design

This study's research design, which is secondary quantitative, was chosen. In this study strategy, secondary data—data that has already been collected—is used by the researchers (Baye et al., 2019). The study is then organized and summarized to improve its overall effectiveness. The study's objective was to use sector-level data to establish and assess the impact of trade liberalization on Ghana's agriculture sector by conducting a systematic analysis of the series of variables included in the study. The study used a model for multivariate regression analysis and the Bounds test to test for co-integration.

2.2 Statistical Data and Economic Estimations

The study used econometric methods to analyse the data. To build theories or verify preexisting hypotheses in economics and to predict future trends based on past data, econometrics uses statistical and mathematical models (Greene, 2008). In econometrics, economic processes are quantified using a combination of economics, mathematics, and statistical inferences. To put it another way, it converts theoretical economic models into useful tools for deciding on economic policy (Panzera and Postiglione, 2022). Therefore, multivariate regression analysis and error correction models or the Bounds test, which looked at short- and long-term associations between variables, were used in econometric analysis.

Testing for unit root and performing a cointegration test utilizing the Augmented Dickey Fuller and Philips-Perron cointegration approach served as the foundation for the inquiry and examination of the stationarity qualities of the series variables and long run relationship. Prais-

Winston method of correlation was also used to investigate the correlation between the independent variables used in the analysis.

2.3 Nature and Sources of Data

Economic theory or any other information that is known about the phenomenon being examined serves as the foundation for any econometric model specification (Anderson, 2022). Secondary data are the sort of data used in this study project. Additionally, information was gathered from many organizations, including the National Bureau of Statistics (NBS), Ministry of Agriculture, Ministry of trade and Industry, Ghana Statistical Service, World Bank World Development Indicators (WDI), UNESCO, and United Nations Statistical Division (UNSTAT). In order to see the changes and variances, we also conducted a comparative study of the various data acquired over time.

Economic Model

$AGDP = \beta_0 + \beta_1 ADO + \beta_2 ACF + \beta_3 (EP/IP) + \beta_4 REXR + \beta_5 FIA$ ..... (1)

Since there are other unobservable variable that can explain AGDP, we then add the unobservable variables such as DPS = Domestic Political Stability/Instability (error term) into (2) then we have:

$AGDP = \beta_0 + \beta_1 ADO + \beta_2 ACF + \beta_3 (EP/IP) + \beta_4 REXR + \beta_5 FIA + \mu_t$ ..... (2)

When transformed into a log-linear form, it becomes,

$LogAGDP = \beta_0 + \beta_1 LogADO + \beta_2 LogACF + \beta_3 Log(EP/IP) + \beta_4 LogREXR + \beta_5 LogFIA + \beta_6 \mu_t$ ..... (3)

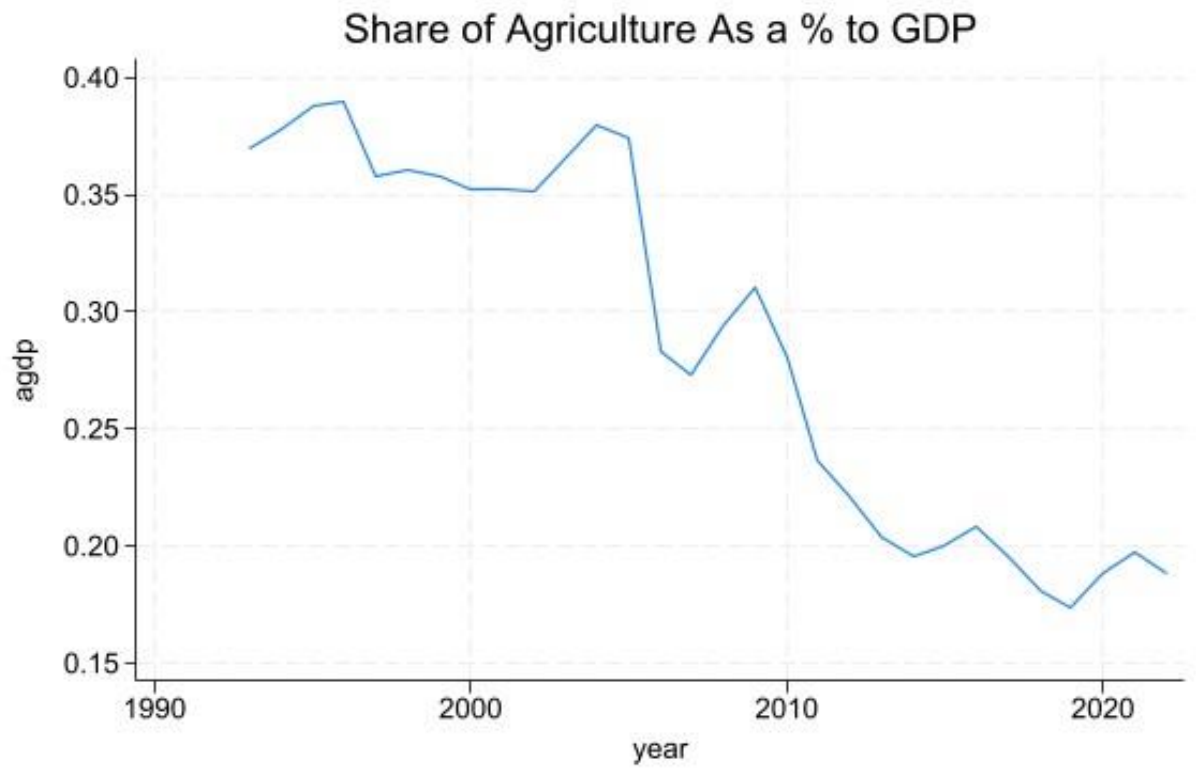
A priori Expectations (1): $\beta_0 > 0; \beta_1 > 0; \beta_2 > 0; \beta_3 > 0; \beta_4 > 0; \beta_5 > 0$

