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Agricultural Exports and Economic Growth: A Disaggregated Analysis for Ghana

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Abstract

Examining the correlation between agricultural exports and economic growth, a study was carried out in Ghana at the disaggregate level using the Autoregressive Distributed Lag (ARDL) model with yearly time series data spanning from 1990Q1-2011Q4 to advise policy makers on the dynamics of growth. Both the long-run and the short-run results reveal that, cocoa export has a positive and significant impact on economic growth whiles the export of pineapple and banana has negative effect on economic growth even though pineapple export is not significant in both long run and short run. In addition, the study found unidirectional causality running from banana to economic growth, a bi-directional causal relationship between cocoa export and economic growth and no causality between economic development and pineapple export in Ghana. As a result, the study recommends that the performance of Ghana Export Promotion Authority and Ghana Free Zones Board should be made public in other to grab the awareness of foreign investors, and by so doing, it would provide access to global markets to Ghanaian exporters. There is also the need for the government of Ghana to bring into force structural changes which will ensure that additional values are added to them hither to their exportation.

Keywords

Economic Growth, Cocoa Export, Banana Export, Pineapple Export, Ghana

1. Introduction

International trade tends to break the limitation of the domestic market and as a result expands the market by enhancing distribution of labour and productivity [1]. The expansion in the market leads to increased global production, thereby resulting in internal and external economies of scale and growth in an econ-

omy's income. These, according to Afonso, Ó. [2], make international trade an important dynamic force that is capable of improving the ability and skills of workers, technical innovation, capital accumulation and overcoming technical indivisibilities, therefore, likely to generate economic growth of the partaking countries. The role of exports in determining economic development is considered as an important policy issue in many developing economies [3] [4] [5] [6] [7]. Growth in real exports tends to cause growth in real gross national product for a number of reasons. Exports help to generate foreign exchange which is used to purchase the much-needed manufactured goods, capital goods, and technology. Through pressure of foreign rivalry, motivations for technological development, economies of scale, and higher ability operation leading to extra resourceful management exports indirectly contribute to economic growth. Ultimately, exports have a direct impact on productivity due to an improved allotment of resources based on comparative advantage and specialization [8]-[14].

Developing countries in formulating their economic development strategies emphasize sectoral exports; mainly tourism service exports, coffee exports, banana exports, cocoa exports, rice exports and the like. In fact, the expansion of agricultural exports contributes tremendously in increasing the rate of economic growth in developing countries. This may be so since those countries have a comparative advantage in the agricultural sector given their endowment of resources. It was found in the review of literature that, studies on the relationship between agricultural exports (particularly, sectoral exports) and economic growth are very scarce. This is because only a few scholars have paid attention in terms of empirical studies to the impact of agricultural exports on economic growth [15]-[22]. Over the past decades, the value of merchandise export from Ghana has increased from US $2562.4 million in 2003 to US $13752 million in 2013, representing export to GDP ratios of 32% and 31% respectively, and an average growth rate of 22% over the period [23]. In 2013, over 53% Ghana's workforce was employed in agriculture industry meaning that improving agricultural industry will eventually reduce the country's unemployment [24].

Therefore, owing to lack of interest in the effects of cocoa, banana and pineapple exports on economic growth, this study attempts to unearth the impacts of agricultural exports on the Ghanaian economy since the country has a comparative advantage in the production of cocoa, banana, and pineapple.

2. Literature Review

If countries (especially, developing countries) specialized in sectors with lower income elasticity of demand for agriculture, their income growth would always lag behind that of developed countries hence, widening the gap between the rich and the poor countries, with poor countries productivity growth remaining permanently low [25] [26]. In view of the important of the subject and the wide divergence in theoretical positions, normous empirical studies [27]-[32] have been conducted using ELG theory to study the effect of entire export on eco-

nomic growth. However, the findings of these previous studies were inconclusive and did not provide any strong evidence either for or against the ELG hypothesis [33] as cited by Kang, H. [21].

Keho [34] applying the Johansen cointegration test and Vector Error Correction Model (VECM) investigate the export-led growth theory in La Cote d'Ivoire. It was found that there is one long-run equilibrium correlation between the variables and was also argued that exports Granger induce economic growth in both short-run and long-run giving an evidence for the export-led development theory. Saleem & Sial [35] analysed the causality between exports and GDP in Pakistan and their results discovered that there is unidirectional causality moving from exports to GDP and GDP per capita, though Saleem, A., & Sial, M. H. [36] unveiled a signal of unidirectional causality from exports to economic growth, supporting the hypothesis of growth-driven export (GDE).

Ehinomen & Oguntona [37] applied ARDL and Granger causality test to find out if there exists a causal and long-run relationship between export and economic growth in Nigeria. Examining the real GDP, exchange rate, export values, gross capital formation, labour force population and imports values, annually time series data was employed from 1970 to 2010 which revealed the existence of a unidirectional relationship between economic growth and export in Nigeria and also the existence of long-run correlation between export and economic growth.

