

Drivers of Cocoa Export in Ghana in the Era of Free Trade

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Abstract: Cocoa is important to the economy of the producing countries in West Africa. This paper investigates some determinants of cocoa export from Ghana in the era of free trade. Using Johansen cointegration and ordinary least squares regression (OLS) approaches, the cointegration result shows there exists a long-run equilibrium relationship between cocoa exports and quantity of cocoa output, domestic consumption, trade openness and the world price. More so, the OLS results also provide ample evidence that cocoa output, aggregate world cocoa export and trade openness have a robust positive effect on cocoa export from Ghana. The findings indicate a weak relationship between the world price and export. However, the results show an inverse relationship between domestic cocoa consumption and cocoa export in the country. The study concludes that these variables are the principal drivers of cocoa export from Ghana. More so, the findings thus suggest that Ghana has a comparative advantage in exporting cocoa products. The government of Ghana and partners should create an enabling environment and investment climate to stimulate cocoa producers and traders to ensure sustainable cocoa production and export by increasing farm gate prices, subsidizing farm inputs and providing affordable loans.

Key words: Cocoa export • Cointegration • Liberalization • World price

INTRODUCTION

The integration and expansion of global trade through the reduction of trade barriers such as import tariffs and quotas are among the significant indicators of free trade. The trend of trade liberalization has remarkably risen since the creation of the General Agreement on Tariffs and Trade (GATT) in 1948, replaced by the World Trade Organization (WTO) as a body for trade negotiations, policies and rules. Trade has been one among the key forces that are driving world integration in recent decades.

Sustained and accelerated development of agricultural production and trade are the key to economic growth, development and poverty reduction in the Sub-Saharan Africa [1]. Many countries have seen the export of agricultural commodities like cocoa as a vehicle for the transformation of the agricultural sector, improving the livelihood of farmers/producers and national development. However, partly due to unfavourable trade rules in primary agricultural products and insufficient food production, food exports are small relative to the food imports in some West African countries.

Ghana was the world's largest producer and exporter of cocoa beans between 1911 and 1976 [2]. However, due to the decline of production, Ghana is presently the third largest producer and second largest exporter of cocoa beans. Cocoa is among the major employers of labour and source of income for smallholder farmers. In addition, cocoa is a major source of domestic and foreign earnings from agriculture in Ghana.

The government of Ghana government sets up a marketing board (The Cocoa Marketing Board, also now known as the COCOBOD) in 1947, among other responsibilities, to buy and export all cocoa products in the country. Critics argued that the marketing board was ineffective as it failed to ensure farm expansion and a better price for the farmers/producers [2]. To foster free trade, growth and development in the developing countries, the World Bank (WB) and the International Monetary Fund (IMF) introduced a program, called Structural Adjustment Programs (SAPs) in 1980s. The banks stressed that agricultural marketing boards in countries like Ghana was ineffective and they suggested in liberalizing agricultural sector of the economy. During the SAPs era, Ghana was expected to implement certain

policy reforms as a condition for receiving loans from the WB and IMF. Trade liberalization and privatization of state corporations were among the policy conditions. The cogent objectives for liberalization in cocoa products were to accelerate cocoa marketing, export competition and sustainable economic growth.

Significant trade liberalization in cocoa marketing in the West African countries took place in Nigeria (1986), Cameroon (between 1991 and 1994) and Côte d'Ivoire (1998-2002), while Ghana adopted a partial liberalization between 1992 and 1993 [3]. Even though, Ghana refused fully to liberalize cocoa products, critics argued that, free trade has exposed aggro industries into import competition from the already well-established global companies which led to the closure of some Agro based firms in the country. Consequently, Ghana presently depends on processed food imports (i.e. cocoa chocolate and powder) from the advanced economies for consumption as postulated by the dependency theory.

Empirical Evidence: Some researchers have attempted to investigate some drivers of cocoa export in Ghana and other countries in recent decades. For instance, [4] found a positive relationship between cocoa production and export in Ghana. Similarly, [5-6] investigate factors that seem to have an influence on cocoa export from Nigeria. Their results showed that cocoa production has a positive relationship with export from Nigeria. They stressed that Nigeria has high comparative advantage in cocoa export. In the same direction, [7] examine some drivers of cocoa export from Cote D'Ivoire. The results signified that cocoa bean production has positively impacted cocoa exports from the country. Conversely, their result provides a negative connection between domestic cocoa consumption and export.