2.4 Variables Description

2.4.1 Agricultural as a Share to GDP

This represents the total performance of the agricultural sector in the country during a specific fiscal year as compared to total GDP. It can be observed from the graph below that, agricultural performance has continually declined over the past decades. This can however be attributed to various factors such as a shift of the Ghanaian economy to the service sector, poor infrastructure in the agricultural sector or just a lack of enough investment into the sector.

Figure 1 Agriculture as a percentage to GDP

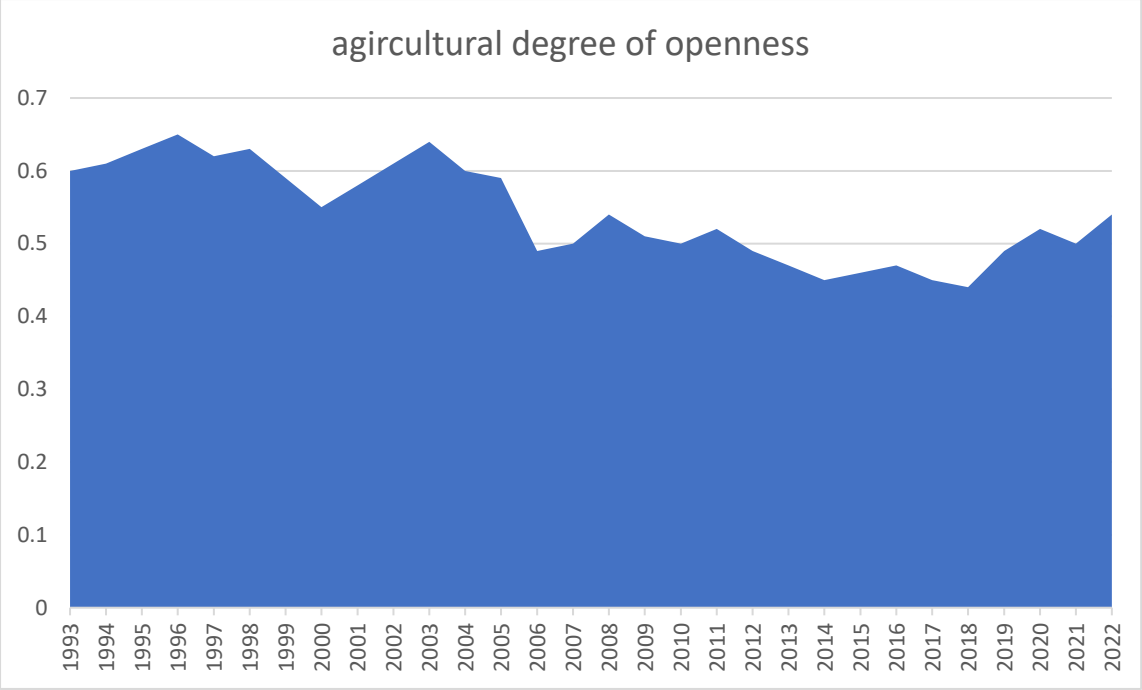


Source: World Bank data (2023)

2.4.2 Agricultural Degree of openness.

The size of registered imports and exports inside a country's economy is used to gauge how open that economy is.