Noula *et al.* [19] applied Cobb Douglas production function with Engle-Granger two step approach and Vector Correction Model (VECM) to explore the impact of agricultural exports on economic growth in Cameroon between the period of 1975-2009, which revealed a mixed effect of agricultural exports on economic growth, with cocoa export having a negative and insignificant impact on economic growth. However, coffee and banana export have positive relationship and significant to economic growth of the country.

Due to the importance of trade to the South Korean economy, Tsegaye, D. L. [38] empirically employed Cobb Douglas production function under Vector Error Correction Model (VECM) and Granger causality to examine the connection between economic growth and trade and concluded that in the long-run, unidirectional causality exists between economic growth and export and also the presence of bi-direction causality for imports in Korea. In addition, the study found unidirectional short run causality from exports and imports to economic growth; supporting both export-led growth (ELG) and import-led growth (ILG) hypotheses. The study implied that both trades (imports and exports) play significant part in inspiring economic growth; and stated that a focus on export promotion as a singular trade policy might face huddles in sustaining economic growth. Rahman & Hossain [39] applied Johansen & Juselius cointegration test, Vector Auto-Regressive (VAR) approach joined with Granger causality test to study the role of agriculture in economic development of Bangladesh. A long-run correlation between economic growth and agricultural was uncovered,

and the existence of unidirectional causality was revealed moving from agriculture to economic development based on the Granger causality test in Bangladesh. The Vector Auto-Regressive (VAR) results also confirmed that changes in agricultural GDP react more critically to economic growth and therefore suggested that, in order to stimulate economic development in Bangladesh, effort should be made on boosting the agricultural sector.

Boansi *et al.* [40] employed Johansen Full Information Maximum Likelihood test to estimate the economic and policy essentials of agricultural exports. The study was intended to inform agricultural trade policy prescriptions on how growth observed in Ghana's agricultural export sector might be maintained and increased. It was found that the country is prevented from exploiting the growth enhancing opportunities in the short run due to her structural weaknesses in production, trade and marketing environments, while potential obstacles to trade results in similar implication in the long-run. The researchers, therefore, suggested that policy makers need to address the current structural inefficiencies and weaknesses in production, augmented diversification of agricultural exports, marketing and trade, attraction of export enhancing foreign direct investments, augmented openness to trade, and augmented domestic production in order to sustain and increase the growth of the Ghanaian agricultural export sector.

Bokosi [41] employed the Vector Autoregressive (VAR) approach in Malawi on an annual secondary data from 1980 to 2013 to reveal the empirical evidence that exist between economic growth and trade where export trade was disaggregated into services and goods exports to estimate two models. The relationship between growth and export of services was investigated in the first model whereas the relationship between growth and goods export was estimated in the second model. No evidence for long-run relationship between export of services and goods on economic growth was found but the study found out that export of goods has an affirmative effect on economic development in the short-run. Affirmation of the presence of unidirectional causality based on the Granger causality test moving from goods export to economic development and also the existence of unidirectional causality from goods to service export was found.

Shah *et al.* [42] studied the outcome of agricultural exports on economic development in Pakistan with the help of secondary data from 1972 to 2008. The findings indicated that agricultural exports negatively relate to economic growth, whereas non-agricultural exports were found to positively influence economic growth.

Bashir *et al.* [43] studied the export-led growth theory in Pakistan using the vector error model, Granger causality tests, and cointegration on yearly time series data for the period of 1972 to 2012 in Pakistan. The study found that, in both long-run and short-run there is a significant positive relationship between exports and economic growth. Hence, the study concluded that there is an existence of export-led growth theory in Pakistan and therefore made a suggestion to the government to put in place incentives such as export bonuses, export

credit guarantee schemes, and export financing, to encourage Pakistani exporters.

Njimanted & Aquilas [4] examined the effect of timber export on economic growth in Cameroon by applying Johansen Cointegration and Vector Error Correction Model through hannual time series spanning a period of 1980-2014. The findings show that timber exports contain an insignificant affirmative impact on economic growth in both long-run and short-run. To these researchers, it is incumbent on the Cameroonian government to encourage increased consumption of locally-manufactured wood products, encourage the establishment of locally based wood processing industries, and restrict imported manufactured wood products.

Using the vector error correction model, Johansen cointegration test, and Granger causality test [44] examined the effect of disaggregated agricultural exports on economic growth of Ethiopia. The study discovered a negative and insignificant correlation among pulses export and economic growth, although both oilseeds and coffee export were discovered to have a significant and positive influence on economic growth. It was further found that there exists a bi-directional correlation among coffee and oilseeds export, and economic growth, while there was unidirectional causality moving from pulses export to economic growth.

Ouma *et al.* [22] examined the relationship of the agricultural trade by means of economic growth in East African Community (EAC) from the period 2000 to 2012. Vector Error Correction Models (VECM) and bi-variate Vector Auto-Regressive (VAR) were employed in the study for which the empirical results revealed that East African countries (EAC) member states have different and mix results. Kenya and Rwanda exhibited a unidirectional link between agricultural export and economic growth whiles Uganda, Burundi and Tanzania shows no relationship.