Yeboah, Shaik, Wozniak and Allen [8] use the gravity model to estimate the potential of bilateral cocoa export commodities in the era of free trade from 16 major cocoa producing nations to the USA. Using panel data for the period 1989-2003, they found out that differences between resource endowments, economic size of countries and the sum of bilateral gross domestic product (GDP) of the U.S., as well as the exporting nations were the main drivers of the cocoa export.

Similarly, [9] investigates the export performance of cocoa and palm kernel in Nigeria. Using cointegration and error correction model (ECM), the results showed an association between cocoa export and output, producer price, world prices and real exchange rates in Nigeria. In the same direction, [10] determine the impacts of trade liberalization on the major agricultural products such as

cocoa, palm kernel, groundnut and palm oil in Nigeria. They found out that the free trade has positively thrived export crops. More so, [11] examine some determinants of export performance of three principal agricultural products (cocoa, rubber and palm-kernel) in Nigeria in the era of free trade. Using the ECM method, their results indicated that there exist both short run and long run equilibrium relationships with the variables in the models. They stressed that agricultural export product like cocoa should be promoted for the national benefits.

In order to verify the drivers of cocoa output in Ghana, [2] use Johansen cointegration and OLS regression approaches. They establish a long run equilibrium relationship between cocoa bean production, the world price and cocoa export. Their OLS results also indicate that cocoa export has a robust positive influence on annual output in the country.

In view of the significance of cocoa as a principal export crop and a major source of foreign earnings in Ghana, it is imperative to verify some drivers of cocoa export in recent years, hence, the relevance of this study. This article is an attempt empirically to verify some determinants such as cocoa output, domestic consumption, the world price and trade openness that appears to be driving cocoa export in Ghana for the past two decades.

Theoretical Framework: Because the favourable climatic condition is among the principal factors in cocoa cultivation in countries like Ghana, it could be linked with the theories of international trade such as the comparative, absolute advantage and factor endowment theory which explained why countries involve in trade.

The absolute advantage trade theory was coined by [12] who is regarded as the father of modern economics. Smith defined absolute advantage as the process by which a country can produce a particular good at a lower cost than the other country. Therefore, a country that trade across national borders should specialize in producing goods that it has an absolute advantage over another. Smith maintained that; all countries would benefit if they practice free trade and specialize in what they could produce cheaply. Smith assumed that every country had an absolute advantage over another. What if a nation has an absolute advantage in producing everything? Comparative advantage theory has answered this question.

The comparative advantage theory was propounded by [13] who stressed that countries would mutually benefit from each other even if one has an absolute advantage over the other in producing of all the goods

that they are trading. Ricardo postulated that the country should specialize in producing goods that it has the highest output relatively at the lowest cost in comparison with the other country. The theory was based on, among other assumptions; only two countries (e.g., Ghana and USA) involve in the trade; only two products (e.g., cocoa and wheat) are traded; no trade barriers and there is a balance of trade.

Heckscher–Ohlin trade theory was coined by Eli Heckscher and Bertil Ohlin based on the theory of comparative advantage. The theory is also called ‘factor endowment theory’ because it stressed that the pattern of production and trade across the national borders would depend on the factor endowments. The theory maintained that the international trade takes place due to the differences in the comparative costs of factors of production that arise, due to the abundant or insufficient resources (cocoa) within countries. The theory argued that the country should produce and export products that it has cheap factor(s) of production and import products or inputs that are scarce locally [14]. Due to the favourable tropical climatic condition which is a significant endowment factor for cocoa farming, Ghana has taken the advantage and concentrated on producing and exporting cocoa products.

Cocoa Production and Export: Table 1 shows the trend of annual cocoa production and export in the world (measured in tonnes) and the share of cocoa production and export from Ghana as a percentage of world

production and export between 1961 and 2012. As presented in the table, annual cocoa bean output in the world has drastically increased from 1.2 million tonnes in 1961 to 5 million tonnes in 2012. In the same direction, the annual world cocoa export has also steadily increased from 1 million metric tonnes in 1961 to 3.2 million metric tonnes in 2011, making an average of 4.1% annual export growth rate. This increment could partly attribute to trade liberalization in cocoa crop. Despite the fact that trade barriers still exist in primary agricultural products, the west has opened its markets for cocoa beans.

Ghana is the third largest cocoa producer in the world after Ivory Coast and Indonesia and the second largest exporter of the cocoa crop after Ivory Coast. Arguably, Ghana is a major supplier of the cocoa crop in the world. Table 1 shows that Ghana recorded over 75% average annual cocoa export as a percentage of domestic cocoa bean output. The major cocoa export destinations are Western Europe and North America where cocoa processing industries are located. However, as shown in the table, Ghana’s cocoa export as a percentage of world export has fluctuated and decreased from 40% in 1961 when the country was the largest exporter to 10.4% in 2010 and drastically increased to 21.8% in 2011. Arguably, cocoa export was not given the expected attention by the Ghanaian government.