Figure 2 ADO



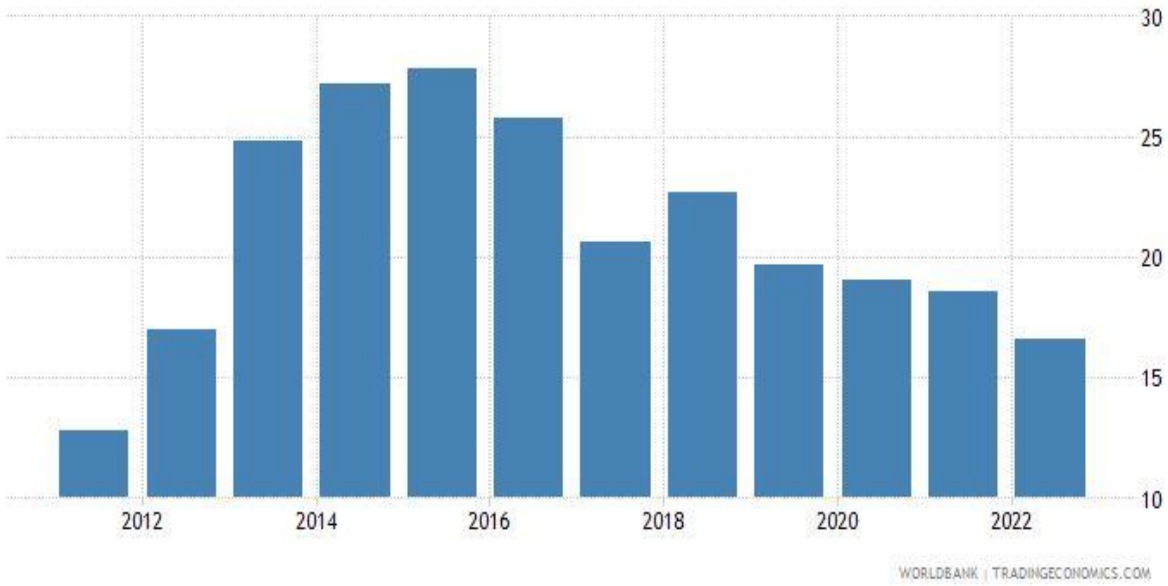
Source: Derived from data. Trade Economics (2023)

A-prior Expectation: Ghana's agricultural performance may be enhanced by a higher level of openness in the sector, as evidenced by increased trade liberalisation and market access. This is because, Increased access to global markets can raise agricultural exports, enhance knowledge transfer, and draw in foreign investment. But it also makes the industry vulnerable to global price volatility and competition, which may call for sensible rules to control.

2.4.3 Agricultural Capital Formation

The portion of a nation's current output and imports that are not consumed or exported during the accounting period but are instead set aside to increase its stock of capital goods is referred to as capital formation. These may include agricultural farm machinery, human capital, technology etc. Figure 3 presents Ghana’s agricultural capital formation from 2012 to 2022. (Trade Economics, 2023).

Figure 3 Agricultural Capital Formation



Source: Trade Economics (2023)

A-prior Expectation: The performance of agriculture is likely to benefit from increased agricultural capital development, which includes investments in infrastructure, technology, and human capital. Adequate capital formation can result in improved mechanization, increased performance, and modernization of the agricultural industry, all of which can raise farm income and yields.

2.4.4 Agricultural exports and imports price ratio (EP/IP)

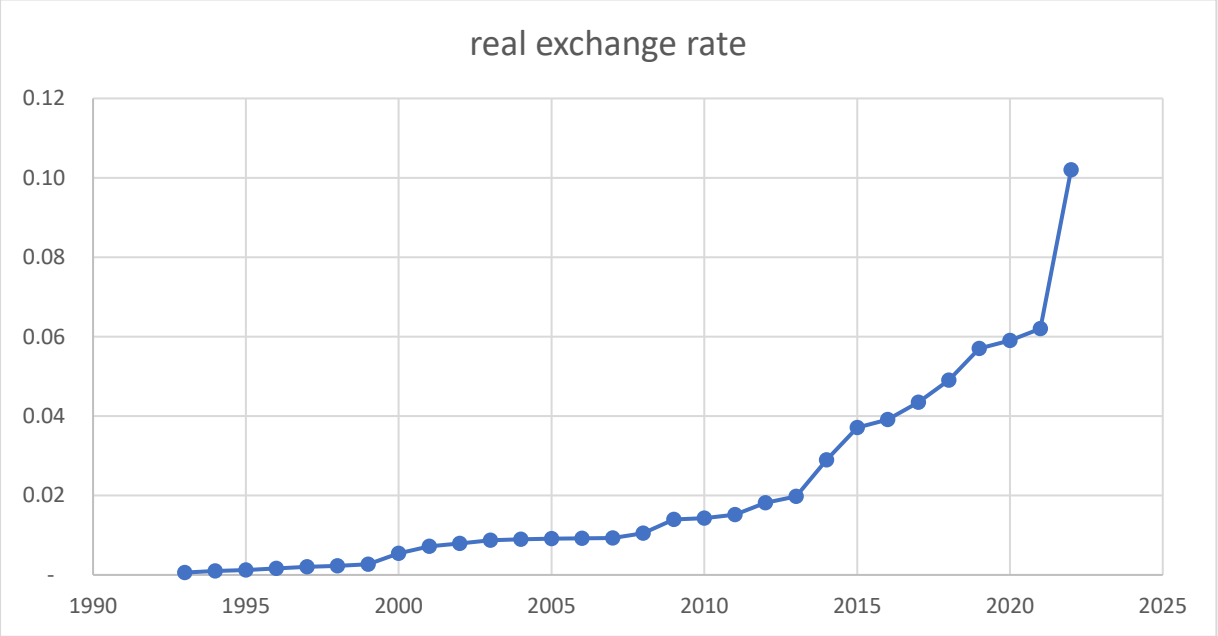
This agricultural branch of the government of the Republic of Ghana primarily exports cashew nuts, cocoa seeds and beans, peanuts, ground nuts, and other tillage-added agricultural benefits like red mercury and gold. The majority of food imports are comprised of bulk, intermediate, and consumer goods such rice, wheat, soybean meal, and poultry.

