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What determines the price received by cocoa farmers in Cameroon? An empirical analysis based on bargaining theory

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Studies have shown that small-scale agricultural producers from developing countries do not generally obtain the potential gains of trade. To investigate what can be done to help them get better prices, we examine ways to increase their bargaining power. Using data from 1,854 cocoa transactions between traders and producers in Cameroon during the 2005/2006 season, we show that when the bargaining situation is least favorable to the producers (because prices are non-negotiable due to interlinked credit and there is information asymmetry) the traders seize the entire surplus generated by the trade. Farmers who can avoid accepting credit from the cocoa buyers and can delay sales until after the start of the school year, when the buyers will not be able to take advantage of the farmers' financial need, are able to negotiate higher prices. To improve their bargaining situation, Cameroonian cocoa producers need an efficient market information system, better access to credit and the development of collective marketing.

Keywords: reserve price; asymmetric information; bargaining theory; cocoa; Cameroon

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Des études ont montré qu'en général les petits producteurs des pays en voie de développement n'obtiennent pas les éventuels profits du marché. Afin de réfléchir à ce qui pourrait les aider à obtenir de meilleurs prix, nous étudions les moyens d'augmenter leur pouvoir de négociation. A partir de données concernant 1,854 transactions ayant trait au cacao, entre les négociants et les producteurs du Cameroun pendant la saison 2005/2006, nous démontrons que lorsque la situation de négociation est la moins avantageuse pour les producteurs (parce que les prix ne sont pas négociables en raison des crédits conjugués et de l'asymétrie de l'information) les négociants raflent la totalité du surplus que génèrent les transactions. Les fermiers qui peuvent se passer des crédits que proposent les acheteurs de cacao et qui sont capables de retarder les ventes jusqu'après le début de l'année scolaire – lorsque les acheteurs ne sont pas en mesure de profiter des difficultés financières que connaîtraient les fermiers – peuvent négocier des prix plus élevés. Pour améliorer la situation dans laquelle ils se trouvent lorsqu'ils négocient, les producteurs de cacao camerounais ont besoin d'un système d'information efficace sur les marchés, d'un meilleur accès au crédit et d'un développement du marketing collectif.

Mots-clés : *prix de réserve ; information asymétrique ; théorie de la négociation ; cacao ; Cameroun*

I. Introduction

Many empirical studies have been conducted in developing countries to explain the prices received by agricultural producers. The first studies (in the years following agricultural liberalization in developing countries) generally concluded that the benefits to smallholder producers were limited by high transaction costs, the lack of transport, and difficulties in accessing credit (De Janvry et al., 1991; Goetz, 1992). Recent studies also show that producers remain poorly connected to the market and the traders generally seize the gains from trade (Key et al., 2000; Gabre-Madhin, 2001, 2009). After the cocoa markets in Nigeria and Cameroon were liberalized, traders and exporters began to supply inputs previously supplied by state marketing boards. To overcome credit constraints, these traders devised interlinked credit arrangements where inputs were provided by the trader, with the cocoa producer obligated to sell his output to the trader and to accept lower prices (Gockowski, 2008).

Two ways of enabling farmers to obtain better prices for their products can be explored. The first involves promoting collective marketing by producer organizations (POs). Collecting and bulking small producers' outputs at the village level reduces transaction costs (because of economies of scale) and also increases their bargaining power. In the wake of liberalization, collective marketing by POs gave cause for great hope (De Janvry et al., 1991; Goetz, 1992). Various studies confirm that producers genuinely obtain a higher price when they sell their produce via a PO and this remains an attractive solution today, although its limitations have also become clear (Coulter et al., 1999; Bernard et al., 2008). POs sometimes have difficulty getting established and, if they do, they also face problems in organizing themselves to market their members' products. POs sometimes operate very effectively, and obtain relatively high prices though acquiring only a relatively small share of the quantities produced by their members (Bernard et al., 2008).

The second way to increase producers' prices is to strengthen the individual producers' bargaining power. Bargaining theory explains how the surplus generated by trade is divided between the buyer and the seller (Stahl, 1972; Rubinstein, 1982; Binmore, 1987; Wilson, 1987; Corominas-Bosch, 2004). It analyzes the main determinants of the distribution of the surplus (such as information available to the different agents and the price-setting rules) and thereby allows us to identify the variables that can be influenced so as to alter the distribution in favor of the producers. This theory has given rise to numerous tests in experimental economics. However, it has scarcely, if ever, been used in empirical studies aimed at explaining agricultural prices in developing countries. This is regrettable, as improving or strengthening the bargaining power of small-scale producers is one way to improve farmers' income and reduce poverty. This article examines the second option (reserving an analysis of the impact of collective marketing on prices received by producers for a separate paper).²

We first analyze the determinants of the producer prices for the case of cocoa farmers in Cameroon. Cocoa plays an important economic and social role in Cameroon, accounting for 6% of export earnings in 2006 and contributing 115 billion CFA francs to the national economy. There are approximately 260,000 producers and a total of 400,000 hectares is planted to cocoa. Before the 1994 liberalization, the domestic cocoa market was strictly regulated. The state supplied the inputs, set a pan-territorial cocoa price, collected the goods from the producers (via state-sponsored 'cooperatives' in the Southwest region and regulated licensed buyers in the Central and South regions) and controlled export marketing by cooperatives and licensed buyers. The complete liberalization of cocoa marketing in 1995 increased the price received by the producer and also the variability of this price (Gilbert et al., 1999), but the quality of Cameroonian cocoa declined. Generally speaking, as a result of market imperfections, the results of the liberalization policy have not been as good as expected (Bernard, 2003; Okah-Atenga, 2005). Consequently, producers often find themselves in a weak bargaining situation vis-à-vis buyers (Gockowski, 2008) particularly when producers are bound to a buyer or when they sell their goods outside the main harvesting period (September to December), as there are fewer buyers during this period. The risk of the cocoa beans being damaged if not stored in appropriate conditions (protected against humidity and insects) is also a major problem for producers (and even for POs).