Table 1 also shows the export as a percentage of cocoa production in Ghana, in some years, export as a percentage of domestic production was more than 100% (in 1962) or close to 100% (in 1961 and 2011).

Table 1: World and Ghana Cocoa production and exports (in tonnes and %), 1961-2012

Year	World cocoa production and export		Ghana cocoa production and export			
	World export (mt)	World Production (mt)	Ghana export (mt)	Production (mt)	Ghana export (% world export)	production (% of world production) export (% domestic production)
1961	1,028,536	1,186,364	411,850	415,200	40.04	35.00 99.19
1965	1,306,400	1,229,189	501,920	415,800	38.42	33.83 120.71
1970	1,135,555	1,543,448	367,362	406,000	32.35	26.30 90.48
1975	1,160,250	1,561,669	322,240	397,300	27.77	25.44 81.11
1980	1,064,709	1,670,684	194,679	277,200	18.28	16.59 70.23
1985	1,384,859	2,014,015	171,797	194,400	12.41	9.65 88.37
1990	1,896,392	2,532,151	248,970	293,355	13.13	11.59 84.87
1995	1,823,357	2,991,303	238,841	403,900	13.10	13.50 59.13
2000	2,503,429	3,373,428	360,250	436,600	14.39	12.94 82.51
2005	2,981,935	4,044,229	535,298	740,000	17.95	18.30 72.34
2006	3,027,329	4,301,335	589,172	734,000	19.46	17.06 80.27
2007	2,761,772	3,897,965	506,358	614,500	18.33	15.76 82.4
2008	2,683,209	4,263,272	474,706	680,781	17.69	15.97 69.73
2009	2,997,680	4,206,746	395,711	710,638	13.20	16.89 55.68
2010	2,703,601	4,339,064	281,437	632,037	10.41	14.57 44.53
2011	3,198,896	4,679,108	697,236	700,020	21.80	14.96 99.6
2012	NA	5,003,211	NA	879,348	NA	17.58 NA

Source: Authors’ analysis based on FAOSTAT, 2013

This issue is likely from the data collection; export or output was either under-reported or over-reported. Another reason for these differences could be because, the quantity produced in the previous year is likely to be exported in another year.

Cocoa is the largest agricultural export commodity in Ghana. The country's cocoa exports even though fluctuating; it has steadily increased from 412 thousand tonnes to 697 thousand tonnes between 1961 and 2011. The fluctuation of the quantity of cocoa export in the country could be attributed to the world price, domestic production and supply for export, neglect of cocoa related activities by the government, partners and farmers, etc. For instance, both farm gate and the world price over the years were also far from consistent.

Historically, as compared to large scale grains like wheat and corn, world cocoa prices have been less prone to severe price shocks. Arguably, this might be *“due to the difference in scale of global production and consumption, as well as differing degrees of speculative investment”*; thus, it is likely to exacerbate volatility in the cocoa bean prices [15, p. 9]. Reflecting, inter alia, changes in global cocoa prices, partly due to the variations in the global value relative to the national currency, competition and quality. Although world market prices have increased over the years, real farm gate prices [16, p. 8] in Ghana did not reflect this upward trend.

MATERIALS AND METHODS

Data Sources: Secondary data, such as books, article journals and annual statistical data from various institutions are used. Annual time series data between 1989 and 2011 obtained from the Food and Agriculture Organization (FAO) of the United Nations; United Nations Conference for Trade and Development (UNCTAD); and the International Monetary Fund (IMF) world economic outlook are used in this study. The period of the study was chosen because it reflected the SAPs period, which was aimed for trade liberalization in Ghana. Econometric software Gretl 1.9.14 and Stata 12.0 is used for the multivariate analysis.

Model Specification: The model specified the annual cocoa export (tonnes) as a dependent variable, which is being explained by cocoa output (tonnes), domestic consumption (tonnes), the world price (US\$/t), world cocoa export (tonnes), trade openness and real effective exchange rate. The multiple regression model is specified below:

$$QCEX = f(QCP, DCON, WP, QWCEX, TOPEN, REER) \quad (1)$$

Thus, the econometric model is mathematically specified as follow:

$$QCEX_t = \beta_0 + \beta_1 QCP_t + \beta_2 DCON_t + \beta_3 WP_t + \beta_4 QWCEX_t + \beta_5 TOPEN_t + \beta_6 REER_t + \varepsilon_t \quad (2)$$

where; QCEX is the annual quantity of cocoa export (tonnes); QCP is the quantity of cocoa production (tonnes); DCON is quantity of domestic consumption of cocoa (tonnes); WP is the world price of cocoa beans (US\$/t); QWCEX is the aggregate of world cocoa export (tonnes) proxied for competitiveness; TOPEN is the index of trade openness ((Exports+ Imports)/Nominal GDP*100), it demonstrates the level of country's integration into the global economy; REER is the real effective exchange rate measured for the value of domestic currency as against foreign currencies; ε_t is the error term; β_0 represents constant; while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 are coefficients of each variable in the model.