A-prior Expectations: In general, the performance of agriculture is favoured by a higher ratio of agricultural exports to imports. A favourable ratio shows that a nation exports more agricultural goods than it imports, which can boost foreign exchange revenues, farmers' incomes, and sector growth overall. It's crucial, nevertheless, that the equilibrium supports the domestic agricultural sector.

2.4.5 Real Exchange Rate

The components of the real exchange rate (REXR) between two currencies are the nominal exchange rate (for instance, the cost of one euro in dollars) and the ratio of prices in the two countries. Figure 4 presents the graph of real exchange rate of Ghana.

Figure 4 REXR



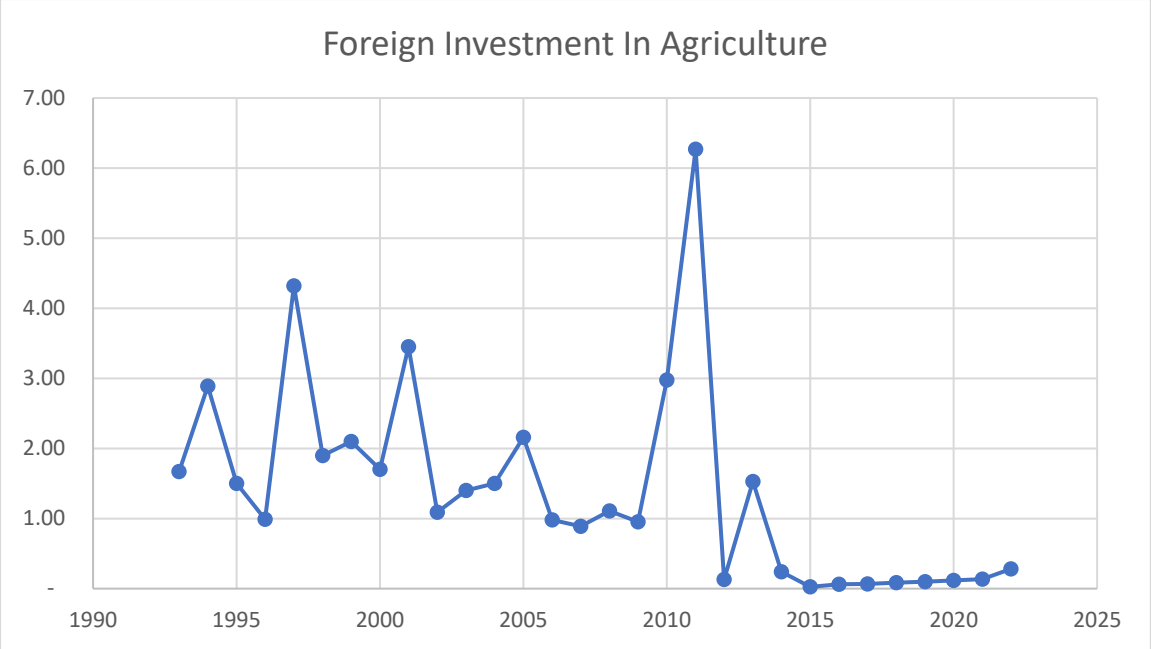
Source: derived from data. Focus Economics (2023)

A-prior Expectation: The performance of agriculture is anticipated to be supported by a stable or competitive real exchange rate. A stable or competitive exchange rate can improve Ghana's agricultural exports' competitiveness in global markets and lower the cost of imported agricultural inputs. While an undervalued currency might drive up input costs, an inflated one can impede exports.