This study was based on data from 1,854 selling transactions by 689 producers in the two main production zones of the country, the Centre and the Southwest. These data are taken from a survey conducted in 2006 by International Institute of Tropical Agriculture (IITA). We first review the bargaining theory literature, then formulate and test hypotheses about the determinants of the prices received by cocoa producers in Cameroon, after which we discuss the implications of these results for development policies.

2. Theoretical framework: Bargaining theory

Bargaining theory attempts to explain price setting. For a transaction to be conducted, the buyer and seller must both derive a certain level of satisfaction. The price is therefore necessarily a compromise between the seller's reserve price (the price below which there is no incentive to conduct the transaction) and the buyer's (the price above which there is no incentive to conduct the transaction). Bargaining theory aims to explain where the price will

² C Kamdem, Impact of collective marketing by cocoa farmers' organizations in Cameroon, unpublished draft.

be set within the bargaining price range defined by the two reserve prices. Theoretical analyses of bargaining usually take the reserve prices as exogenous and consider them to be equal for all sellers and all buyers. However, in practice price differences between producers may result from differences in the bargaining situation or from differences in the producer's or buyer's reserve prices. Any empirical analysis must therefore incorporate data on both the bargaining situation and the reserve prices.

Three categories of variable determine where the price will be set within the bargaining range:

- *The characteristics of the agents*, particularly their level of risk aversion and their level of impatience. Risk aversion is a psychological element which determines how risk affects the agent's welfare (and thus behavior). The level of impatience reflects the way the agent's utility declines as the negotiation becomes prolonged. This is because of both the opportunity cost of time and the disutility which might result from delay in receiving either the money (for the seller) or the product (for the buyer).
- *The market institutions* which determine price-setting rules, in particular the identity of the party who makes the first price proposal (buyer or seller) and the possibility of bargaining (the 'take it or leave it' price or a negotiable price).
- *The distribution of information* between the buyer and the seller – their respective reserve price, risk aversion, level of impatience and level of information. Four situations are theoretically possible: i) complete information, ii) asymmetric information where only the buyer is completely informed, iii) asymmetric information where only the seller is completely informed, and iv) asymmetric (incomplete) information on both sides.

Different combinations of these three categories of variable produce a variety of bargaining situations, most of which have been studied in the literature. It is therefore possible to classify the literature according to the bargaining situations studied. Table 1 classifies and summarizes such literature by combining the price setting rules (the 'take it or leave it' price or a negotiable price) with the information available to the two agents. In addition to the situations presented in this table (differentiated by information and price setting rules), the outcome of the bargaining process of course also depends on the characteristics of the agents, particularly their risk aversion and level of impatience.

Table 1: Overview of the literature by bargaining situation

Distribution of information	Price setting rules	
	Take it or leave it	Negotiable
Complete information	Trivial case	Stahl (1972), Rubinstein (1982), Binmore (1987), Wilson (1987), Corominas-Bosch (2004)
Asymmetric information (party informed = the party who makes the first proposal)	Trivial case	Cramton (1984), Fudenberg et al. (1985), Grossman & Perry (1985), Gul & Sonnenschein (1985), Wilson

		(1987), Corominas-Bosch (2004)
Asymmetric information (party informed = the party who does not make the first proposal)	Classic case of decision-making in a situation of uncertainty	Coase (1972), Sobel & Takahashi (1983), Cramton (1984), Bikhchandani (1985), Fudenberg et al. (1985), Rubinstein (1985), Gul et al. (1986), Wilson (1987), Corominas-Bosch (2004)
Incomplete information on both sides	Classic case of decision-making in a situation of uncertainty	Cramton (1984), Fudenberg et al. (1985), Wilson (1987), Dajun & Katia (1997), Watson (1998), Corominas-Bosch (2004).

For convenience we call the agent who makes the first price proposal the *price-maker*, and the agent who does not make the first price proposal the *non-price-maker*. In a situation of complete information, if the price is non-negotiable, the result is trivial: the price-maker, (i.e. the agent who makes the first price proposal) sets the price at the level of the other agent's reserve price and takes the entire surplus. When the price is negotiable, the solution is a little more complex. The agents can draw out the negotiations, hence the importance of the level of impatience of both the buyer and the seller. Rubinstein (1982) analyzes the case where both agents have the same level of impatience. In this situation, the utility of an agent (i) depends on both the share of the potential surplus that he obtains (x) and the period during which he obtains it (t) using the formula $U_i(x, t) = x \delta^{t-1}$, where δ^{t-1} lies between 0 and 1 and represents the update coefficient. Rubinstein shows that the price-maker obtains $1/(1-\delta)$ while the non-price-maker obtains $\delta/(1-\delta)$. If $\delta = 0$, both agents are extremely impatient and any surplus disappears at the second period. The situation is therefore comparable to that of the 'take it or leave it' price: any surplus is seized by the price-maker. When δ tends to 1 (agents are infinitely patient), the surplus tends to be equally distributed. This model (in which the only variable distinguishing between the two agents is the right to make the first proposal) shows that the market power resulting from this right is correlated to the common impatience of the agents. Naturally, one agent may be more patient than the other, which gives him an advantage.