3. Econometric Methodology

3.1. Model Specification

Observing the empirical work of Kang, H. [21], this study set out to examine the role of agricultural exports (especially cocoa, banana and pineapple exports) in economic growth by focusing on the supply perspective, and it is due to the fact that Ghana has a comparative advantage in the production of cocoa, banana, and pineapple. Primarily, this study used augmented neo-classical framework developed by Solow R. M. [45], Feder, G. [46], and Ram, R. [47] to specify the following model:

$$Y_t = f\left(K, L, X\right) \tag{1}$$

where Y represents the real GDP, K is the capital stock proxies for domestic investment (INV), L denotes the labour force (LABF), and X indicates the exports. In an attempt to investigate the contribution of the agricultural sectors to eco-

nomic growth, as such, the study divided the export input into three more strictly defined as cocoa, banana, and pineapple exports (see [21]). In view of that, Duc, N. M., & Tram, N. A. [48] and Serenis, D., Tsounis N., and Serenis, P. [49] indicated the extended form of the Equation (1) to capture the impact of the sectorial exports on economic growth as expressed in Equation (2) below:

$$Y_t = f\left(K_t, L_t, X_t^c, X_t^b, X_t^p\right) \tag{2}$$

where X_t^c, X_t^b, and X_t^p denote cocoa exports (COCX), banana exports (BANX), and pineapple exports (PINX) respectively. It is important to note that exchange rate provides information about the differences in economic activity between countries and is considered as an important economic indicator [50] [51]. Economists have long known that poorly managed exchange rates can be catastrophic for economic growth. The exchange rate has a negative effect on economic growth [52] [53]. So, Equation (2) can be written as:

$$\mathrm{RGDP}_t = f\left(\mathrm{INV}_t, \mathrm{LABF}_t, \mathrm{EXR}_t, \mathrm{COCX}_t, \mathrm{BANX}_t, \mathrm{PINX}_t\right) \tag{3}$$

In order to rule-out the differences in the units from Equation (3), the researchers applied natural logarithm on both sides leading to the empirical model expressed in Equation (4).

$$\begin{aligned} \ln \mathrm{RGDP}_t = {} & \beta_0 + \beta_1 \ln \mathrm{INV}_t + \beta_2 \ln \mathrm{LABF}_t + \beta_3 \ln \mathrm{EXR}_t \\ & + \beta_4 \ln \mathrm{COCX}_t + \beta_5 \ln \mathrm{BANX}_t + \beta_6 \ln \mathrm{PINX}_t + \varepsilon_t \end{aligned} \tag{4}$$

where β_1 represents the elasticity coefficients. The following are expected $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 > 0$, and $\beta_6 > 0$. Also, in indicates natural logarithm. The other variables have already been defined.

3.2. Data Source

The study applied quarterly time series data from 1990Q1-2011Q4. The data on real GDP, labour force, investment, and exchange rate were obtained from World Development Indicators (2015) published by the World Bank. Also, the data on cocoa export, banana export, and pineapple export were sourced from Food and Agricultural Organisation Statistics Database.

3.3. Estimation Strategies

3.3.1. ARDL Cointegration Test

The existence of long-run relationship was tested using cointegrated test which revealed cointegration for two or more series and a long-term equilibrium relationship was well-established between them. This normally implies that the variables must have long term co-movement. However, for time series, variables that exhibit cointegration, even though they may be non-stationary in levels, the regression relationships of these variables do have a long-run relationship. Therefore, testing the cointegration becomes very important when dealing with time series data. On Condition that the variables are integrated by the means of order zero or one [*i.e.* I (0) or I (1)], as a result, the study applied the Auto-Regressive Distributed Lag (ARDL) Bounds test approach to cointe-

gration. Pesaran & Shin [54] and Pesaran, M. H., Shin, Y., & Smith, R. J. [55] designed the ARDL Bounds Test model which was used because it gives less difficult process in arriving at a short-run and long-run variability between the variable under study relative to multivariate cointegration techniques. The method is particularly dynamic which methodology is able to provide a simple univariate framework with regresses that are either stationary I (0) and/or non-stationary I (1). The ARDL Bounds testing method provides logical t-test, F-test, and unbiased long run calculations even when some of the regress in the model is endogenous especially in the case of fundamental macro-economic variables. Though, the method is used to study the short-run and the long-run relation between the variables, a conditional ARDL model of order (m, n^1, n^2, n^3, n^4, n^5, n^6) was used to test the long-run relationship of the variables identified. The long-run ARDL model assumed the form;

$$\begin{aligned}\ln \mathrm{RGDP}_t = {} & \alpha_o + \sum_{i=1}^{m} \beta_{1i} \ln \mathrm{RGDP}_{t-i} + \sum_{i=1}^{n^1} \beta_{2i} \ln \mathrm{INV}_{t-i} + \sum_{i=1}^{n^2} \beta_{3i} \ln \mathrm{LABF}_{t-i} \\ & + \sum_{i=1}^{n^3} \beta_{4i} \ln \mathrm{EXR}_{t-i} + \sum_{i=1}^{n^4} \beta_{5i} \ln \mathrm{COCX}_{t-i} + \sum_{i=1}^{n^5} \beta_{6i} \ln \mathrm{BANX}_{t-i} \\ & + \sum_{i=1}^{n^6} \beta_{6i} \ln \mathrm{PINX}_{t-i} + \varepsilon_t \end{aligned} \quad (5)$$

The lag optimum of the variables concerned was selected based on Schwarz Bayesian criterion. This is because it gives more parsimonious models specification.