Cointegration Test: Cointegration approaches are used to determine if there exists a valid long-run relationship between variables in the model. In order to determine the number of cointegration vectors, [20] used two tests: trace and the maximum Eigenvalue tests. Trace statistic, tests the null hypothesis of no cointegrating vectors ($r = 0$) against the general alternative of one or more cointegrating vectors ($r > 0$), while maximal Eigenvalue statistics tests the null hypothesis of r cointegrating vector(s) present against the specific alternative of $(r + 1)$ cointegrating vector(s) present.

RESULTS AND DISCUSSION

Unit Root Test: Because, annual time series ' data is prone to spurious regression results when x and y series are non-stationary (random walk). Non-stationary variables are differenced to produce other sets of observations such as the first-differenced and the second-differenced values to become stationary (no random walk). The order of integration using both Augmented Dickey- Fuller (ADF) and Philips-Perron (PP) unit root tests is presented in table 2. Given that the entire variables have become stationary, we proceed to run Johansen cointegration and ordinary least squares (OLS) regression models.

Johansen Test for Cointegration: The model selection for cointegration is usually computed using an information criterion method, known as lag-order selection criteria.

Table 2: Unit root test for model for model 2 (constant term only)

Variable		ADF Stat	Order of integration	PP Stat	Order of integration
QCEX	Level	-1.940	1(1)	-1.741	1(1)
	First diff	-5.741***	1(0)	-5.793***	1(0)
QCP	Level	-4.772***	1(0)	-4.879***	1(0)
	First diff	-4.964***	1(0)	-4.972***	1(0)
DCON	Level	-0.271	1(1)	-0.269	1(1)
	First diff	-4.964***	1(0)	-4.972***	1(0)
WP	Level	-3.619***	1(0)	-3.541***	1(0)
	First diff	-4.161***	1(0)	-4.132***	1(0)
TOPEN	Level	-0.020	1(1)	-0.031	1(1)
	First diff	-4.161***	1(0)	-4.132***	1(0)
QWCEX	Level	-7.084***	1(0)	-8.481***	1(0)
	First diff	-4.259***	1(0)	-4.254***	1(0)

Note: McKinnon (1991) critical values are: -2.630 for 10%, -3.000 for 5% and -3.750 for 1% level

Table 3: Trace and maximal Eigenvalue test results for cointegration (constant)

Hypothesized No. of CE(s)	Trace Test		Maximum Eigenvalue test	
	Statistic	0.05 critical value	Statistic	0.05 critical value
None	204.9469	124.24	84.3472	45.28
At most 1	120.5998	94.15	47.4149	39.37
At most 2	73.1848	68.52	37.7329	33.46
At most 3	35.4520*	47.21	22.8061	27.07
At most 4	12.6459	29.68	8.7106	20.97
At most 5	3.9353	15.41	3.3329	14.07
At most 6	0.6023	3.76	0.6023	3.76

Note: The asterisk * indicates the rejection level

We have chosen lags 1 and proceed to run the Johansen cointegration test Based on the evidence provided by the information criterion. Table 3 presents the results of both Johansen trace and maximal Eigenvalue tests for cointegration. Both Maximal Eigenvalue and Trace tests indicate for the rejection of the null hypothesis of no cointegration vectors at the 5% significance level. An alternative hypothesis is accepted that there is a long run equilibrium relationship between the all the variables in the model. This signifies that all the variables in the model are moving together in the long run.

When a cointegration is established, it can be viewed as an indirect test of long run causality. We, therefore, conclude that variables in the model are likely to be driving cocoa export from Ghana in the long run. When a cointegration is established, it is advisable to run Vector error correction model (VECM). However, we have opted to run ordinary least squares (OLS) regression model.

Diagnostic Test for OLS Regression: Table 4 presents results of the diagnostic tests for OLS. The results of the tests seem to satisfy the prior econometric test as all the *P. values* of the diagnostic tests in table are greater than

0.05 levels. More so, all the results of the tests show that the model is linear and correctly specified. It also shows that the variability of a variable has minimum variance and they are not heteroskedasticity and the error term is normally distributed. The variables used in the model are not autocorrelated. Given that all the classical assumptions of the linear regression model were fulfilled, we have continued with the OLS estimation method. The OLS regression result is presented in table 5.