In a situation of incomplete information, an agent who is poorly or insufficiently informed risks making the wrong decision. The intensity of this risk falls as his level of information increases. The effect of this risk on the behavior of the agent depends on his level of risk aversion. If the information is asymmetric, the informed agent enjoys a significant advantage. If the informed agent is also the price-maker, the effects support each other, enabling him to seize the majority of the surplus. Even if the price is negotiable, the non-price-maker (for instance the producer) will find it difficult to play for time, even if he is patient. Indeed, if he does not know the reserve price or the level of impatience of the other agent, he runs the risk of being too greedy and thus causing the negotiations to break down. He will therefore be encouraged not to bargain too aggressively (especially if he is risk averse). The situation in which the informed agent is the price-maker is more subtle and more complex. In a situation

where prices are non-negotiable, the result depends primarily on the risk aversion of the price-maker: the greater his aversion to risk, the higher the price he will propose so as to minimize the risk of the negotiations breaking down. In a situation where prices are negotiable, a Coasian result applies. Coase (1972) demonstrated that if the informed agent is patient and the uninformed agent is impatient, the former can seize the majority of the surplus even if it is the latter who is the price-maker.

In a situation of incomplete information for both parties, both agents are subject to risk. In a situation where the price is non-negotiable, making the first price proposal remains an advantage: the price-maker will generally obtain a larger share of the surplus unless he is hugely risk averse. In the situation where prices are negotiable, it is generally the more patient agent who will succeed in obtaining the majority of the surplus, even if the different levels of risk aversion would suggest otherwise (Cramton, 1984; Watson, 1998).

Table 2 summarizes the main findings from the literature about each bargaining situation.

Table 2: Main ways of allocating surplus in different bargaining situations

Distribution of the information	Price setting rules	
	Take it or leave it	Negotiable
Complete information	The price-maker takes the entire surplus. The price is equal to the reserve price of the other agent.	The possibility of ‘playing for time’ enables the non-price-maker to obtain a share of the surplus, especially if both agents are patient (Rubinstein, 1982), and especially if he is more patient than the price-maker.
Asymmetric information (party informed = the party who makes the first proposal)	The price-maker takes the entire surplus. The price is equal to the reserve price of the other agent.	The non-price-maker’s chance of obtaining a share of the surplus, by playing for time, is reduced because he does not know the other agent’s parameters (reserve price, rate of impatience), and especially if he is risk-averse.
Asymmetric information (party informed = the price-maker)	The price-maker will generally obtain a larger share of the surplus. The allocation depends on the level of information and risk aversion of the price-maker.	The allocation of the surplus depends primarily on how impatient the agent is. If the informed agent is patient and the uninformed agent is impatient, the former can obtain most of the surplus, even if it is the latter who is the price-maker (Coase, 1972).

Incomplete information on both sides	The price-maker will generally obtain a larger share of the surplus. The allocation depends on the level of information and risk aversion of the price-maker.	The more patient agent will generally succeed in obtaining the majority of the surplus, even if the difference in risk aversion would suggest otherwise (Cramton, 1984; Watson, 1998).
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3. Hypotheses about the determinants of the prices received by cocoa producers in Cameroon

The theoretical explanation of the determinants of the price received by the producer leads us to formulate a number of hypotheses about the cocoa market in Cameroon.

We have seen that the price level depends on the bargaining situation, which may itself be characterized in part by combining the price setting rules ('take it or leave it price' versus negotiable price) with the information available to the two agents. The first stage therefore involves characterizing the main bargaining situations in which Cameroonian cocoa producers find themselves.

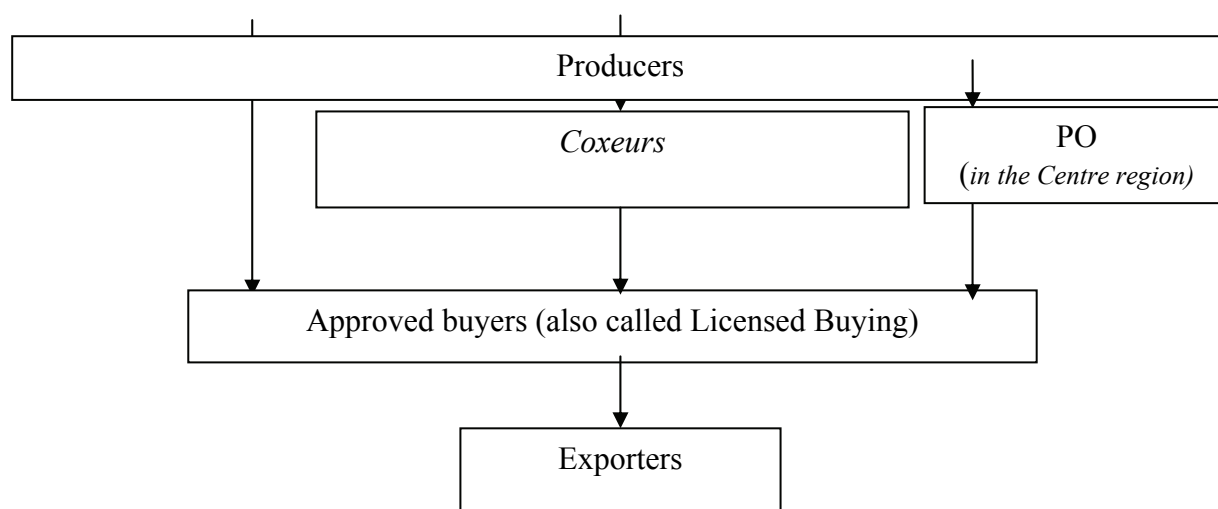


Figure 1: Organization of the cocoa marketing chain in Cameroon

The structure of the cocoa marketing chain is relatively simple (Figure 1), though the two main production zones (Centre and Southwest) function differently in some respects. The producers can either sell directly to approved buyers (but this often requires a long journey as the buyers are based in the towns), sell to *coxeurs*³ (who generally buy the cocoa from the