Also, the error correction model was used to capture the short-run dynamics as follows:

$$\begin{aligned}\Delta \ln \mathrm{RGDP}_t = {} & \alpha_o + \sum_{i=1}^{m} \gamma_{1i} \Delta \ln \mathrm{RGDP}_{t-i} + \sum_{i=1}^{n^1} \gamma_{2i} \Delta \ln \mathrm{INV}_{t-i} + \sum_{i=1}^{n^2} \gamma_{3i} \Delta \ln \mathrm{LABF}_{t-i} \\ & + \sum_{i=1}^{n^3} \gamma_{4i} \Delta \ln \mathrm{EXR}_{t-i} + \sum_{i=1}^{n^4} \gamma_{5i} \Delta \ln \mathrm{COCX}_{t-i} + \sum_{i=1}^{n^5} \gamma_{6i} \Delta \ln \mathrm{BANX}_{t-i} \\ & + \sum_{i=1}^{n^6} \gamma_{6i} \Delta \ln \mathrm{PINX}_{t-i} + \theta \mathrm{ECM}_{t-1} + \varepsilon_t \end{aligned} \quad (6)$$

where γ_1 is the short-run coefficient of model's dynamic adjustment to equilibrium. ECM_{t-1} term is Error Correction factor. It shows the estimate of short-run disequilibrium adjustment of long-run equilibrium error term. θ measures the speed of change to get to the equilibrium in the existence of shocks.

3.3.2. Granger Causality Test

The Granger causality test developed by Granger, C. W. J. [56] is an econometric tool that looks at identifying causality among a group of variables. The idea of causality does not imply causation but that one variable helps to explain another variable better. Thus, if Y and X are two variables of interest, we say X Granger causes Y if Y is not better explained by the lag values of Y, but that considering a variable X and its lags will better predict the behaviour of variable Y. Generally,

the expression of Granger causality test in a bivariate situation is given by following equations:

$$Y_t = A_{10} + \sum_{i=1}^{k_{11}} A_{11} Y_{t-i} + \sum_{i=1}^{k_{12}} A_{12} X_{x-i} + U_{1t} \quad (7)$$

$$X_t = A_{10} + \sum_{i=1}^{k_{21}} A_{21} Y_{t-1} + \sum_{i=1}^{k_{22}} A_{22} X_{x-i} + U_{2t} \quad (8)$$

4. Results and Analyses

4.1. Stationary Test

The study used Augmented Dickey-Fuller (ADF) test to observe the stationeries of the variables concerned. The results are presented in Table 1.

Results obtained from the ADF test exhibited that investment and pineapple export were stationary in their levels. During the test, the null hypothesis of unit root was rejected for variables; real GDP, labour force, exchange rate, cocoa export, and banana export in their levels as they attained stationarity after first differencing at the 5% significant level since their tau values were higher than the

Table 1. Results for augmented Dickey-Fuller test.

(a)

Variables	Augmented Dickey-Fuller		IO
	Levels		
	No Trend	Trend	
LNRGDP	2.254048	2.682400	?
LNLABF	−1.404255	−0.786047	?
LNINV	−4.049724***	−3.959953**	I (0)
LNEXR	−2.279752	−0.392563	?
LNCOCX	0.239540	−2.747651	?
LNBANX	−2.378033	−2.621446	?
LNPINX	−3.179227**	−3.417358*	I (0)

(b)

Variables	Augmented Dickey-Fuller		IO
	First Difference		
	No Trend	Trend	
LNRGDP	−12.74961***	−12.93601***	I (1)
LNLABF	−12.96100***	−12.89302***	I (1)
LNEXR	−5.091735***	−5.641887***	I (1)
LNCOCX	−10.94571***	−10.95763***	I (1)
LNBANX	−8.042295***	−7.917979***	I (1)

Source: By authors (2017). **Note:** The rejection of the null hypothesis of a unit root/non-stationarity is indicated by ***, **, * at 1%, 5%, and 10% significance level respectively.

critical values of the ADF statistic. It is apparent from the results that none of the variables are integrated of order two [I (2)], thereby providing a reasonable justification for the application of an ARDL model.

4.2. Cointegration Test

This test was conducted to establish the level relationship for the ARDL model expressed in the methodology and the results are illustrated in Table 2 as cointegration test results.

The Bounds test is conducted using the "F" statistic. Given that F-statistic is 3.745552, and the critical ARDL lower and upper Bounds test values are 2.45 and 3.61 for the 5% significance level and 3.15 and 4.43 for the 1% significance level respectively. Based on the results above, the null hypothesis of no level effect is rejected due to the fact that the F-statistic is beyond the upper bound at a significant level of 1%. This means that there is a level relationship between real GDP and all the other regresses in the model.

4.3. Results of the Estimated Long Run Coefficients

Table 3 presents the results of the long run coefficient estimates of the ARDL model.