2.4.6 Foreign Investment on Agriculture (FIA)

To fill the financing gap that developing nations experience to boost food production and agricultural performance, foreign direct investment is a key source. It represents Ghana's foreign investment on agriculture as a fraction of GDP as compared to the previous year (Statistica, 2020).

Figure 5 Foreign Investment in Agriculture



Source: derived from data. Statistica (2023)

A-prior Expectation: Depending on the terms and conditions, more foreign investment in agriculture is expected to have positive impact on agricultural performance. The infusion of much-needed finance, technology, and knowledge can come from foreign investment. However, it should be handled properly to guarantee that it benefits neighbourhood groups, prevents land grabbing, and is in line with the objectives of the country's agricultural growth.

3. ANALYSIS, RESULTS, AND FINDINGS

3.1 Descriptive statistics

Through a descriptive analysis that displays the variables' and their measures' summary statistics, the researcher looked at the characteristics of the variable. The statistical analysis of the variables employed in the study – actual data values of (AGDP, ADO, ACF, EP/IP, REXR, FIA) are shown in this subsection. It also includes the mean value, median value, standard deviation, minimum value, maximum value, and range values. The mean value is the sum of all values in the group data divided by the number of observations, the median value is the middle value of each variable in the data set, and the standard deviation is the square root of the variance. The summary statistics for each variable used in the analysis are displayed in Table 1. During the study period (1993 – 2022), Ghana's Agricultural Performance as a percentage to GDP has fluctuated between 17% and 39%, with an average value of 29%. The

outcome also revealed that Ghanaian Agricultural Performance to GDP has a 8% standard deviation around its mean value (Table 1).

The value of Agricultural Degree of openness ranged from 44% to 65%, with an average value of 54%. Agricultural Capital Formation has an average value of 21% with a range of 12% to 29%. Agricultural Capital Formation has a 5%-point spread around its mean value. The range of Agricultural exports and imports price ratio was between 2% and 11%, with a mean value 5% (Table 2). Real Exchange Rate has a 2-point spread around its mean value. The range of Real Exchange Rate was between 0% and 10%, with a mean value of 2%. Foreign Investment on Agriculture has an average value of 142% with a range of 3% to 627%. Foreign Investment on Agriculture has a 144-point spread around its mean value.

Table 1 Summary statistics of variables

Variable	Obs	Mean	Std. dev.	Min	Max
AGDP	30	0.29	0.08	0.17	0.39
ADO	30	0.54	0.07	0.44	0.65
ACF	30	0.21	0.05	0.12	0.29
EPIP	30	0.05	0.02	0.02	0.11
REXR	30	0.02	0.02	0.00	0.10
FIA	30	1.42	1.44	0.03	6.27

3.2 Stationary test

At a 1% significance level, the factors in the table below were taken into account. As a result, we rule out the possibility of a unit root and come to the conclusion that they are all stationary. This is as a result of using first difference method used to rectify nonstationary variables with the exception real exchange rate (REXR) which was corrected at the fourth difference. Using Stata's Varsoc, the Akaike and Bayesian Information Criterion (AIC and BIC) were utilised to determine the best lag to apply when testing the variables.

Table 2 Test for stationarity using Augmented Dickey Fuller (ADF) test

Variable	ADF-stat	1% Critical value	5% Critical value	10% Critical value	Conclusion
d**AGDP**	-4.30	-3.73	-2.99	-2.99	Stationary
dADO	-5.02	-3.73	-2.99	-2.63	Stationary
dACF	-4.44	-3.73	-2.99	-2.63	Stationary
dEPIP	-8.69	-3.73	-2.99	-2.63	Stationary
D4.REXR	4.73	-3.75	-3.00	-2.63	Stationary
dFIA	-8.65	-3.73	-2.99	-2.63	Stationary

3.3 Correlation matrix

Prais-Winston method of correlation was used in this section to find the correlation between the independent variables. The correlation matrix's findings, which are shown in table 3, revealed that there is very little correlation between the model's independent variables. The main reason for finding correlation between the independent variables is to identify whether there are similarities in the data that will lead to multicollinearity. According to (Gujarati, 2009), a significant amount of multicollinearity is indicated if the pairwise correlation between two variables is greater than 0.8. As a result, the overall findings exclude multicollinearity.