³ *Coxeurs* are collectors working for an approved buyer. They are paid on commission.

producers and resell it to the approved buyers) or entrust the sale of their cocoa to a PO which then sells it to the approved buyers. The first marketing channel (selling directly to the approved buyers) is primarily the domain of large-scale producers.⁴ It is not widespread in the Centre region (only 5% of the number and volume of transactions), but very widespread in the Southwest (53% of transactions and 59% of the volume traded). The second channel (selling to *coxeurs*) is used by about half of the trade, both in the Centre (51% of transactions and 47% of the volume traded) and the Southwest (47% of transactions and 41% of the volume traded). The third channel (selling via a PO) is used only in the Centre, where it accounts for almost half of the trade (44% of transactions and 48% of the volume traded).⁵ As we have already explained, there are no POs in the other production region, i.e. the Southwest. The approved buyers then resell the cocoa to exporters. This marketing chain is ‘funnel-shaped’: with 160,000 producers across the two zones, there are about 1,000 *coxeurs* who sell the produce to approximately 35 approved buyers. At the end of the chain, three exporters control almost all the cocoa produced.⁶ The cocoa is moved from the farms to the villages (where the *coxeurs* and the POs collect the cocoa), before being transported to small provincial towns (home to the approved buyers), then finally to the port of Douala (where the exporters are based).

The bargaining situation faced by producers depends on the marketing channel concerned. In this article we consider only producers who sell individually. When producers sell individually, the first price proposal is always made by the cocoa buyer (*coxeur* or approved buyer). This price can be negotiable or non-negotiable, depending on the relationship between the farmer and the buyer. Some farmers receive credit from the cocoa buyer in cash or in inputs (insecticides and fungicides). This credit is provided interest-free, simply as a way for the buyers to increase their supplies (as the credit is reimbursed in cocoa). In such a situation of interlinked transactions, the farmer is bound to a buyer: he cannot capitalize on competition between buyers (Gockowski et al., 2008). Furthermore, he can no longer negotiate the price with ‘his’ buyer.⁷ The return on funds lent was estimated to range from 19 to 45% and was usually recovered by paying lower prices for the cocoa sold by the producer and/or charging higher prices for the inputs supplied on credit (Gockowski et al., 2008). The producers are always poorly informed about the situation of the buyers. The buyers are also in a situation of uncertainty with regard to the producers’ situation (reserve price and level of impatience), except at the start of the school year when almost all cocoa producers need money relatively quickly. In Cameroon, in spite of government efforts to reduce the cost of education supported by the parents, the cost of educating a child in the rural areas is about 25,000 CFA francs per year (INS, 2002), including school needs and the Parent-Teacher Association fee, which has become quasi-compulsory. Thus with an average income of 400,000 CFA francs per year (Kamdem, 2010) and an average of three children in school (STCP, 2010), education

⁴ This is convergent with the result obtained by Fafchamps & Vargas (2004) where only producers with large quantities travel to sell their product.

⁵ After liberalization, in the Centre region the former state cooperatives disappeared. POs primarily grew up thanks to the support of development projects such as the Sustainable Tree Crop Program based at the IITA. According to Folefack & Gockowski (2004), 40% of the cocoa producers in the Centre are members of a PO. In the Southwest, the former cooperatives (such as the Southwest Farmer Cooperative Union based in Kumba) were placed in the hands of traders (who are also often producers), although they sometimes present themselves as POs. In the absence of projects supporting producers’ initiatives, no POs have been able to emerge in the Southwest.

⁶ These exporters are Cargill, ADM and OLAMCAM.

⁷ On the other hand the farmers who have not obtained credit from the cocoa buyers can bargain, and often do. Indeed, the negotiation can last more than a day: the *coxeur* may visit the producer in the morning and again in the evening or even the following day.

represents approximately 20% of the income of a rural Cameroonian cocoa farmer. Thus, at the beginning of the school year farmers have an enormous need for cash, and the buyers are fully aware of this.

In the case of individual sales, the bargaining situation can be defined according to two variables: the existence of credit granted by the buyer to the producer (which indicates whether or not the price is negotiable) and the selling period (the start of the school year acts as a proxy for asymmetric information between buyer and producer). This leads us to identify the bargaining situations for cocoa producers in Cameroon shown in Table 3.

Table 3: Bargaining situations of cocoa producers in Cameroon (individual sales)

Price setting rules	Take it or leave it	Negotiable
Distribution of the information		
Asymmetric information (informed party = the buyer)	S0. Individual sales with buyer credit at the start of the school year	S1. Individual sales at the start of the school year (without buyer credit)
Incomplete information on both sides	S2. Individual sales with buyer credit at times other than the start of the school year	S3. Individual sales at times other than the start of the school year (without buyer credit)

According to the different bargaining situations, the price is set at a different level within the interval between the two reserve prices. In situation S0, the price will theoretically be set at the level of the producer's reserve price (the buyer seizes the entire surplus). The share of surplus obtained by the producer (i.e. the weight of the buyer's reserve price in the price-setting process) increases as we shift towards S1 or S2 and the largest share is obtained in situation S3. Hence, if it is not the start of the school year (situations S2 and S3), the buyer is poorly informed about the producer's reserve price and level of impatience, a situation which may lead the buyer to pay a higher price. This enables us to formulate the following hypotheses about the determinants of the prices received by the producers:

H1: In situation S0 (producers are bound to the buyer by credit and the start of the school year), only the producer's reserve price influences the price (the buyer's reserve price has no effect on the price).

H2: The price received by the producers is higher in bargaining situations S1 and S2 than in situation S0. It is even higher in situation S3.