OLS Regression Model Result: As presented in table 5, the result signifies that the estimated model is a “good fit” given that the Adjusted R-squared 73% is accounted for by the variability in the dependent variable in the model. More so, the *p. value* and *F. statistics* in the model indicated that all the variables in the regression model jointly influence cocoa export from Ghana (statistically significant at the 0.01 level). The results in table 5 further show that the dependent variable, QCEX (quantity of cocoa export) is statistically significant and is positively associated with the repressors except for REER (not statistically significant), while the world price of cocoa has merely passed the 10% significance level.

Table 4: Diagnostic test

Test	Test- statistic	P. value
Non-linearity test (squares)	4.73373	0.57839
Ramsey's RESET	2.63323	0.107
White's test for heteroskedasticity	16.147445	0.184576
Breusch-Pagan test for heteroskedasticity	11.628576	0.070787
Test for normality of residual	2.153	0.34085
Breusch-Godfrey test for first-order autocorrelation	0.851969	0.356
Autocorrelation- Ljung-Box Q'	0.424324	0.515
Test for ARCH of order 2	4.3245	0.115066

Table 5: OLS, using observations 1989-2011

Dependent variable: QCEX				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	-3319.68	1800.63	-1.8436	0.08384*
QCP	336.954	98.8161	3.4099	0.00358***
DCON	-0.12557	0.056736	-2.2132	0.04177**
WP	149.226	80.8393	1.846	0.08348*
QWCEX	530.128	124.343	4.2634	0.00059***
TOPEN	977.942	310.952	3.145	0.00626***
REER	-28.5643	119.546	-0.2389	0.81419
P-value (F)	0.000075			
R-squared	0.801107			
Adjusted R2	0.726522			
F (6, 15)	10.74087			
P-value (F)	0.000075			

Note: The asterisks (**, ***) denote statistically significant level at 5% and 1% respectively

The results also provide an ample positive relationship between cocoa export and QCP (quantity of cocoa production), statistically significant at 0.01 level. Holding other variables constant, an increase in cocoa production might bring a corresponding increase in the quantity of cocoa export from Ghana. This result is in consonance with the works of [2, 4-7] who also found a positive relationship between cocoa production and export in Nigeria, Cote D'Ivoire and Ghana. Conversely, the result shows a negative connection between cocoa export and domestic consumption (DCON) in Ghana, statistically significant at 0.05 level (see table 5). This signifies that; the more the cocoa beans consume at home, the less the export and vice versa. This result is in consonance with the works of [7] who also found a negative relationship between cocoa export and domestic consumption in Cote D'Ivoire.

Figure 5 also provides a robust and strong positive relationship between the aggregate of world cocoa export (QWCEX) and cocoa export from Ghana, proxies for the resource endowment factor or comparative advantage, statistically significant at the 0.01 level. This implies that an increase in world cocoa export is likely to induce Ghana

to increase the export cocoa products. Ghana is the third largest cocoa producer in the world and the second largest exporter of the cocoa crop after Ivory Coast. Due to the favourable tropical climatic condition (factor endowment), Ghana has a comparative advantage in cocoa production and export.

Table 5 also provides robust evidence that trade openness index (TOPEN) has a positive influence on cocoa export from Ghana (statistically significant at 0.01 level). Holding other variables constant, an increase in the level of trade openness proxies for free trade, Ghana is likely to increase the quantity of cocoa export. Trade openness demonstrates the position of the country in the integration into the global economy. This signifies that as trade openness index increases, cocoa export may also increase in the country.

CONCLUSION AND POLICY DIRECTIONS

The aim of this contribution was to analyse some determinants of cocoa export in Ghana, using Johansen cointegration and OLS regression methods. Johansen cointegration results show there exists a long-run

equilibrium relationship between cocoa exports and the explanatory variables such cocoa production, domestic consumption and the world price. More so, the OLS results also provide a positive relationship between cocoa export and cocoa production, the volume of world cocoa export and trade openness in Ghana. However, the results show an inverse association between cocoa export and domestic consumption in the country.

The study concludes that these variables are the principal drivers of cocoa export from Ghana. More so, the findings indicate that the country has a comparative advantage in exporting cocoa products. The government of Ghana and partners should create an enabling environment and some incentives to stimulate cocoa producers and traders by increasing farm gate prices, subsidizing farm inputs and providing affordable loans to them to ensure sustainable cocoa production and export.

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