Table 3 Correlation matrix

	LNREXR	LNACF	LNADO	LNEP/IP	LNFIA
LNREXR	1.0000				
LNACF	0.0705	1.0000			
LNADO	-0.7677	-0.0160	1.0000		
LNEP/IP	0.5147	-0.1230	0.6154	1.0000	
LNFIA	-0.7071	0.2763	0.6733	0.2081	1.000

3.3.0 The relationship between the independent variables and the existence of multicollinearity.

3.3.1 Ghana’s exchange rate (REXR) and the other variables

The variable REXR measures the rate at which the country’s currency is exchanged for other foreign currencies. The correlation matrix in Table 4 shows that the Prais-Winston correlation

coefficient between REXR and ACF (Agricultural Capital formation) is 0.0705. The result reveals a weak and positive correlation between REXR and ACF. Moreover, EP/IP also reveals a strong positive relation with REXR. However, FIA and ADO have a strong negative correlation with REXR. Since none of the coefficient variables is more than 0.8, we can confidently say there is no problem of multicollinearity among the independent variables.

3.3.2 The Correlation between ACF AND ADO, EP/IP, FIA.

The results from the Prais-Winston correlation matrix in Table 4 reveal the existence of a weak negative correlation between ACF (Agricultural Capital Formation) and ADO and EP/IP. The correlation coefficient between the ACF and ADO is -0.0160. Whilst the correlation between ACF and EP/IP is -0.123. There is however a positive correlation between ACF and FIA. Indicating that, foreign investors are motivated to invest in the country's agricultural sector when there are necessary inputs such as good human resource, land, government support etc.

3.3.3 The Correlation between and Agricultural Degree of openness and exports and imports price ratio and Foreign Investment in Agric.

The correlation matrix in Table 4 shows that the correlation coefficient between ADO and EP/IP (Agricultural exports and imports price ratio) is 0.6154. The result reveals a significant and positive correlation between ADO and EP/IP. Also, there exist a strong positive correlation between ADO and FIA. This implies that, as the country opens up it borders to international traders, export and import ratio and FIA is likely to improve. This explains the positive relationship among the variables.

3.4 Variance Inflation Factor (vif)

Ordinarily, in a time series multivariate regression analysis, it is likely going to lead to a spurious regression when there is the presence of multicollinearity among the independent variables. This method is supposed to guide us to determine and avoid multicollinearity and spurious regression and also to enable us to predict the value of the dependent variable in future. Therefore, from table 4 below, a VIF of 2.83 is far less than 10 hence we can conclude that the estimation used is good for our model and doesn't exhibit multicollinearity.

Table 4 Variance inflation factor

Variable	**VIF**	**1/VIF**
lnado	**4.02**	**0.248675**
lnfia	**3.37**	**0.29658**

lnrexr	**3.2**	**0.31253**
lnepip	**2.23**	**0.447546**
lnacf	**1.3**	**0.767589**
Mean VIF	**2.83**	

3.5 Multivariate Regression

Table 5 illustrates the direct significant effect of trade liberalization on Ghana's Agricultural Performance. The independent variables used in measuring the impact of trade liberalisation on agricultural performance are the log values of ACF, ADO, REXR, EP/IP and FIA. The R Square of the model summary illustration is .8965, which means the significant effect of trade liberalization accounts for 89.65% of the total contribution of factors that influence Ghanaian Agricultural Performance as a percentage of total GDP and Ghana's agricultural export and import.

Table 5 multivariate regression

Variable (in log forms)	Coefficient (***β)***	Standard error	p-value
Intercept	-1.20	0.35	0.002
Foreign investment in agriculture	0.03	0.03	0.311
Export and import price ratio	-0.09	0.05	0.107
Agricultural capital formation	0.04	0.11	0.701
Agricultural degree of openness	1.19	0.30	0.001
Real exchange rate	-0.10	0.02	0.000
Number of observations	30	R-squared	0.8965

According to the above-mentioned regression results in Table 5, the intercept C indicates that, on average, when all the independent variables are zero (0) the dependent variable, or agricultural performance to GDP (LNAGDP) will decline by 1.2%. The intercept is statistically significance at 1%. This is not surprising because, the results basically means that, in the absence of trade liberalization or trade openness, Ghana's agricultural performance is expected to decline. This concurs to Nowbutsing (2014) theoretical postulates, which contend

that increased economic openness leads to growth and lower production costs, which lower import levels, boost exports, and raise domestic production.

With regards to ADO, the test indicates that the variable is statistically significant at one percent. This implies that a percentage increase in the agricultural Degree of Openness (ADO) will cause the dependent variable, Ghanaian Agricultural Performance, to increase by 1.19%. Theoretically, it would follow that a greater degree of openness would result in improved domestic performance, as evidenced by the findings of these studies, the data supports the theoretical a prior expectation.

