ISSN 0716-1689 impreso
ISSN 0718-3216 electrónico

COMPETITIVENESS OF NIGERIAN COCOA IN THE DUTCH MARKET: AN ERROR CORRECTION MODEL (ECM) APPROACH

COMPETITIVIDAD DE LA COCOA DE NIGERIA EN EL MERCADO HOLANDÉS: UNA APROXIMACIÓN CON EL MODELO DE CORRECCIÓN DE ERROR (ECM)

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ABSTRACT

The study analyzed the competitiveness of Nigerian cocoa *(Theobroma cacao)* in the Dutch market using the Error Correction Model (ECM) over 1961–2009 periods. Data were published in national aggregates on specific trade and macroeconomic variables from reputable sources. Prior to ECM estimation, the variables were subjected to stationarity and cointegration tests before instrumenting for simultaneity. Findings showed that the cocoa exported was positively influenced by the quantity produced by non-participating countries, and negatively by the export price of cocoa and that of substitute crop in the long run. On the part of supply relation, cocoa exported had a negative sign implying decreasing marginal output with respect to cost in both long and short run. The coefficient of market power was -0.626 and -0.005, in the long and short run, respectively. Based on the findings, the study advocates intervention from government, private sector and donor agencies to revitalize the export capacity.

Keywords: export, competitiveness, Dutch market, cocoa.

RESUMEN

Este estudio analizó la competitividad de la cocoa (*Theobroma cacao*) nigeriana en el mercado holandés usando el Modelo de Corrección de Error (ECM) en el período 1961-2009. La información usada fue publicada en compendios nacionales sobre comercio específico y variables macroeconómicas de fuentes confiables. Antes de hacer la estimación del ECM, las variables se sometieron a pruebas de estacionalidad y de cointegración antes de aplicar la simultaneidad. Los resultados indicaron que la cocoa exportada fue afectada positivamente por la cantidad producida por los países no participantes, y negativamente en el largo plazo por el precio de exportación de la cocoa y de los cultivos sustitutos. En relación a la oferta, la cocoa exportada tuvo un signo negativo lo que implica incrementos marginales decrecientes con respecto al costo, tanto en el corto como en el largo plazo. El coeficiente de poder de mercado fue -0,626 y -0,005, en el largo y corto plazo, respectivamente. Basado en los resultados, el estudio sugiere la intervención del gobierno, del sector privado y de agencias donantes con el objeto de revitalizar la capacidad de exportación.

Palabras clave: exportación, competitividad, mercado holandés, cocoa.

Recibido: 27 junio 2012. Aceptado: 16 agosto 2012.

INTRODUCTION

Nigeria's agricultural commodity exports can be categorized into traditional and non-traditional. The prominent traditional export commodities include cocoa, palm oil, palm kernel, rubber, cotton, groundnut, kola nut, among others, while the non-traditional export commodities include pineapple, cashew, eggs, processed fruits, and alcoholic beverages, to mention a few, which have emerged as the most demanded products in the international markets (Mbanasor and Nwachukwu, 2009; ICCO, 2009). Export markets for these products exist in United States of America (USA), European Union, Gulf States, Japan, Singapore, and China.

Among the export crops from Nigeria, cocoa is the most prominent in terms of production and export capacities. Since its introduction into Nigeria, it has grown to be a major export crop, which has elevated Nigeria to the status of the third largest producer of cocoa in Africa, and the fourth largest in the world. The continent is now responsible for some 68% of the world crop, and production is centered in West Africa, with Cote d'Ivoire, Ghana, Nigeria and Cameroon being first, second, third, and fourth, respectively, in the African rankings of producers. In terms of contribution per country to the world market, Cote d'Ivoire, Ghana, and Nigeria produce 43%, 14% and 6%, respectively (Wilcox and Abbot, 2004; Ayemibo, 2010; CBI, 2010).

