Original Research Article

Determinants of farmers' satisfaction with the price of cocoa in Ghana

ABSTRACT

This paper sheds light on one key aspect of the liberalization of export crop marketing in developing countries which has received a lot of research attention, namely pricing. The government of Ghana has been criticized by many researchers for its stance against price liberalization in the cocoa sector, owing to its stringent monopoly over pricing. The current study does not delve into the pros and cons of price liberalization, but seeks to investigate the factors influencing producers' satisfaction with pricing. Using cross-sectional data and a logit model, the study revealed that farmers' age, educational status and farm income were the significant factors influencing producers' satisfaction with the price of cocoa in Ghana. The paper concludes that attempts to draw the youth into cocoa farming is not likely to be successful considering the disenchantment of younger farmers with cocoa pricing in Ghana.

Keywords: Cocoa, Ghana, liberalization, logit model, price

1. INTRODUCTION

Cocoa is central to the economy of Ghana and historically has been the most dominant crop in terms of government policy in the agricultural sector. After relinquishing its number one global producer status due to decline in production, Ghana is currently the world's second largest producer of the crop after Cote d'Ivoire as reported by [1]; [2], and [3].

Cocoa production plays a very strategic and important role in the economy of Ghana according to [4], [5], and [6] while the history of its production and pricing is one of the most important in the country's political economy. Export earnings from cocoa production provided a major source of revenue for the post-independent economy of Ghana and the crop continues to support Ghana's socio-economic development through the inflow of foreign exchange earnings and employment creation. Cocoa production is an important source of livelihood for many smallholder producers in the country. According to [7], as a result of favorable external conditions and internal reforms, cocoa has become the driver of growth and poverty reduction in Ghana. However with the discovery of oil, it is speculated that cocoa's influence on the Ghanaian economy is likely to diminish if Ghana fails to learn from the mistakes of oil producing countries in the developing world.

Due to external pressure to liberalize the cocoa sector, the government opted for a partial liberalization policy, instead of a fully liberalized market. Ghana thus remains the only major cocoa producing country without a fully liberalized marketing system according to [8] and [3]. The introduction of liberalization, though partial, brought significant changes in the cocoa sector such as prompt payment, and the choice to sell to the preferred buyer. The introduction of private buyers, among other things, was intended to bring about efficiency in cocoa marketing, guarantee farmers ready market and cash payment. It was also intended to generate a number of production incentives to the producers of the crop [8].

The government of Ghana has been criticized for overtaxing cocoa farmers, particularly in the era prior to liberalization. The price received by cocoa farmers was considered to be far below the freight-on-board (fob) price, a situation that was considered as a disincentive to production. The pricing of cocoa remains the prerogative of the Ghana Cocoa Board (COCOBOD) Producer Price Review Committee. The control over pricing has been questioned by some researchers on the basis that competitive cocoa-purchasing markets have the tendency to stimulate efficiency and reduce delivery costs, leading to higher price for producers [9].

According [10], there are no monopolistic tendencies in the Ghanaian cocoa sector as no single buyer holds a market share large enough to induce monopolistic practices. This scenario is attributed to the absence of price competition. Furthermore, the Ghana Cocoa Board (COCOBOD) only sets a floor price, which means that technically, buying companies could pay farmers prices higher than the official producer price [2]. However, buyers rarely paid farmers a price above the floor price. As noted by [10] buyers compete for market share through non-price mechanisms like the provision of incentives, input subsidies, and cash rewards to farmers.

It was indicated by [10] that in the absence of price competition, an interesting marketing scenario has emerged in the Ghanaian cocoa sector with producer-buyer loyalty serving as the key determinants for gaining market share. Licensed cocoa buying companies have devised ways to ensure that they win the loyalty of buyers and these include prompt payments, involvement in the social activities of communities, provision of credit and supply of inputs, among others. In return, farmers pledge their loyalty to buyers who keep to their promises and offer certain incentives and cash rewards. Market reform has also brought more benefits to farmers than the period prior to partial liberalization [11].