Consistent with economic theory, the labour force has a positive and significant effect on economic growth. This can be stated that, in the long-run, an increase in labour force by 1% would result in 1.31% increase in economic growth. The sign of this variable is due to the fact that a rise in the size of labour force presents an opportunity to drive economic growth expansion and increase gross domestic product. This result is similar to the findings of Gemechu, D. [57], Shewangizaw, S. [58], and Noula, G. A., Gustave, L. S., & Munchunga, D. G. [19], but it contrasts the study by Njimanted, G. F., & Aquilas, N. A. [4] which exhibited an inverse relationship labour force and economic growth.

From the results in Table 3, it was found that the coefficient of gross fixed capital formation proxies for investment is positive. Thus, 1% jumps in investment increases the growth rate of the economy by 0.04%. This means that even though investment is not statistically significant in the long-run with the rate of growth of the economy, they are positively correlated. This shows the low level of investment and low capital-intensive economy of Ghana. Although the government has formulated and implemented an economic policy to bridge the gap between the agricultural and manufacturing sectors, the manufacturing sector is concentrating more on labour intensive than capital intensive in an attempt to

Table 2. ARDL bounds test results for cointegration.

F-statistic	Level of Significance	Lower Bound	Upper Bound	Decision
3.745552	10%	2.12	3.23	Evidence of cointegration
	5%	2.45	3.61	
	1%	3.15	4.43	

Table 3. Estimated ARDL long run coefficients.

Dependent Variable: **LNRGDP**				
Variables	Coefficient	Std. Error	T-Statistic	Probability
LNLABF	1.312543	0.125673	10.444086	0.0000
LNINV	0.041171	0.057145	0.720464	0.4734
LNEXR	0.124020	0.015323	8.093766	0.0000
LNCOCX	0.419000	0.023206	18.056065	0.0000
LNPINX	−0.000511	0.009091	−0.056179	0.9553
LNBANX	−0.100187	0.012533	−7.993857	0.0000
C	−0.153674	0.075472	−2.036164	0.0451

Source: By authors (2017).

curb unemployment. This finding is not in line with that of Njimanted, G. F., & Aquilas, N. A. [4] who established a positive and significant correlation among investment and economic growth in Cameroon. From the results as displayed in Table 3, the exchange rate was found to exert a positive influence on economic growth, and it was significant at the 1% level. This is an indication that a 1% increase in exchange rate has the impetus of increasing the growth rate of the Ghanaian economy by approximately 0.12% in the long-run. Since the study suggested an inelastic relationship between exchange rate and economic growth, there ought to be a shift in the structure of both production and trade towards products with demand elastic and high value-added products. A similar result was found by Yifru, T. [44], Kagnew, W. [59], Henneberry, S. R., & Khan, M. E. [60], Fentahun, B. [61], Gemechu, D. [57].

More so, cocoa export was exhibited a positive sign and it was significant at 1% in the long-run. This implies that in the event of a rise in cocoa export, the growth rate of the Ghanaian economy will increase approximately by 0.42%. Thus, cocoa export is directly inclined to influence economic growth in Ghana. Empirical results by Shashi, K., & Marcella, V. [62] suggested an evidence of a positive association between the cocoa sector and the growth rate of the Ghanaian economy. However, Noula, G. A., Gustave, L. S., & Munchunga, D. G. [19] discovered that, in Cameroon, cocoa export negatively relates to economic growth.

Unexpectedly, the study found a negative relationship between pineapple export and economic growth in Ghana. Meanwhile, in the long run, an increase in pineapple export by 1% would not trigger a significant decrease in economic growth, given its coefficient of −0.000511. The long run results also revealed a negative and statistically significant coefficient of banana export at 1% level. The elasticity coefficient of −0.100187 indicates that banana export exerts a negative influence on economic growth in Ghana in the long run, hence a 1% rise in the level of banana export results in a 0.10% fall in the growth rate of economic growth. Previous studies such as Noula, G. A., Gustave, L. S., & Munchunga, D.

G. [19] contradict the outcome of this study.

4.4. Results and Discussion of the Estimated Short Run Coefficients

Table 4 presents the result of the error correction model.

The estimated short run dynamics exhibited an R-squared value of 0.986277 meaning about 98.6% of the variation in the growth of real GDP is explained by the independent variables in the model. The R-bar-square is about 98.5%. The F-statistic confirmed the joint significance of all the independent variables at 1% significance level. The error correction term was highly significant at 1% and negative which is the appropriate sign for it. A coefficient of −0.929729 is indicative of the fact that approximately 93% of all disequilibria from the preceding year's shock converges back to the long-run equilibrium in the existing year. The rate of the growth of the economy if positively influenced by the labour force in the short-run. With a statistically significant coefficient at the 1% level, economic growth will rise by 1.22% should the labour force increase by 1%. This presupposes that human capital is growing, owing to expanding education, skills and training facilities and provision of better health facilities in most deprived rural and urban areas of the country [44].