By implication, Nigeria competes favorably with other frontline producing nations in supplying the world market. Cocoa beans are produced in 16 states of the federation, namely Ondo, Cross River, Oyo, Osun, Ekiti, Ogun, Edo, Kogi, Akwa Ibom, Delta, Abia, Kwara, Ebonyi, Rivers, Taraba and Adamawa, with an annual production of 400,000 metric tons, being 98% exported. Ondo State is the highest cocoa producing state in Nigeria, and Idanre is the hub of cocoa production in the state.

Cocoa is largely produced on small scale, and the average delivery per farmer is roughly 300 kg per hectare per season. The export free on board price of cocoa beans has fluctuated between USD 3,000-3,500 t^{-1} from January to August 2010, while the local market price of raw cocoa beans per ton ranges from USD 2667 to 3333 (NGN 400,000.00 to 500,000.00) (NGN: Nigerian naira) to deliver it to Lagos, Nigeria, point of export (1 USD = 150 NGN) (Ayemibo, 2010; Nwachukwu et al., 2010).

The demand and supply dimensions of agricultural goods also may lead to imperfect competition. For example, the nature of raw agricultural products (bulky, perishable, limited substitutability, etc.) and their production (economies of scale, exit barriers, etc.) creates opportunities for firms to exert market power on the demand and supply side, respectively (Sexton and Lavoie, 2001). Imperfect competition in the trade of agricultural goods is driven by factors such as increasing returns, intra-firm trade and market structure (UNCTAD, 2008).

Although market power is perceived in literature as an index of degree of competitiveness of the industry, it reflects the wedge between price and marginal cost and its existence is tied to the demand conditions the firm faces.

Theoretical framework

Assuming an industry consisting of a number of identical firms faces market demand given by the following:

$$Q_t = Q(P_t, Z_t) \quad (1)$$

where Q_t is the total quantity demanded, P_t is the market price, Z_t is a vector of exogenous variables such as the prices of substitutes and income, and t is a time subscript.

Since Q and P are determined simultaneously, the demand function can also be written in inverse form, $P_t = P(Q_t, Z_t)$.

Suppose also that the aggregate marginal cost facing the industry is given by

$$MC_t = MC(Q_t, W_t) \quad (2)$$

where W_t is a vector of exogenous variables such as input costs.

Assuming that the industry is perfectly competitive, equilibrium price and quantity will be determined by

$$P_t = P(Q_t, Z_t) = MC_t = MC(Q_t W_t) \quad (3)$$

More generally, if the industry is imperfectly competitive, equilibrium is where perceived industry marginal revenue equals industry marginal cost. If industry revenue is defined as $R_t = PQ_t = P(Q_t, Z_t)Q_t$ the equilibrium condition can be rewritten as:

$$MR(\lambda) = [P(Q_t, Z_t) + dP/dQ_t(Q_t Z_t)Q_t] = MC(Q_t, W_t) \quad (4)$$

λ can be interpreted as an index of market power being exerted in an industry, that is, the wedge in equilibrium between industry price and industry marginal cost (Sperling, 2002).

The value of λ falls in the range $0 \leq \lambda \leq 1$; if the industry is perfectly competitive, the parameter $\lambda = 0$, and (4) becomes the usual condition that price

equals marginal cost. If the industry is either a monopoly or firms demonstrate perfectly collusive behavior, $\lambda = 1$, and (4) becomes the normal expression for a monopoly markup. Intermediate values of λ reflect oligopolistic outcomes where the markup over marginal cost is less than the monopoly mark-up; for example, A will take the value *1/n* if the *n* firms in the market behave in Cournot-Nash fashion (Susanto, 2006). The reason for the Cournot-Nash value of $\lambda = l/n$ becomes apparent once a connection is made between the market power parameter λ and the concept of conjectural variations.