A percentage rise in agricultural capital formation (ACF) will result in a 0.04% increase in the dependent variable AGDP. In this study, "Agricultural Capital Formation" refers to imported and locally produced farm machinery and instruments such fertilizer, pesticides, fungicides, irrigation systems, and harvesting equipment. The result obtained here is in line with a priori expectations because it is theorized that technology increases domestic production, but my brief argument is that the 0.04% contribution is not really sufficient to justify agricultural capital formation in Ghana because huge funds have been invested in these aspects of agriculture, and secondly, fifteen years of structural results demonstrate that as the year increases, the contribution on agricultural capital formation decreases.

A percentage rise in the ratio of export to import prices (EP/IP) will result in a -0.09% reduction in the dependent variable AGDP. This demonstrates that, on average, export prices (the numerator) are lower than import prices (the denominator), and it also demonstrates the disadvantageous terms of trade (TOT) for most of our export commodities. The data doesn’t support our a-prior expectations because Ghana is highly import dependent for most of its goods. Theoretically speaking, a positive EP/IP ratio should lead to an improvement in AGDP. However, the nature of the data collected doesn’t support that fact for a developing country like Ghana. This is because, imports far outweigh exports.

A stable exchange rate is expected to have positive impact on agricultural performance. However, Due to the volatility and depreciating of the local currency, exchange rate has an adverse effect on agricultural performance. A percentage increase in the real exchange rate (REXR) will result in a fall of 0.1% in the dependent variable AGDP. This suggests that when the real exchange rate (REXR) rises, AGDP experiences a negative effect, which is inconsistent with a priori expectations. Moreover, a percentage increase in foreign investment in agriculture (FIA) will raise the dependent variable, Ghanaian Agricultural Performance, by 0.03%. This suggests that as foreign investment in agriculture increases, so does the

performance of Ghanaian agriculture (AGDP), which is consistent with a priori expectations and also supports the Ghanaian economy.

It is important to note that, apart from REXR and ADO which are statistically significant at 1% significance level, the rest are insignificant to the dependent variable (AGDP). This means that based on the data collected and the analysis made so far, the only variables that affects Ghanaian Agricultural performance are REXR and ADO.

3.6 ARDL and Bound Test

Autoregressive Distributed Lag (ARDL) adds lagged values for both the dependent and independent variables to the traditional autoregressive model (AR). When there may be a mixture of stationary and non-stationary variables present, it is utilised to investigate the long-term relationships between variables. The Bound test is used to ascertain whether there is a cointegration in ARDL models. The main goal is to investigate the null hypothesis whether there is a long-term relation between the dependent and the independent variables despite short term fluctuations. Figure 5 below shows the bounds test from our ARDL.

Figure 6 Bounds test

```
H0: no level relationship                                   F =     2.099
Case 3                                                      t =    -1.735

Finite sample (5 variables, 29 observations, 5 short-run coefficients)

Kripfganz and Schneider (2020) critical values and approximate p-values
```

	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	2.615	4.062	3.244	4.937	4.865	7.172	0.180	0.479
t	-2.488	-3.799	-2.889	-4.293	-3.734	-5.339	0.297	0.684

The bounds test has a null hypothesis of H0: there is no cointegration between the dependent and the independent variables whiles the alternative hypothesis (H1) is that there is a long-run relationship. In the bounds test, the test statistics is the F-statistics and the critical values are chosen based on significant levels (5%). Therefore, since F-statistics of 2.099 is greater than 0.05 we do not have enough evidence to reject the null hypothesis. This implies that further evidence maybe required to determine the overall importance of trade openness on agricultural performance in Ghana. There can be short term benefits and disadvantages of trade openness on the agricultural sector and the economy as a whole but the data suggests

that there is no clear long run benefit since every country is unique and with different challenges.

CONCLUSION, RECOMMENDATION AND FUTURE WORK

4.1 Conclusion

In conclusion, this dissertation has examined the complex interplay over a three-decade period between trade liberalisation and Ghana's agricultural economy. The main goal was to determine the effects of various variables on agricultural performance as a percentage of GDP (AGDP), including foreign investment in agriculture (FIA), real exchange rate (REXR), agricultural degree of openness (ADO), agricultural capital formation (ACF), and export and import price ratio (EPIP). These elements were anticipated to have a favourable effect on AGDP a priori. However, some interesting findings came from the empirical analysis. FIA, ADO, and ACF showed the anticipated positive beneficial influence on AGDP but REXR and EPIP unexpectedly showed a negative effect.