Although not significant, Gross fixed capital formation as a ratio of GDP proxies for investment was consistent with the long run results and maintained its positive sign. This means that increment in domestic investment over the years has not been able to spur the desired boost in economic growth in Ghana. Consistent with the long-run results, the coefficient of exchange rate in the short-run was positive and significant at the 1% significance level. The results, thus, suggest that if the exchange rate goes up by 1%, the Ghanaian economy will respond by increasing the growth rate by 0.12%. The short-run and long-run results show that exchange rate has been a stimulant for economic growth.

Table 4. Estimated ARDL short run coefficients.

Dependent Variable: **DLNRGDP**				
Variables	Coefficient	Std. Error	T-Statistic	Probability
D (LNLABF)	1.220309	0.099843	12.222244	0.0000
D (LNINV)	0.038277	0.053226	0.719146	0.4742
D (LNEXR)	0.115305	0.014125	8.163419	0.0000
D (LNCOCX)	0.389557	0.025540	15.252560	0.0000
D (LNPINX)	−0.000475	0.008452	−0.056183	0.9553
D (LNBANX)	−0.093147	0.011579	−8.044347	0.0000
CointEq (−1)	−0.929729	0.025926	−35.860922	0.0000
Cointeq = LNRGDP − (1.3125*LNLABF + 0.0412*LNINV + 0.1240*LNEXR + 0.4190*LNCOCX − 0.0005*LNPINX − 0.1002*LNBANX −0.1537)				
R^2 = 0.986277; $\bar{R}^2$ = 0.985061; F-Statistic = 811.1224 (0.000000)				

Source: By authors (2017).

The elasticity of the cocoa export has a positive sign of 0.389557 and significant at the 1% level of significance. This implies that based on the assumption of "ceteris paribus", the Ghanaian economy will improve by 0.39% in the short-run when cocoa export is increased by 1%. On the other hand, Noula, G. A., Gustave, L. S., & Munchunga, D. G. [19] revealed that cocoa export has a negative and significant impact on economic growth in Cameroon.

The sign of the coefficient of pineapple export was negative, but it was not significant. With a coefficient of −0.000475, meaning that, in the short-run, pineapple export has no significant influence on Ghanaian economy.

The study further found a negative relationship between banana export and economic growth, and it was confirmed empirically at the 1% significance level. With a coefficient of −0.093147, an increase in the banana export will reduce the growth of the economy by 0.09%.This means that in the short run, a rise in the banana export has the potential of deterring economic growth in Ghana. This result is at variance with the findings of Yifru, T. [44] who suggested that banana export is a major source of economic growth in Cameroon.

4.5. Granger Causality Test

The results of the pair wise Granger causality test among all the export variables and economic growth is given in Table 5.

Economic growth was rejected in the analysis of Table 5 based on the fact that the null hypothesis that varies in banana export does not Granger, given the probability of 0.0004. This implies that changes in economic growth are explained by variations in banana export, though there was no causality moving from the disparities in economic growth to banana export. The insinuation of this result is that there exists a unidirectional causality from banana export to the growth of Ghana economy.

Cocoa export and economic growth in Ghana has a bi-directional causal correlation between them. The null hypothesis that the changes in cocoa export do not Granger because economic growth was rejected due to 0.0027 probability value. There is consistency in terms of the results since the null hypothesis that changes in economic growth do not Granger cause the variations in cocoa export

Table 5. Results for granger causality test.

Null Hypothesis:	Obs.	F-Statistic	Prob.
LNBANX does not Granger cause LNRGDP	86	8.55859	0.0004***
LNRGDP does not Granger cause LNBANX		1.78060	0.1751
LNCOCX does not Granger cause LNRGDP	86	6.37959	0.0027***
LNRGDP does not Granger cause LNCOCX		4.67401	0.0120**
LNPINX does not Granger cause LNRGDP	86	1.38992	0.2550
LNRGDP does not Granger cause LNPINX		1.32449	0.2716

Source: By authors (2017). **Note:** The rejection of the null hypothesis of a unit root/non-stationarity is indicated by ***, ** at 1%, and 5% significance level respectively.

was rejected, given 0.0120 probability value. The implication is that the variations in economic growth are explained not only by changes in its own lags but also by the lags of cocoa export and the opposite is also factual during the period of the research.

The null hypothesis of no causality from pineapple export to economic growth was accepted as a result of the probability of 0.2550. This implies that changes in the growth rate of the Ghanaian economy are explained by the lags of pineapple export, but only by the lags of the economic growth. It was further found that the variations in economic growth do not have a predictive impact on pineapple export considering the *p*-value of 0.2716. The economic growth of Ghana has no interconnection with pineapple export.