This connection is illustrated briefly here using a simple duopoly model. Let firm 1 expect firm 2 to produce q_2 units of output. If firm 1 produces q_1 units of output, the total output it expects to be sold in the market is $Q = q_1 + q$. The profit maximizing problem for firm 1 is then:

$$\max q_1 \{P(Q)q_l - c_l(q_1)\} \quad (5)$$

where $P(Q)$ is the inverse demand function, and $c_1(q_l)$ is firm l's total cost function.

Differentiating (5) with respect to q_1, and after some manipulation, the first-order condition is

$$P(Q) + dP/dQ\left[1 + dq_2/dq_1\right]q_1 + MC_1(q_l) \quad (6)$$

where $MC_1(.)$ is firm l's marginal cost, q_2 is the equilibrium value of q^e_2, and dq_2/dq, is the conjectural variations term. It summarizes how firm 1 conjectures firm 2 will vary its output when firm 1 makes a small change in output. Denote this term as u if the firms are symmetric, that is, they have identical costs and, therefore, produce the same level of output, then equation (6) can be generalized to *n* firms as:

$$P(Q) + dP/dQ\left[1 + (n-1)v/n\right]Q = MC \quad (7)$$

Recall equation (4) and compare with (7). These two are identical equations, where the index of market power is defined as $\lambda = [1 + (n - 1)v] / n$. It is obvious that if firms behave in Cournot-Nash fashion, that is, $v = 0$, then the corresponding value of λ is l/n. Hence, λ is interpreted as an index of the degree of market power, in which is nested a conjectural variations parameter.

In order to identify λ in an econometric model, the method employed in Susanto (2006) and Nwachukwu (2009) is adapted. The export demand function in (1) is specified in the following form:

$$Q_i = \alpha_0 + \alpha_1 P_{it} + \alpha_2 P_{st} + \alpha_3 I_t + \alpha_4 P_{it} I_{it} + \alpha_5 W_{it} + \varepsilon_{it} \quad (8)$$

where Q_i is the quantity of commodity sold in the export market, P_t is the real price of commodity, other exogenous variables include I_t is the income of the destination country, $P_{it}I_{it}$ is the interaction term between P_{it} and I_{it}, W_t is the total production of non-participants in the destination market and ε_{it} is the error term. This form of demand function, used in earlier studies by Sperling (2002) is linear in coefficients but contains the interactive term $P_{it}I_{it}$.

Following Nwachukwu (2009), suppose that the aggregate marginal cost of production takes the following functional form:

$$MC_t = \varnothing_b V_t + \varnothing_c C_t + \eta_{it} \quad (9)$$

Marginal cost is assumed to be a function of variable inputs and Ocean Freight Rate denoted with V_t *and* C_t, respectively

Equation (9) can now be substituted into the profit-maximizing condition (4). Rearranging terms, the following equation known as the optimality equation (supply relation) is derived:

$$P_{it} = \varnothing_0 + \varnothing_a Q_{it} + \varnothing_b V_t + \varnothing_c C_t + \lambda Q_{it} + \left[\frac{\eta_{it}}{\alpha_1 + \alpha_4 I_t}\right] \quad (10)$$

Equation (10) is an equilibrium condition where perceived marginal revenue equals marginal cost. All variables are as previously defined while λ and η_{it} represent the index of market power and error term, respectively. Note that the interactive term adds some nonlinearity to the demand function so that λ can be identified. If W_{it} changes, the demand curve will rotate around the equilibrium point and trace out the supply relation, which allows the ease of calculating the degree of market power.

The objective of this study was to estimate the level of competitiveness of Nigerian cocoa on the Dutch market.

MATERIALS AND METHODS

Data sources

Data used by the study were national annual aggregates obtained from secondary sources and were used in their first difference form. They covered the periods 1961-2009 and were mainly from several issues of the Production Yearbook published by the Food and Agriculture Organization (FAO), FAOSTAT website, the National Bureau of Statistics (NBS) Annual Abstract of Statistics, and several issues of the Central Bank of Nigeria's (CBN) Annual Reports, and Statement of Accounts, United Nations and World Bank databases.