As the price received by the producer depends on both the bargaining situation and the producer's and the buyer's reserve prices (PRP and BRP), we need information about the reserve prices in order to test our hypotheses. This is difficult in empirical studies as the reserve prices involve not only the real costs to which the agents are subjected but also opportunity costs. We must therefore look for some proxies for the reserve prices.

The producer's reserve price (PRP) represents the threshold price below which it is preferable for the producer not to make the transaction. The PRP therefore depends on i) the costs paid

by the producer (if the price is lower than the average cost, the producer loses money), ii) the price he hopes to obtain from other agents, and iii) the consequences with which he will be confronted if he does not succeed in selling his product quickly to another agent.

The costs borne by the producers include production costs,⁸ transport costs and transaction costs. Production costs are generally lower in the Southwest than in the Centre. Indeed, the Southwest is much more favorable to cocoa production from an agro-climatic point of view. Moreover, the farms in the Southwest are larger (on average three times larger) and production is more intensive (with an average yield of 900–1,000 kg/ha compared to 300–450 kg/ha in the Centre) (Gilbert et al., 1999).⁹ The transport costs of cocoa can be estimated by the distance between the producer's home and the point of sale (even if they are also affected by other parameters such as the condition of the roads and the means of transport available to the producer). This distance also gives us an idea of the transaction costs borne by the producers (costs involved in travelling to the point of sale, including the opportunity cost of time).¹⁰ Transaction costs may also include the losses resulting from manipulative tactics used by the buyers in evaluating the level of humidity of the cocoa.¹¹ Finally, because of economies of scale, transaction costs also depend on the quantities sold.

The price that the producer hopes to obtain from other agents depends on the information available to him about international prices and the extent to which he can capitalize on the competition between buyers. In the cocoa market in Cameroon, not all producers have the same level of information about prices. Depending on what is available to him, the producer can obtain information via the Market Information System¹² introduced by the ONCC (National Coffee and Cocoa Board), which requires the availability of a mobile phone. The producer can also obtain information from the media (radio, TV and press), from the POs, his neighbors or even the buyer. The level of competition depends on the binding practices between the producers and the buyers and on the number of buyers present in the zone. The producer can be bound to a buyer if the buyer grants him credit in the form of cash or inputs ('interlinked transactions'). Gockowski's (2008) study on the impact of credit on cocoa marketing in Cameroon shows that producers who receive credit from the buyer obtain prices lower than those received by other producers. If the producer is not bound by credit, the possibility of capitalizing on competition depends primarily on the number of buyers in the zone.

⁸ Since the cocoa farmer price is also guided by the international cocoa market, when the international price is too low, the cocoa farmer's price could be below his production cost, in which case the reserve price depends only on the transaction costs.

⁹ Although the Southwest is a smaller area than the Centre and has three times fewer producers, it nevertheless produces more cocoa.

¹⁰ The point of sale depends to a large extent on the marketing channel adopted: the producer's house (if selling to a *coxeur*), the cocoa purchasing centres located in the local administrative capitals (if selling to an approved buyer), or the PO store.

¹¹ The buyer measures the level of humidity as this gives an idea of the weight lost by the cocoa during the drying process. According to official standards, the normal level of humidity is 8%. For every additional one percent in the level of humidity, the buyer deducts one kg of cocoa per 75-kg sack: this is the discount. Only the approved buyers have hygrometers: the *coxeurs* estimate the level of humidity in a more subjective manner by breaking open the beans.

¹² This information system involves sending the SMS 'cocoa' using a local mobile phone and receiving the CIF (cost, insurance and freight) and FOB (free on board) prices in effect on that particular day. This price is communicated via an ONCC server. However, this system is not well known among producers.

The consequences of the producer's failure to sell his produce quickly depend primarily on the his financial needs. These in turn depend on the level and degree of his income diversification and sometimes also on the occurrence of seasonal expenditure for agricultural activities or family consumption (such as the start of the school year).

As regards the buyer, his reserve price (BRP) represents the price below which it is preferable for the buyer not to make the transaction. The BRP therefore depends on i) the buyer's resale price, ii) the transport and transaction costs borne by the buyer, iii) the price and quantities that he hopes to obtain with other agents (a price which in turn depends on the seasonality and number of buyers present in the zone), and iv) the potential damage to his reputation if he does not succeed in satisfying his clients' demands.

The buyer's resale price depends on the international price converted into CFA francs and the number of intermediaries separating him from the exporter, as approved buyers are closer than the *coxeurs* to the exporters.¹³ The transport costs are linked to the distance between the place of purchase and the place of delivery of the cocoa (the port of Douala), as well as the condition of the roads.

The transaction costs borne by the buyers depend primarily on the volumes sold by the producers (economies of scale), the formal and informal taxes to which they are liable and the costs of the services required in order to store the producers' supply. Consequently, in the Centre region in particular, the *coxeurs* are sometimes the target of 'rackets' by the authorities (in principle, only approved buyers are authorized to buy cocoa). In the Southwest, the *coxeurs* sometimes come together as a CIG (Common Initiative Group), and this is liable to formal taxes.¹⁴ The cost of credit agreed in order to reserve the supply, such as credit granted to farmers during production to guarantee the purchasing contract, must also be taken into account. For the *coxeurs*, we must also take into account the costs of the services they provide to the producers during the cocoa marketing campaigns or at other times. For example, they act as intermediaries for the purchase of inputs, food products from town (rice, soap, smoked fish, etc.) and sometimes building materials.

The price and quantity that a buyer hopes to obtain from other producers depends primarily on the number of rival buyers present in the zone, the possible presence of POs in the zone and the seasonal nature of production (during the main harvest period, the buyers are willing to pay more as the cocoa is of a better quality and the competition is intensified by the presence of numerous buyers).