This paper is a follow up on previous studies by this author to investigate the impact of liberalization of cocoa marketing from the perspective of producers. To achieve this, the paper solicited the views of farmers about their satisfaction with the price of cocoa offered by the government. Since the response is binary, in which case a farmer is either satisfied or not, a binary choice model was used to analyze the data. The logit model was chosen for this study because of its wide application in modeling binary responses.

2. METHODOLOGY

The following section is a presentation of the study area, data, analytical and empirical model for the study.

2.1 Study Area and Data- second level heading.

The study was conducted at Bibiani-Anhwiaso-Bekwai District in the Western Region which is regarded as the leading cocoa producing region in Ghana. The District is found in the forest belt and experiences an average annual rainfall between 1200 mm and 1500 mm. The rainfall distribution is bimodal. The agro-climatic conditions of the area permit the growing of crops such as cocoa, rubber, maize, cassava, plantain and cocoyam. Data for the study was collected from 80 randomly selected cocoa farmers located in four communities in the Bibiani-Anhwiaso-Bekwai District. Face-to-face interviews were conducted with the respondents. Out of the 80 respondents, 78 provided complete information and were used in the study.

2.2 Analytical framework and empirical model - second level heading.

The study employs the logit model to analyze the data due to the dichotomous nature of the dependent variable. As noted by [12] and [13], OLS regression is inadequate when the dependent variable is discrete. While we only observe the values of 0 and 1 for the dependent variable (y), there is a latent, unobserved continuous variable y* that determines the value of y. The logit model estimates the probability that the dependent variable is 1 (y = 1), that is, the probability that the event occurs.

If we denote satisfaction with pricing by yi, then yi = 1 if farmer is satisfied and yi = 0 if unsatisfied. The binary outcome model estimates the probability that y = 1 as a function of the independent variables (x). Therefore,

$$p = prob[\mathrm{y} = 1 \mid \mathbf{x}] = F(\mathbf{x}'\boldsymbol{\beta}) \tag{1}$$

Where **β** is a vector of parameters and **x** is a vector of explanatory variables influencing satisfaction with pricing.

There are three different models that can be estimated depending on the functional form of $F(\mathbf{x}'\boldsymbol{\beta})$. In the linear probability model, we have $F(x'\beta) = x'\beta$ [that is, $p = prob[\mathrm{y} = 1 \mid \mathrm{x}] = x'\beta$]. However, the regression model has a problem in that the predicted probabilities are not restricted to lie between 0 and 1. As a result we do not employ the regression model when we have a binary dependent variable. Rather, we employ logit model for which $F(\mathbf{x}'\boldsymbol{\beta})$ is the cumulative distribution function (CDF) of the logistic distribution. The model is expressed as

$$F(\mathbf{x}'\boldsymbol{\beta}) = \Lambda(\mathbf{x}'\boldsymbol{\beta}) = \frac{e^{x'\beta}}{1+e^{x'\beta}} = \frac{\exp(\mathbf{x}'\boldsymbol{\beta})}{1+\exp(\mathbf{x}'\boldsymbol{\beta})} \tag{2}$$

where Λ = the cumulative probability distribution function of the logistic distribution. The predicted probabilities are now limited between 0 and 1.

The Logit model specification for the study can be written as:

$$y_i^* = \beta_0 + \sum_{j=1}^{N} \beta_j x_{ji} + v_i \tag{3}$$

$$\text{So that } y_i = \begin{cases} 1 & if\ y_i^* > 0 \\ 0 & otherwise \end{cases} \tag{4}$$

where x represents a vector of random variables, v is a random disturbance term, and β is a vector of unknown parameters to be estimated by the method of maximum likelihood.