Model specification and data analysis

To estimate the degree of export competitiveness (market power), equations (8) and (10) are operationalized. The export demand function is specified thus:

$$Q_i = \alpha_0 + \alpha_1 P_{it} + \alpha_2 P_{st} + \alpha_3 I_t + \alpha_4 PI_{it} + \alpha_5 W_{it} + \varepsilon_{it} \quad (11)$$

where Q_i = the quantity of Nigerian cocoa to Netherlands;

P_{it} = Real export price of the crop;

P_{st} = Real export price of substitute crop (coffee) in the Dutch market;

I_t = Income proxy by Agricultural Gross Domestic Product (GDP) of Netherlands;

PI_{it} = The interaction term, which is the product of P_{st} and $I_{it;}$

W_{it} = Total production of the export crop excluding participating countries in the cocoa Dutch market;

$\alpha_{;s}$ = Parameters to be estimated;

ε_{it} = Error term

The supply relation is also operationalized in line with equation (10) and stated thus:

$$P_{it} = \emptyset_0 + \emptyset_a Q_{it} + \emptyset_b V_t + \emptyset_c C_t + \lambda Q_{it} + \left[\frac{\eta_{it}}{\alpha_1 + \alpha_4 I_t}\right] \quad (12)$$

where:

V_t = Variable cost of producing the export crop proxied by a ratio of the producer price (in local currency) to a measure of the domestic price. This models the cost of production;

C_t = Ocean freight rate.

All variables are as previously defined and λ is an index of market power.

Prior to estimation, Q_i which is observed to be endogenous has to be instrumented due to the simultaneous relationship between Q_t and P_t. In line with time series estimation, the variables were subjected to stationarity and cointegration tests. The confirmation of cointegrating relationship provided the impetus to estimate Error Correction Model (ECM) in the bid to ascertain the short run dynamics.

To obtain the price elasticity as well as income elasticity, the following was applied:

$$\varepsilon_p = (\theta_p + \theta_{pI} \bar{I})(\bar{P}/\bar{Q}) \quad (13)$$

where ε_p = Price elasticity; $\bar{I}$ = Mean income of the destination country; $\bar{P}$ = Mean real export price of cocoa; $\bar{Q}$ = Mean export quantity of cocoa;
and the income elasticity given as

$$\varepsilon_I = (\theta_I + \theta_{pI} \bar{P})(\bar{I} / \bar{Q}) \quad (14)$$

where ε_I = Income elasticity.

For convenience, the Lerner index (Lerner, 1934) is stated thus:

$$L = \frac{P - MC}{P} = \frac{-\lambda Q_i (\partial P_t(.)/\partial Q_t)}{P} = \frac{\lambda}{\varepsilon} \quad (15)$$

RESULTS AND DISCUSSION

As shown in Table 1 the quantity of cocoa exported to Netherlands was influenced positively by the total quantity produced in the world, excluding those of the participating countries in the destination market, and negatively by the export price of cocoa and the substitute export crop in the long run. The coefficients of export price of the commodity and that of the substitute crop (coffee) were statistically significant at 5% and 1% levels of probability, respectively. The negative sign implies that the quantity demanded by the importing country increases as export price decreases. This result is in tandem with the theory of demand as reported by Nwachukwu et al., 2010) that prices and quantities demanded of a commodity are inversely related *ceteris paribus*.

The negative sign possessed by the coefficient of price of the substitute crop is not in line with a priori expectation and established demand theory. Although the outcome is surprising, one possible reason is that import decisions are often motivated by political rather than economic rationale. Over the years, Netherlands has remained one of Nigeria's trading partners which show that their bilateral relations have been cordial. The coefficient of world production of the commodity excluding those of participating countries in the Netherlands market had a positive sign. The sign identity contradicts a priori expectation based on the understanding that world production increases as demand for the commodity increases. This can only hold true if the cocoa beans from Nigeria have a much higher quality than those from most other countries, or if the stocks in the short run part of the Error Correction Model (ECM) present a high value due to trade effects. For example, price band or import quotas in the European Union (EU).