Additionally, at the 1% level of significance, only REXR and ADO were statistically significant whilst the remaining variables were not statistically significant at any level of significance. Importantly, the results of statistical tests used to determine multicollinearity, such as the Prais-Winston correlation and the variance inflation factor (VIF), supported the conclusion that the independent variables did not exhibit multicollinearity. This gives the regression results more validity. These results highlight how intricate the interaction between trade liberalisation and Ghana's agriculture industry is. While certain elements seem to improve agricultural production, others could have unforeseen effects. When developing trade policies and initiatives targeted at enhancing the agriculture industry, these intricacies must be considered.

In contrast, globalization has favourably impacted technology, infrastructural development, growth, and living standards in other developing Asian nations including India, China and Lebanon through the promotion of foreign direct investments. Due to the limited absorption of technology and poor infrastructure in Ghana, globalization may not have an impact on sustainable agriculture.

The study suggests that protective policies be employed to encourage foreign direct investment inflow into the agriculture sector rather than just the extractive industry as Ghana explore globalization potential. A change in the unfavourable interactions will always result from the implementation of measures that will promote foreign direct investment, Agricultural Degree of openness into the agricultural sectors and stabilization of the local currency to boost to ensure confidence in the economy and also protect investors capital. It is important to

promote foreign direct investments that provide expertise and technology to the agricultural sector. Only through foreign direct investment can the decline in domestic resources be compensated for.

4.2 Recommendation and future work

The findings reveal that exchange rate performance and Export and Import ratios are negatively related to Ghana's Agricultural Performance (AGDP), contrary to theoretical expectations. This result is in line with the data collected within the Ghanaian context. Ghana is a high import dependent country with a volatile and unstable currency. Investors are weary of investing in economies that they can't reap their capital back. Unstable exchange rate makes it difficult to attract foreign and local investors as their capital might reduce in value in the future. It is crucial to regularly monitor exchange rate changes and take precautions to lessen their negative effects on the agriculture sector given the unexpected negative impact of the real exchange rate on AGDP. It is therefore imperative for the government to implement policies such as currency board to manage the fluctuation of the currency. Ghana's trade policies should be developed to support and improve the performance of the agriculture industry. Even though liberalisation can have positive effects, it is necessary to make sure that it is accompanied by measures that address the drawbacks that have been noted, especially those that have been linked to the real exchange rate and export-import price ratios. It is suggested to have a more varied trade policy that takes these things into account.

Additionally, future studies must look into measures that can entice foreign investment, which may help to support a stronger currency. Agriculture-related foreign investment has a favourable impact on the AGDP. Positive policies and incentives that promote foreign investment can assist improve agricultural output even further. This should be carried out in a way that supports Ghana's long-term objectives for agricultural growth. The agriculture sector will benefit from attracting foreign investment, according to the favourable relationship between foreign investment in agriculture (FIA) and AGDP. The government and policy makers should implement measures that encourage foreign investment, such as offering incentives and maintaining a clear regulatory environment.

To counter the negative effect of EPIP on AGDP, authorities may include actions to support export-oriented agricultural products or safeguard local farmers. Agricultural Capital Formation (ACF) and AGDP were positively related, although the 0.043% contribution may not be enough to support the considerable investments made in this area of agriculture. A more effective distribution of resources is required for agricultural capital formation. Future studies should

evaluate the success of these investments and think about shifting resources to initiatives that will result in greater agricultural yield. The expansion of policies and programmes targeted at boosting agricultural capital formation is necessary. This can involve financial commitments to the agriculture industry's infrastructure, technological advancements, and people resources. The government and policy makers must keep a close eye on how policies and actions are affecting the agriculture industry. Future studies must determine how well policies aimed at enhancing trade openness, capital formation, exchange rates and foreign investment are working on a regular basis. To optimize their beneficial effect on agricultural sector and the economy, policies should be adjusted as necessary. To improve performance, lower production costs, and boost Ghana's agricultural products' competitiveness abroad, the government and policy makers must invest in agricultural research and innovation. Future studies must investigate ways to diversify agricultural markets and products to lessen reliance on a selected few trading partners and commodities. The government must spend money on educating and equipping farmers with the skills they need to adopt cutting-edge agricultural techniques and technology that can increase performance and resistance to shocks from the outside world.

It is important to note that, our study suggest there is no long run benefit between trade openness and the performance of the Ghanaian agricultural sector. This has been supported by many researchers in our literature review who found that trade liberalization of agricultural commerce has significantly affected developing countries due to high import dependency and unfair foreign competition. Just like Nigeria, (Oguijubia et al., 2004) found that there was no real benefit between trade openness and actual economic growth. In other to avoid wasteful expenditure in the current dispensation, authorities need to overhaul the fundamentals of the economy and fix the leakages in other to fully benefit from trade liberalisation.

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