The marginal effects of the logit model is calculated as

$$\partial p / \partial x_j = \Lambda(\mathbf{x}'\boldsymbol{\beta})[1-\Lambda(\mathbf{x}'\boldsymbol{\beta})]\beta_j = \frac{e^{(\mathbf{x}'\boldsymbol{\beta})}}{(1+e^{(\mathbf{x}'\boldsymbol{\beta})})^2}\beta_j \tag{5}$$

The logit model for the study was specified as follows:

$$y_i = \beta_0 + \sum_{j=1}^{5} \beta_j x_{ji} + v_i \quad (6)$$

where y_i = satisfaction with pricing (=1 if satisfied, 0 otherwise), x1 =age; x2 = education (binary): 1 if educated, 0 otherwise; x3 = sex (binary): 1 if male, 0 otherwise; x4 = farm size; x5 = farm income.

The variables used in the study and their expected signs are given in Table 1.

Table 1: Description of variables used in the model

Variable	Description	Expected sign
Satisfaction with price	Dummy: 1 if satisfied; 0 otherwise	
Farm size	Farm size in acres	+/-
Farm income	Farm income in Ghana Cedis	+
Age	Age of farmer in years	+/-
Sex	Dummy: 1 if male; 0 for otherwise	+/-
Education	Dummy: 1 if educated; 0 for otherwise	+/-

2.3 Choice of variables used in the study

The choice of the variables included in the logit model to analyze farmers' satisfaction with the price of cocoa in Ghana is discussed in the following section.

The age of farmers is anticipated to influence their perceptions and satisfaction of cocoa pricing since perceptions are formed with the passage of time. In addition, older farmers are expected to be more experienced in farming so that they can make better informed choices compared to younger farmers. As family size increases for older farmers, their expectations of higher income could also influence their perception of the price they receive for their produce. Older farmers are therefore hypothesized to be less satisfied with the price of cocoa.

Gender differences can also play a role in farmers' satisfaction with pricing. This is because male farmers are usually breadwinners of their families and the expectation of higher income can influence their perceptions about price. Male farmers are therefore hypothesized to be less satisfied with the price of cocoa. Education enables the individual to critically assess situations particular issues of economic importance.

Educated farmers who are well-informed are likely to make better informed decisions and the knowledge of the price system could influence their perceptions about price. In addition, educated farmers have a higher opportunity cost of labor and will therefore anticipate higher rewards for their labor. It is therefore anticipated that educated farmers will be less satisfied with the price of cocoa. As the educated farmers interact with other workers in paid employment, this is likely to influence their perceptions. If the notion that farmers are inadequately remunerated in most developing economies, then the likelihood of dissatisfaction with pricing will be high for the educated cocoa farmer.

It is anticipated that farmers with larger farms may hire labor for farm operations and the high cost of operation may impute the desire for higher returns from farming. As such, farmers with large farms will anticipate improved prices and may therefore be less satisfied with the

price of cocoa. On the contrary, if farm size translates into more output, then farmers with large farms are likely to be more satisfied with pricing compared to small farm owners. Farm size was included by [14] as a variable in a study of farmers' satisfaction with an Agricultural Inputs Voucher (AIV) system in China. The variable showed a negatively significant relationship with satisfaction with the AIV system.

An increase in farm income is expected to give a positive perception of price while low income is expected to generate the opposite effect. Hence income is expected t have a positive relationship with satisfaction. [14] included the income variable in a study of farmers' satisfaction with an Agricultural Inputs Voucher (AIV) system in China. The research however reported a negatively significant relationship with satisfaction.

3. RESULTS AND DISCUSSION

The results of the study and the discussion of the main findings are presented in the following section. A brief summary statistics of the respondents is followed by the distribution of the respondents according to their satisfaction with pricing. The maximum likelihood estimates of the parameters of the logit model are presented thereafter.