In the short run, only the one-year lag of the quantity demanded and the world production excluding Netherlands market participants were significant. They were both positively signed and significant at 1 and 5%, respectively. By implication, 10% increase in the quantity demanded was influenced by 8.7% rise in the quantity demanded the previous year. This implies that there is rising demand for cocoa in the selected European market but the downward trend in production in Nigeria has dampening effects. This result is

Table 1. Estimates of the export crop: Demand function.

Tabla 1. Estimaciones del cultivo de exportación. Función de demanda.

Long-run	
Variable	**Cocoa**
Intercept	953.918***
	(353.487)
LnP_t	-20.020**
	(10.004)
LnP_{st}	-0.637**
	(0.318)
LnI_t	0.932
	(0.825)
$LnPI_t$	0.008
	(0.018)
LnW_t	0.636***
	(0.156)
Short-run	
Intercept	-0.720**
	(0.278)
LnQ_{t-1}	0.875***
	(0.113)
LnP_{t-1}	0.001
	(0.499)
LnP_{st-1}	-0.050
	(0.193)
LnI_{t-1}	-0.729
	(3636.003)
$LnPI_{t-1}$	1.275
	(1.952)
LnW_{t-}	0.291**
	(0.124)
ECM_{t-1}	-0.078***
	(0.015)
R^2	0.729
Adjusted R^2	0.675
F- Statistic	13.480
LM	0.007
RESET	67.520

Source: Output of analysis
Values in parentheses are t-test

not consistent with the findings of Susanto (2006) that had a negative sign for world production in a similar study on soybean complex in the USA.

Given the presence of the interaction term, PI, the price elasticity of demand can be obtained using the appropriate formula (Eq. 13 and 14). Using the mean value (mean export quantity – 30556.93 tons), the price elasticity of export demand for cocoa was found to be -0.80 while the income elasticity was 0.09. This indicates that the Netherlands market is demand elastic and income inelastic. This implies increased income on the part of the exporting country (Nigeria).

The coefficient of the lagged error term (ECM_{t-1}) for cocoa possessed the expected negative sign and it is highly significant at 1% level of probability. The significance supports cointegration and confirms the existence of long run steady equilibrium relationship between quantity demanded and price of cocoa, substitute commodity and world production, excluding participating countries in the market. There was an infinitesimal adjustment of about 8% after deviations from the long run equilibrium.

The coefficient of adjustment was -0.370, indicating that the speed of adjustment was not appreciable (37%) and significant at 1% level of probability. Economically speaking, the coefficient measures the speed at which rubber export supply adjusts to changes in the price of substitute and income of the importing country in an effort to achieve long-run static equilibrium. The diagnostic statistics showed that the data fit the regression line reasonably high as confirmed by the R^2 and adjusted R^2. The F-statistic of 34.33 was significant at 1% probability level and tests the overall significance of the model. The model was also free from misspecification error and serial correlation as indicated by RESET of 72.81 and LM of 0.326, respectively.

To facilitate the estimation of the market power parameter, the ECM estimation result for the supply relation is presented in Table 2. In general, the diagnostic statistics showed that the model was well determined as confirmed by the results of LM, R^2 and adjusted R^2 tests.

The quantity of cocoa exported had a negative sign, which indicates decreasing marginal output with respect to cost. This is plausible since Nigeria falls within the rank of developing nations and has been operating below optimal capacity.

This is the case both in the long run and short run. Nkang et al. (2006) averred that negative short run elasticity could probably be attributable to failure of farmers to replace their old and low-yielding cocoa trees with high yielding ones. Beyond this, rising production costs especially labor costs are known to partially offset output price increases.