5. Conclusion

The aim of the study is to estimate at the disaggregated level, the effect of export of agricultural products on economic growth in Ghana. A positive relationship between economic growth and cocoa was realised in both the long- and the short-run whereas the effect of pineapple export was revealed to have a positive but insignificant impact in both the short and the long-run on economic growth. The study further observed that, a negative and significant relationship existed between banana export and economic growth. The study also found from the Granger causality test that, there existed a unidirectional causality running from banana to economic growth, and a bi-directional causal connection between economic growth and cocoa export. Pineapple export was however discovered to have no causality with economic growth. The study, therefore, suggests the followings policy recommendations; though cocoa export is growth enhancing, to sustain its impact on the economy, the need to ensure maximum productivity in the cocoa sector is vital. This could be done through free mass cocoa spraying, offering free fertilizers and cocoa seedlings to cocoa farmers, and enough funds ought to be provided for cocoa roads project to constructall roads in cocoa farming communities. Considering the negative impact of pineapple and banana exports, it is, therefore, incumbent on the government of Ghana to bring into force remedial measures and structural changes which will ensure that additional values are added to them hither to their exportation. It is also important that the activities of Ghana Free Zones Board and Ghana Export Promotion Authority are prioritized and publicized to catch the attention of foreign investors and again provide access to international markets to Ghanaian exporters.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Appendix Table 1. The table represents data on Gross Domestic Product, labour force, investment, exchange rate, cocoa export, banana export, and pineapple export from World Development Indicators (2015), Food and Agricultural Organisation Statistics Database respectively.

YEAR	LNRGDP	LNLABF	LNINV	LNEXR	LNCOCX	LNBANX	LNPINX
1990Q1	2.274356	1.066308	0.657907	−0.86056	3.201709	2.04389	1.103623
1990Q2	2.275382	1.066334	0.661371	−0.85863	3.199575	2.051396	1.132222
1990Q3	2.277434	1.066386	0.6683	−0.85478	3.195305	2.066408	1.18942
1990Q4	2.280513	1.066464	0.678692	−0.84899	3.188902	2.088926	1.275217
1991Q1	2.284618	1.066568	0.692549	−0.84127	3.180364	2.11895	1.389613
1991Q2	2.288328	1.066672	0.697221	−0.832	3.17108	2.136489	1.449904
1991Q3	2.291644	1.066776	0.692709	−0.82118	3.16105	2.141544	1.456091
1991Q4	2.294565	1.06688	0.679012	−0.8088	3.150275	2.134113	1.408174
1992Q1	2.297093	1.066984	0.65613	−0.79487	3.138755	2.114197	1.306153
1992Q2	2.298988	1.067062	0.638968	−0.78443	3.130114	2.099261	1.229636
1992Q3	2.300252	1.067113	0.627527	−0.77746	3.124354	2.089303	1.178625
1992Q4	2.300883	1.067139	0.621807	−0.77398	3.121474	2.084324	1.15312
1993Q1	2.309748	1.068214	0.794501	−0.70396	3.094028	2.138147	1.405807
1993Q2	2.310306	1.068317	0.793608	−0.69591	3.097867	2.138145	1.406963
1993Q3	2.311423	1.068523	0.791823	−0.67981	3.105547	2.138139	1.409276
1993Q4	2.313099	1.068832	0.789146	−0.65567	3.117066	2.13813	1.412744
1994Q1	2.315333	1.069244	0.785576	−0.62347	3.132425	2.138118	1.417369
1994Q2	2.317798	1.069655	0.7816	−0.596	3.14535	2.139655	1.443622
1994Q3	2.320493	1.070066	0.777216	−0.57324	3.155839	2.14274	1.491502
1994Q4	2.323419	1.070475	0.772427	−0.55521	3.163893	2.147374	1.56101
1995Q1	2.326575	1.070884	0.76723	−0.54189	3.169512	2.153556	1.652146
1995Q2	2.328942	1.07119	0.763333	−0.53191	3.173726	2.158193	1.720498
1995Q3	2.33052	1.071394	0.760735	−0.52525	3.176536	2.161285	1.766065
1995Q4	2.331309	1.071497	0.759436	−0.52192	3.177941	2.16283	1.788849
1996Q1	2.338748	1.07238	0.742147	−0.46449	3.364175	2.273808	1.741197
1996Q2	2.339483	1.072474	0.746344	−0.45976	3.350769	2.275348	1.757408
1996Q3	2.340953	1.072662	0.754737	−0.4503	3.323956	2.278427	1.789828
1996Q4	2.343158	1.072944	0.767326	−0.43611	3.283738	2.283047	1.838458
1997Q1	2.346097	1.07332	0.784112	−0.41719	3.230113	2.289206	1.903299
1997Q2	2.349179	1.073735	0.7943	−0.40132	3.198286	2.297001	1.95032
1997Q3	2.352403	1.074188	0.797888	−0.3885	3.188257	2.306433	1.979522
1997Q4	2.355769	1.074681	0.794877	−0.37874	3.200026	2.317501	1.990905
1998Q1	2.359276	1.075213	0.785267	−0.37203	3.233593	2.330206	1.984469