3.1 General description of the respondents

The descriptive statistics of the respondents is provided in Table 2. Forty one (41) percent of the respondents were satisfied with the price of coca. This means that majority of cocoa farmers were dissatisfied with the price they receive for their produce. The mean age of respondents was 48 years which implies that cocoa farmers are not very young. They have the advantage of experience but with increase in age, many are likely to decline in their productivity. More than 80 percent of the respondents have obtained some level of formal education. Less than 20 percent did not receive any formal education. Even though the variable is a dummy and therefore does not provide quantitative evidence of the quality of education possessed by the respondents, it nonetheless remains an important finding that reveals that majority of cocoa farmers in Ghana have attained some level of formal education. Close to 90 of the respondents were males, implying that cocoa farming is dominated by men. The result is expected because men usually dominate in the area of cash crop production in the country due to the pattern of land ownership and customs and traditions that favor men when it comes to ownership of productive resources. Annual income from cocoa farming was GH¢1937 on average. Average farm size was 7.8 acres, implying the respondents are smallholder cocoa farmers. It is reported that the cocoa sector in Ghana employs over 800,000 smallholder farm families [15]. These smallholder farm families derive about 70 – 100% of their annual household incomes from cocoa, hence the importance of pricing to farmers. There are an estimated 350,000 cocoa farms in the country which portrays the cocoa sector as a vast economic sector if we take the entire value chain into consideration.

Table 2: Characteristics of respondents

Variable	Mean	Std. deviation	Minimum	Maximum
Satisfaction with price	0.410	0.495	0	1
Age	47.56	10.982	25	65
Education	0.821	0.386	0	1
Sex	0.885	0.322	0	1
Farm size	7.763	5.756	2	32
Income	1937	2029	204	10200

3.2 Distribution of respondents according to satisfaction with pricing

The characteristics of respondents are contrasted on the basis of satisfaction status in Table 3. Farmers who were satisfied with the price of cocoa were older and had higher farm income. The mean difference of the age variable was significant while that of income was insignificant. Nearly all (96%) of the respondents who were dissatisfied with pricing were educated compared to 63 percent who expressed satisfaction with pricing. Hence the education variable is likely to decrease satisfaction with pricing. The mean difference of the education variable was statistically significant. Respondents who were dissatisfied with pricing had larger farm size compared to those who were satisfied with the price they received for their produce. This suggests that farm size is likely to decrease satisfaction with pricing. However the mean difference was not statistically significant. Finally, 94 percent of farmers who were dissatisfied with pricing were males compared to 81 percent who expressed satisfaction. The mean difference was statistically significant at the 1 percent level.

Table 3: Distribution of respondents according to satisfaction with pricing

Variable	Satisfied (N = 32)	Dissatisfied (N = 46)	t-test
Age	50.63	45.44	-2.098**
Education (1 = educated)	0.625	0.957	1.671*
Sex (1 = male)	0.813	0.935	4.092***
Farm size	7.406	8.011	0.454
Income	2155	1785	-0.790

3.3 Determinants of satisfaction with the price of cocoa

Table 4 shows the results of the logit analysis of the factors influencing farmers' satisfaction with the price of cocoa in Ghana. The model diagnostics reveal an overall good fit of the data as indicated by the significance of the LR Chi-square test. This test is a joint test that all the variable coefficients, except the intercept, are zero. The p-value of 0.00 is less than the 0.05 significance level so we reject the null hypothesis that the variable coefficients are jointly equal to zero. The percentage of correct classification of 73.1 also indicates a good fit of the model. The significant factors determining farmers' level of satisfaction were age of the farmer, farm size and farm income.