The variable cost (proxied by ratio of producer price to a measure of the domestic price) had a positive coefficient in the long run and a negative sign in the short run, but was both significant at 5% risk level. By implication, the variable cost increased by 18.2% in the long run and decreased by 17.33% in the short run as the marginal

cost rose. The positive sign possessed in the long run is in line with expectation and also consistent with Susanto (2006) that had the same result in a similar study in soybean complex. The quantity of export had a negative sign in the short run and implies that marginal cost is decreasing as output increases. The cost of exporting the commodity which was proxied by the ratio of export price to producer price increased by 15% as the marginal cost rose by 10% in the short run. This result was expected.

The coefficient of market power was quite high in magnitude (-0.626) in the long run but plummeted drastically (-0.005) in the short run for cocoa. The long run estimate of market power is 125 times that of the short run in absolute terms. This implies that there was no economic shock of immense magnitude that was experienced during the period. Given that export competitiveness could be assessed using the market power index, the study drew its conclusion. Based on the estimates of the parameter that were close to zero, export market for cocoa is competitive.

In addition, Sperling (2002) reported that the negative coefficient of the market power parameter implied an oligopoly mark up, indicating that exporters are better off under monopoly, rather than a mark down.

Another approach to assess the decision on market power is to apply the Lerner's index (Lerner, 1934) using price elasticity of demand and market power index. It was realized that cocoa had a Lerner's index of 0.783 and 0.006, in the long and short run, respectively. This implies that Nigeria has a relatively high market power in the Dutch markets for cocoa and as such faces less competition. Another observation was that oligopoly power was more in the long run than in the short run. The higher the Lerner index, the greater the mark-up in price over marginal cost (Sperling, 2002).

In relation with the foregoing, Morrissey and Filatotchev (2000) opined that the central assumption of the competitiveness strategy is that during the life of a product, the market power and profitability progressively shift from upstream activities (e.g., production) towards downstream specializations (e.g., distribution).

The supply relation showed that the quantity of cocoa exported had a negative sign which implies decreasing marginal output with respect to cost. This is the case for both long and short run. The variable cost (proxied by the ratio of producer price to a measure of the domestic price) had a positive coefficient in the long run and a negative sign in the short run. The coefficient of market power was -0.626 and -0.005, in the long and short run, respectively. On application of Lerner index, it was realized that cocoa had an index of 0.783 and 0.006 in the long and short run, respectively.

Finally, the study advocates urgent intervention from government, private sector and donor agencies to assist in revitalizing the export capacity and enhancing Nigeria's market power via increased market shares. This is impinged on the fact that output must grow before export takes place. These interventions could be in the form of input/production subsidies, targeted export promotion programs, farm settlement and special derivation formula for producing states.

Table 2. Estimates of the export crop: Supply relation.

Tabla 2. Estimaciones del cultivo de exportación: Relación de oferta.

Long-run	
Variable	**Cocoa**
Intercept	0.880***
	(0.211)
LnQ_t	-0.886*
	(0.349)
LnV_t	-1.820**
	(0.540)
LnC_t	0.105
	(0.071)
ψ_a	-0.626***
	(0.225)
Short-run	
Intercept	-0.372
	(0.865)
LnQ_{t-1}	-0.083
	(0.326)
LnV_{t-1}	-1.733***
	(0.502)
LnC_{t-1}	0.151
	(0.045)
λ_t	-0.005***
	(0.001)
ECM_{t-1}	-0.008***
	(0.004)
R^2	0.914
Adjusted R^2	0.882
F- Statistic	29.340
LM	0.027
RESET	43.120

Figures in parentheses are t-test values.