4. Data

The data used to test our hypotheses were obtained from a study done by the IITA in 2006. This study examined two regions (the Centre and the Southwest), which account for the vast majority (85%) of cocoa production in Cameroon. The data were collected using a single

¹³ The resale price is generally known to the buyers when they negotiate with the producers. The buyers benefit from weekly, monthly or quarterly forward contracts agreed with their customers.

¹⁴ Normally, CIGs do not have to pay taxes in Cameroon when they sell their members' products. But the CIGs in the Southwest function differently: they are Buyers' CIGs which have few registered members and are managed only by the leaders, who buy cocoa from the farmers at a lower price, and sell to the LBA (Licensed Buying Agency) without sharing the benefits with other members. This is why they pay taxes.

questionnaire taken from the baseline survey of the STCP (Sustainable Tree Crop Program) project. The survey recorded the sociological, economic and agronomic characteristics of perennial crop producers. We incorporated a new section into the questionnaire to deal with cocoa marketing. The surveys were conducted during the period February–April 2006. We joined the teams in the field and supervised the implementation of the surveys directly. As a census of the cocoa producers was not available, we adopted the following sampling method. We visited almost all the villages in the 12 Divisions of the Centre (8) and Southwest (4) regions. The district chiefs, the local delegates and some PO directors helped us to meet the cocoa producers.

In total, we interviewed 689 cocoa producers and obtained detailed information about 1,854 transactions. Of the 689 producers interviewed, most were men (92%). More than 40% of the producers interviewed were over the age of 50, indicating an aging population of cocoa producers (a fact which has some consequences for the level of production and the dynamics of the marketing strategies). Furthermore, more than 60% of the producers have a level of education below secondary school (Table 4).

Table 4: Socioeconomic characteristics of the producers interviewed (n=689)

Sex of the producer		Level of education		Age	
Female	8 %			0–20	3%
Male	92 %	No schooling	7%	21–35	20%
		Primary	53%	36–50	33%
		Secondary	36%	51–65	30%
		Higher	4%	>65	14%

Source: IITA Survey (2006)

Table 5 shows the distribution of the 1,854 transactions according to the bargaining situation and the regions. As the table shows, most transactions in our database concern the Centre region. This distribution is in keeping with the number of producers and the production areas (which are higher and larger in the Centre) but not the volumes (which are larger in the Southwest).

Table 5: Distribution of transactions, median prices and mean prices per type, bargaining situation and province

Type of sales	Bargaining situation	Southwest Region			Centre Region			Total		
		Trans- actions	Median Prices	Mean Prices	Trans- actions	Median Prices	Mean Prices	Trans- actions	Median Prices	Mean Prices

Individual sales	S0 (individual sales at the start of the school year with buyer credit)	294	500	521	82	525	529	376	500	523
	S1 (individual sales at the start of the school year without buyer credit)	13	550	554	191	500	521	204	500	523
	S2 (individual sales at times other than the start of the school year with buyer credit)	690	528	528	158	500	521	848	525	527
	S3 (individual sales at times other than the start of the school year without buyer credit)	31	600	566	395	525	538	426	540	540
	Total	1,028	526	528	826	525	530	1,854	525	529

Source: IITA Survey (2006)

The main variables for which data were collected (or constructed using the data collected) enable us to characterize the bargaining situation (NEG), the producer's reserve price (PRP), and the buyer's reserve price (BRP). These variables are summarized in Table 6. We also introduced some control variables. These refer to the age and level of education of the producers. Gender was not incorporated into the analysis given the very low percentage of women in the sample. It is important to note that the expected effect of age is unclear: older producers are more experienced but are also often more risk averse.

Table 6: The variables used in the model

Variables	Description of the variable	Unit	Category	Expected effect
Pp	Price received by the producer	CFA francs/ kg	Dependent variable	
S3	Bargaining situation during periods other than the start of the school year in which the producer has not received a supplier credit	Binary	NEG	+
S2	Bargaining situation during periods other than the start of the school year in which the producer has received a supplier credit	Binary	NEG	+
S1	Bargaining situation at the start of the school	Binary	NEG	+

	year in which the producer has not received a supplier credit			
S0	Bargaining situation at the start of the school year in which the producer has received a supplier credit	Binary	NEG	0 (reference situation)
RevProd	Producer's total income	10,000 CFA francs/ year	PRP	+
IndDivers	Index of the producer's income diversification (the smaller the index, the more the producer is diversified)	between 0 and 1	PRP	+
DistProd	Distance from the house to the point of sale	km	PRP	+
NbTransac	Number of transactions per producer during the campaign		PRP	+
Refact	Discount for excessive humidity of cocoa	Converted into CFA francs/ kg	PRP	indeterminate
InfoP	Information about the CIF price (international market price) ^a	=1 if producer informed	PRP	+
PCaf	Delayed CIF price (previous fortnight)	CFA francs/ kg	BRP	+
DistBuyer	Number of km between the point of sale and the port of Douala	km	BRP	-
DistBuyer2_	Number of non-tarmac km between the point of sale and the port of Douala	km	BRP	-
TypeBuyer	Type of buyer: approved buyer or <i>coxeur</i>	1= if app. buyer	BRP	+
QTransac	Quantity per transaction	kg	PRP; BRP	+
HarvestSeason	Season of abundance	1= if yes	PRP; BRP	indeterminate
QTot	Producer's production	kg	PRP; BRP	+
NbBuyers	Number of approved buyers in the village		PRP; BRP	+
Age	Farmer age		PRP	indeterminate
Educ	Famer education level	1=if farmer has been in school	PRP	+
Zone	Production region	1= if Centre	PO effect	+

^a CIF = cost, insurance and freight

5. Protocol for testing the hypotheses

Our hypotheses can be tested by regressing the price received by the producer (P_P) on the variables shown in Table 6. (Descriptive statistics of these variables are in Tables A1 and A2 in the Appendix.)