Table 4: Maximum likelihood estimates of the logit model of satisfaction with pricing

Variable	Coefficient	P>|z|	Marginal effects
Age of farmer	0.065	0.029**	0.011
	(0.030)		
Educational status	-3.460	0.001***	-0.597
	(1.029)		
Sex of farmer	0.852	0.465	0.147
	(1.167)		
Farm size	-0.065	0.266	-0.011
	(0.058)		
Farm income	0.653	0.044**	0.113
	(0.325)		
Constant	-1.548	0.390	-
	(1.803)		

Number of observations	78
Log likelihood	-40.5
Wald chi2(5)	24.60
Prob > chi2	0.000
Pseudo R2	0.233
Correctly classified	73.1%

*** Statistical significance at 1% level. ** Statistical significance at 5% level. Figures in parentheses are standard errors.

The age of the farmer exhibited a significantly positive relationship with satisfaction with price, implying that satisfaction with pricing increases with age. In other words, older farmers are more satisfied with the price of cocoa than younger farmers. A unit increase in farmers' age increases the probability of satisfaction by 0.01. The satisfaction of experienced farmers with the price of cocoa may be attributed to their long engagement in farming and longer period of dealing with buyers. A reported misnomer in cocoa marketing is the adjustment of the weighing scales by buyers intended to cheat farmers. Older farmers through experience may be well informed so that they do not fall prey to these bad practices and this can influence their satisfaction with the price they receive for their produce.

The educational level of farmers exhibited a negative and highly significant relationship with satisfaction with pricing, implying that educated farmers were less satisfied with the price of cocoa compared to uneducated farmers. The marginal effect shows that the probability of satisfaction with the pricing of cocoa for educated farmers was 0.60 lower than for uneducated farmers. A possible explanation is that educated farmers are more likely to be enlightened and abreast with current information in the economy. Hence they are more likely to be able to analyze economic situations and decipher whether or not they are being well remunerate in their work. In addition, educated farmers have a greater opportunity cost of labor and therefore will anticipate better reward for their labor.

Farm income had a positive and significant relationship with satisfaction with cocoa pricing. Thus as farmers' level of income increases, satisfaction with pricing goes up. A unit increase in farm income increases the probability of satisfaction with cocoa pricing by 0.11. The result is expected because an increase in farm income is a motivation to most farmers and could be interpreted by many farmers to mean that the business of farming is going well. However farmers with low incomes could attribute their low returns to poor pricing of their commodity, hence lower satisfaction with pricing. Since most cocoa-producing households derive a major part of their livelihood from the crop, it implies that farmers who are satisfied with the price of cocoa are likely to be those in the high income bracket. This means that satisfaction with the price of cocoa is related to economic status of the farmer. Income levels are very important to most smallholder farmers and tend to influence their perceptions and satisfaction with development programs and policies. The result of this research is however at variance with [14] who found gross income to have a negative influence on farmers' satisfaction with an Agricultural Inputs Voucher system in China.

Farm size was negatively related to farmers' satisfaction with pricing of cocoa but was not a significant variable. Finally, gender of the farmer had a positive relationship with satisfaction and was not significant.

4. CONCLUSION

The study was carried out to investigate the factors that determine farmers' satisfaction with the price of cocoa in Ghana. Cross-sectional data from cocoa farmers in the Bibiani-Anhwiaso-Bekwai District in the Western Region of Ghana was used for the study. A logit

model was used to analyze the determinants of satisfaction with price. The study showed that two-thirds of the respondents were dissatisfied with the price they receive for their produce, indicating a general disenchantment with the pricing policy of the government. The result lends some credence to the call by liberalization proponents for price liberalization in Ghana's cocoa sector, particularly as it is argued that price liberalization engenders price incentives to producers which will spur production. However, judging from the success story of the Ghanaian cocoa marketing system, as attested by many researchers, such a policy shift may not be helpful after all. What the government needs to do is to offer realistic prices to farmers to motivate production of the crop considering the central role it plays in the socio-economic development of the country. The determinants of satisfaction with pricing were farmers' age, educational status and income from cocoa farming. Younger farmers expressed dissatisfaction with pricing which should be of concern to the government particularly as it seeks to encourage young people to venture into cocoa farming and agricultural production in general.

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APPENDIX