CONCLUSIONS

Having examined export competitiveness of Nigerian cocoa in the Dutch market using Error Correction Model (ECM) after testing for establishing stationarity and cointegration, the study was able to realize that the quantity of cocoa exported was positively influenced by the quantity produced in the world, excluding those of the participating countries, and negatively by the export price of the commodity and the substitute crop in the long run. The result also showed that the price elasticity of export demand was -0.80 while the income elasticity was 0.09. This indicates that Netherlands market is demand elastic and income inelastic. The diagnostic test revealed that there was no misspecification error as confirmed by a RESET estimate of 63.52. The R^2 was 72.9, implying reasonably high goodness of fit. The coefficient of market power was quite high in magnitude (-0.626) in the long run but plummeted drastically (-0.005) in the short run for cocoa, implying that the period did not experience any economic shock which usually influence short run dynamics.

LITERATURE CITED

Ayemibo, B. 2010. Exporting from Nigeria: Cocoa beans. A Certified Documentary Credit Specialist (CDCS) Tutorial. Available at http://www.export-nigeria.com/2010/09/product-profiles-cocoa-beans.html (Accessed September 2010)

CBI. 2010. CBI Market survey: the coffee, tea and cocoa market in the EU. CBI Market Information Database. Available at www.cbi.eu (Accessed 20 January 2011)

ICCO. 2009. Annual Report 2007/2008. International Cocoa Organization (ICCO), London, United Kingdom.

Lerner, A.P. 1934. The concept of monopoly and the measurement of monopoly power. Review of Economic Studies 1(3):157-175.

Mbanasor, J.A., and I.N. Nwachukwu. 2009. Financing value addition in agro raw materials in Nigeria: challenges and strategies.Vol.1 p. 235-249. In P.A. Onwualu, S.C. Obasi, and U.J. Ukpabi (eds.). Nigerian Agro Raw Materials Development: Some of Industrial Crops and Salient Issues. Raw Materials and Research Council, Nigeria.

Morrissey, O. and I. Filatotchev. 2000. Globalization and trade: The implications for exports from marginalized economies. Journal of Development Studies 37(2):1-12.

Nkang, N.M., S.O. Abang, O.E. Akpan, and K.J. Ofem. 2006. Cointegration and error-correction modeling of agricultural export trade in Nigeria: The case of cocoa. Journal of Agriculture and Social Sciences 2(4):249–255.

Nwachukwu, I.N. 2009. Market power and agricultural export performance of Nigeria. A Ph.D. Proposal. Presented to the Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

Nwachukwu, I.N., N. Agwu, J. Nwaru, and G. Imonikhe. 2010. Competitiveness and determinants of cocoa export from Nigeria. Report and Opinion 2(7):51–54.

Sasore, G.M. 2005. Nigeria's export trade of agricultural commodities: Quality control and standards. Nigeria National Crop Outlook Conference. Durbar Hotel, Kano. 26th–27th May. Nigerian Exports Promotion Council, Abuja, Nigeria.

Sexton, R. and N. Lavoie. 2001. Food processing and distribution: an industrial organization approach. In B. Gardner and G. Rausser (eds.) Handbook of Agricultural Economics. Elsevier, Amsterdam, Holland.

Sperling, R. 2002. Estimating oligopsony power in the United States market for slaughter hogs: an error correction approach. Ph.D. Thesis. Department of Agricultural Environmental and Development Economics, The Ohio State University, Columbus, Ohio, USA.

Susanto, D. 2006. Measuring the degree of market power in the export demand for soybean complex. Ph.D. Thesis. Department of Agricultural Economics and Agribusiness, The Louisiana State University, Baton Rouge, Lousiana, USA.

UNCTAD. 2008. Cocoa study: Industry structures and competition. United Nations Conferences on Trade and Development (UNCTAD), Geneva. Italy.

Wilcox, M.D., and P.C. Abbott. 2004. Market power and structural adjustment: the case of West African cocoa market liberalization. American Agricultural Economics Association Annual Meeting. 1-4 August 2004. Denver, Colorado, USA.