According to hypothesis H1, for transactions carried out at the start of the school year by a producer who has received a credit from the buyer, the price should be set at the level of the producer's reserve price (the entire surplus generated by the trade being seized by the buyer).

This implies that all variables linked exclusively to the buyer's reserve price should have no effect on the price. Conversely, at least some of the variables linked to the producer's reserve price should have a significant (positive) effect on the price received by the producers. This can be tested by taking the sample of the 376 transactions corresponding to bargaining situation S0 (Table 5) and by performing the following regression (Table 7):

$$\begin{aligned}
 P_p = & \beta_0 + \beta_1 \text{RevProd} + \beta_2 \text{IndDivers} + \beta_3 \text{DistProd} + \beta_4 \text{NbTransac} + \beta_5 \text{Re fact} \\
 & + \beta_6 \text{InfoP} + \beta_7 \text{PCaf} + \beta_8 \text{DistBuyer} + \beta_9 \text{DistBuyer2} + \beta_{10} \text{TypeBuyer} + \beta_{11} \text{Qtransac} \\
 & + \beta_{12} \text{HarvestSeason} + \beta_{13} \text{QTot} + \beta_{14} \text{nbBuyers} + \beta_{15} \text{Zone} + \beta_{16} \text{Age} + \beta_{17} \text{Educ} + \varepsilon
 \end{aligned} \quad (1)$$

We consider that H1 is confirmed if $\beta_7, \beta_8, \beta_9$, and β_{10} are not significantly different from zero and if the coefficients $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are all positive or zero, with at least one of them being strictly positive.

Hypothesis H2 stipulates that, in the case of individual sales, the price received by the producers should be higher in bargaining situation S1 or S2 than in situation S0 and that it should even be higher in situation S3. The theory does not, however, allow a distinction to be made between situations S1 and S2. We therefore decided to place situations S1 and S2 in a single category called S12. To test hypothesis H2, we take the sample of transactions corresponding to all individual sales for both provinces and the four bargaining situations (Table 5) and perform the following regression:¹⁵

$$\begin{aligned}
 P_p = & \beta_0 + \beta_1 \text{RevProd} + \beta_2 \text{IndDivers} + \beta_3 \text{DistProd} + \beta_4 \text{NbTransac} + \beta_5 \text{Re fact} \\
 & + \beta_6 \text{InfoP} + \beta_7 \text{PCaf} + \beta_8 \text{DistBuyer} + \beta_9 \text{DistBuyer2} + \beta_{10} \text{TypeBuyer} + \beta_{11} \text{Qtransac} \\
 & + \beta_{12} \text{HarvestSeason} + \beta_{13} \text{QTot} + \beta_{14} \text{nbBuyers} + \beta_{15} \text{Zone} + \beta_{16} \text{S12} + \beta_{17} \text{S3} + \beta_{18} \text{Age} + \beta_{19} \text{Educ} + \varepsilon
 \end{aligned} \quad (2)$$

We consider that H2 is confirmed if $\beta_{17} > \beta_{16} > 0$.

¹⁵ Variables S1, S2, and S3 are indeed exogenous: the producers are subjected to the bargaining situation rather than selecting it. Indeed, they do not *choose* to sell at the start of the school year or to receive a credit from the buyer: they do so because they have no alternative.

Table 7: Result of regression (1): test for hypothesis H1

Independent variable	Price
RevProd	0.071 (1.04)
IndDivers	-4.039 (0.32)
DistProd	0.193 (2.19)**
NbTransac	5.939 (3.64)***
Refact	0.398 (2.04)**
QTransac	0.000 (0.04)
NbBuyer	7.401 (3.09)***
QTot	0.000 (0.03)
InfoP	2.592 (0.43)
DistBuyer	-0.117 (1.32)
DistBuyer2	-0.164 (1.40)
PCaf	-0.182 (1.63)
TypeBuyer	-0.550 (0.08)
Age	-0.221 (0.99)
Educ	0.597 (0.05)
Zone	12.621 (0.76)
Constant	668.798 (7.13)***
Observations	376
R-squared	0.26

Robust t-statistics in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Result of regression (2): test for hypothesis H2

Independent variable	Price
S3	21.270 (4.07)***
S1.2	6.181 (1.60)
RevProd	0.095 (2.93)***
IndDivers	8.149 (1.67)*
DistProd	0.108 (1.65)*
NbTransac	2.730 (3.56)***
Refact	0.047 (0.58)

QTransac	-0.001 (1.52)
NbBuyer	4.857 (6.22)***
HarvestSeason	5.442 (1.60)
QTot	0.001 (3.13)***
InfoP	-4.648 (1.60)
DistBuyer	-0.192 (4.11)***
DistBuyer2	-0.125 (2.12)**
PCaf	-0.046 (1.02)
TypeBuyer	10.490 (3.01)***
Age	-0.395 (3.91)***
Educ	0.152 (0.03)
Zone	15.967 (1.80)*
Constant	589.575 (15.14)***
Observations	1854
R-squared	0.19

Robust t-statistics in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

6. Results and discussion

The results of the regressions are presented in Tables 7 and 8. Using the ‘robust’ option of the Stata software, the t-Student statistics are corrected for the heteroskedasticity of the residuals, using White’s method. Robustness is tested. The coefficient R^2 is relatively low, which is not surprising given the type of data used (a cross-section of primary data). With regard to the effect of the bargaining status on the price received by the producers (hypotheses H1 and H2), the results are as follows.