Continued

1998Q2	2.361907	1.075612	0.778059	−0.36699	3.258767	2.339735	1.979642
1998Q3	2.363661	1.075878	0.773254	−0.36364	3.275551	2.346087	1.976423
1998Q4	2.364537	1.076011	0.770852	−0.36196	3.283942	2.349263	1.974814
1999Q1	2.371467	1.076541	0.75	−0.36956	3.232045	2.334876	1.949358
1999Q2	2.372124	1.076736	0.75	−0.35392	3.231777	2.336741	1.958072
1999Q3	2.373439	1.077125	0.76	−0.32264	3.231241	2.340472	1.975501
1999Q4	2.37541	1.077709	0.76	−0.27572	3.230438	2.346067	2.001645
2000Q1	2.378038	1.078488	0.769881	−0.21317	3.229366	2.353528	2.036503
2000Q2	2.380751	1.078752	0.77914	−0.16359	3.228158	2.350233	2.057318
2000Q3	2.38355	1.078502	0.789568	−0.12699	3.226812	2.336182	2.064092
2000Q4	2.386433	1.077738	0.801163	−0.10337	3.225329	2.311376	2.056823
2001Q1	2.389401	1.076459	0.813927	−0.09273	3.22371	2.275814	2.035513
2001Q2	2.391627	1.0755	0.823499	−0.08474	3.222495	2.249142	2.01953
2001Q3	2.393111	1.07486	0.829881	−0.07942	3.221685	2.231361	2.008874
2001Q4	2.393853	1.07454	0.833072	−0.07676	3.22128	2.22247	2.003546
2002Q1	2.400707	1.072547	0.724033	−0.06304	3.253602	2.376295	2.166921
2002Q2	2.401625	1.0723	0.727672	−0.06109	3.260516	2.390765	2.108793
2002Q3	2.403461	1.071805	0.73495	−0.05719	3.274344	2.419706	1.992539
2002Q4	2.406216	1.071063	0.745868	−0.05135	3.295086	2.463118	1.818157
2003Q1	2.409888	1.070074	0.760424	−0.04356	3.322743	2.521	1.585648
2003Q2	2.413672	1.069037	0.775352	−0.03732	3.347117	2.577393	1.460244
2003Q3	2.417568	1.067953	0.790651	−0.03263	3.368207	2.632297	1.441947
2003Q4	2.421575	1.066821	0.806321	−0.02948	3.386015	2.685712	1.530754
2004Q1	2.425694	1.065643	0.822363	−0.02788	3.400539	2.737638	1.726667
2004Q2	2.428783	1.064759	0.834394	−0.02668	3.411432	2.776583	1.873602
2004Q3	2.430842	1.064169	0.842415	−0.02588	3.418695	2.802546	1.971559
2004Q4	2.431872	1.063875	0.846425	−0.02548	3.422326	2.815528	2.020537
2005Q1	2.440765	1.061558	0.858401	−0.02499	3.375883	2.320879	1.528386
2005Q2	2.44191	1.061211	0.851778	−0.02484	3.38378	2.358312	1.597935
2005Q3	2.444202	1.060518	0.838531	−0.02452	3.399576	2.433177	1.737035
2005Q4	2.447639	1.059477	0.81866	−0.02405	3.423269	2.545475	1.945684
2006Q1	2.452222	1.05809	0.792166	−0.02343	3.454859	2.695205	2.223882
2006Q2	2.456821	1.057128	0.772136	−0.02253	3.47293	2.76169	2.415831
2006Q3	2.461437	1.056592	0.758571	−0.02136	3.47748	2.74493	2.521532
2006Q4	2.46607	1.056482	0.75147	−0.01993	3.46851	2.644926	2.540983
2007Q1	2.470719	1.056797	0.750833	−0.01823	3.44602	2.461676	2.474184
2007Q2	2.474205	1.057034	0.750356	−0.01695	3.429152	2.324238	2.424086

Continued

2007Q3	2.47653	1.057191	0.750038	−0.0161	3.417907	2.232613	2.390687
2007Q4	2.477692	1.05727	0.749879	−0.01567	3.412285	2.186801	2.373987
2008Q1	2.493726	1.057477	0.771086	−0.00289	3.438678	2.17278	1.691539
2008Q2	2.494244	1.057461	0.769235	0.003891	3.442646	2.177862	1.720971
2008Q3	2.495281	1.057429	0.765532	0.017452	3.45058	2.188025	1.779835
2008Q4	2.496836	1.057382	0.759979	0.037794	3.462482	2.203269	1.868132
2009Q1	2.498909	1.057319	0.752573	0.064916	3.478352	2.223595	1.98586
2009Q2	2.502098	1.057341	0.751451	0.084072	3.483611	2.223154	2.060351
2009Q3	2.506401	1.057448	0.756611	0.095263	3.47826	2.201947	2.091605
2009Q4	2.511818	1.057642	0.768054	0.098487	3.4623	2.159973	2.079622
2010Q1	2.518351	1.05792	0.785779	0.093746	3.43573	2.097232	2.024402
2010Q2	2.52325	1.058129	0.799073	0.09019	3.415802	2.050177	1.982986
2010Q3	2.526516	1.058269	0.807936	0.08782	3.402517	2.018806	1.955376
2010Q4	2.528149	1.058338	0.812367	0.086635	3.395874	2.003121	1.941571
2011Q1	3.172301	1.312204	1.005008	0.128098	4.525957	3.360199	2.66407
2011Q2	2.926991	1.210733	0.927292	0.118192	4.175971	3.10036	2.458061
2011Q3	2.436372	1.007791	0.77186	0.098381	3.475999	2.58068	2.046043
2011Q4	1.700442	0.703378	0.538713	0.068664	2.42604	1.801161	1.428016