Hypothesis H1 is confirmed by the analyses of the 376 transactions corresponding to situation S0 (transactions undertaken at the start of the school year by a producer who has received a credit from the buyer). None of the coefficients (β_7 , β_8 , β_9 , and β_{10}) of the four proxies representing the buyer’s reserve price (PCaf, DistBuyer, DistBuyer2 and TypeBuyer) has a significant effect on the price (see Table 8). However, three of the six proxies for the producer’s reserve price are significantly positive (β_3 , β_4 , and β_5).

Hypothesis H2 is only partly confirmed by the analysis. The regression performed on the 1,854 transactions corresponding to individual sales shows that the most favorable bargaining situation (S3) does indeed have a beneficial effect on the price received by the producers (β_{17} is significantly positive). However, the intermediary bargaining situations (S1 and S2) do not enable the producers to obtain a higher price than the reference situation (S0).

These results confirm the role of the bargaining situation with regard to the price received by the producers. If the price is non-negotiable and the price-maker (buyer) is well informed

about the producer's reserve price, the price is set at the level of the producer's reserve price (the buyer seizes the entire surplus generated by the trade). This theoretical result (hypothesis H1) is confirmed by the empirical analysis. When moving from this situation which is unfavorable to the producer to a more favorable situation (i.e. if the price becomes negotiable or if the buyer is no longer informed about the producer's reserve price), the situation does not really improve at the intermediate level (i.e. when the price is non-negotiable and the buyer is not informed or when the price is negotiable and the buyer is informed). To obtain a significant improvement in the price received by the producer, the distribution of information must become more equitable and the price must be made negotiable.

7. Conclusion

We have shown that the bargaining situation has a significant effect on the prices received by cocoa producers in Cameroon. When the bargaining situation is most unfavorable (because the interlinked prices are non-negotiable and there is asymmetric information in favor of the traders), the traders seize the entire surplus generated by the trade. To improve the price received by the producers, the price must be made negotiable while at the same time making information less asymmetric. For the cocoa market in Cameroon, this means enabling producers to receive more efficient credit (i.e. with the lowest interest rate) and so they can refuse the credit provided by cocoa buyers (which binds them to the buyer and makes it impossible for them to arbitrate or negotiate the price), so they will be able to wait and sell their produce at times other than the start of the school year.

The main implications for action are as follows. The way to increase the prices received by the Cameroonian cocoa producers is to improve their bargaining situation by providing a more balanced distribution of information between the producers and the traders, combined with negotiable prices. This could be done by promoting an efficient market information system. The current system (managed by the ONCC) only provides information about the FOB (free on board) price and not about the upcountry prices paid in the domestic market. A reduction in information asymmetry could also be achieved by introducing a producer support policy at the start of the school year (for example the distribution of vouchers). This would enable producers to avoid selling during this period of the year when the traders are aware of their financial needs. To improve the price setting rules, it would prove beneficial to introduce a credit program (possibly via micro-finance institutions) or a complementary health insurance. Backed by this more efficient credit, cocoa producers would be able to negotiate the price and capitalize on the competition between buyers.

Another option would be to promote the development of collective marketing by POs. Further research is needed here, but we can assume that this strategy is complementary to the previous one based on improving the bargaining power of individual producers. Indeed, the reason for producers making limited use of POs to sell their produce (although this would enable them to obtain a better price) could be linked to the question of credit. We can assume that producers in urgent need of money cannot sell via a PO because they need access to credit (which is only available through private buyers) or because they cannot wait until the market day organized by the PO to sell their cocoa. A system of credit accessible to the producers (or the implementation of credit systems by the POs) could increase the share of supply obtained by the POs and at the same time the bargaining power of the producers who sell individually.

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Appendix

Table A1: Descriptive statistics for the sample of individual transactions undertaken in bargaining situation S0 (sample used to test H1) (376 observations)

Variable	Mean	Std dev.	Min.	Max.
Price	523.07	60.64	350	700
RevProd	69.98	49.53	7.5	235
IndDivers	0.6476781	0.26	0	1
DistProd	4.87	17.93	0	182
NbTransac	4.09	2.04	1	12
Refact	17.31	14.57	0	66.66
QTransac	711.72	2212.07	5	34000
NbBuyer	2.25	1.55	1	5
QTot	2724.48	7025.35	40	102000
InfoP	0.32	0.467	0	1
DistBuyer	262.65	72.08	115	378
DistBuyer2	79.33	69.28	0	223
PCaf	807.65	25.70	780.38	842.32
TypeBuyer	0.46	0.48	0	1
Age	47.53	14.20	18	110
Educ	0.89	0.30	0	1
Zone	0.21	0.41	0	1

Table A2: Descriptive statistics for the sample of individual transactions undertaken in the Centre region (1,854 observations)

Variable	Mean	Std dev.	Min.	Max.
Price	528.50	62.77	300	700
S3	0.23	0.42	0	1
S1.2	0.57	0.50	0	1
RevProd	62.72	46.51	7.5	300
IndDivers	0.63	0.28	0	2.08
DistProd	2.77	11.61	0	182
NbTransac	3.77	2.03	1	12
Refact	16.97	16.52	0	86.75

QTransac	5.37	1.14	1.61	11.13
NbBuyer	2.70	2.17	1	10
HarvestSeason	0.52	0.50	0	1
QTot	6.79	1.27	3.69	11.53
InfoP	0.35	0.48	0	1
DistBuyer	286.32	79.86	115	450
DistBuyer2	62.48	65.26	0	223
PCaf	806.65	29.50	766.09	950.81
TypeBuyer	0.37	0.47	0	1
Age	48.53	14.75	16	110
Educ	0.91	0.29	0	1
Zone	0.45	0.50	0	1