Effects of Collective Marketing by Farmers' Organizations on Cocoa Farmer's Price in Cameroon

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Abstract

This study aims to evaluate the effects of collective marketing by farmers' organizations (FOs) on cocoa farmer's price in Cameroon. This is done through the quasi-experimental method, which uses the techniques of "Propensity Score Matching". The data used comes from the 2006 International Institute of Tropical Agriculture (IITA) cocoa baseline survey conducted between March 15 and April 15, 2006 and involved 601 cocoa farmers from the Centre region of Cameroon during the 2005/2006 season. The results show that collective marketing has a positive and statistically significant effect on the net price received by farmers. This effect is estimated at 334 FCFA per kilogramme of cocoa sold collectively; that means a 6% increase on the individual sale price. The main recommendation is to promote the development of FOs and collective marketing within them. The development of FOs requires a government policy to support their creation, and by extension, the effects of collective sales. The development of collective marketing can be done through the creation of credit systems by FOs to attract farmers who sell to individual buyers under the constraint of credit received. This would significantly increase the share of supply captured by FOs.

Key words: *Collective marketing, farmers' organizations, farmer's price, cocoa*

1. Introduction

Context and problem statement

Smallholders' access to the market is a permanent concern for development actors in developing countries. Indeed, various studies prove that the smallholder remains poorly connected to the agricultural market (Key et al., 2000; Gabre-Madhin, 2001; Gabre-Madhin, 2009). One of the solutions to improving access to involves promoting collective marketing through farmers' organizations (FOs). However, it is noted that very few studies have so far been carried out on the importance of FOs in the collective marketing of members' products in developing countries.

To accompany market liberalization, the Cameroonian state gradually set up the legal framework necessary for the creation and operation of FOs. Initially, it was the law No.92/006 of 14 August 1992, relating to cooperative organizations and Common Initiatives Groups (CIGs). This law improved the cooperative law of 1973, which envisaged strong intervention of the state within cooperatives. Then it was the decree of Prime Minister No. 92/455/PM on 23 November 1992, laying down the modalities of the application of law No. 92/006. Finally, the decree of Prime Minister No. 2006/0762/PM of 9 June 2006, modifying and supplementing some provisions of the decree of law No. 92. Thus, cooperatives, CIGs and their unions are structures formalized in the framework of law No. 92. They are autonomous private bodies belonging to their members who shall manage, fund and control them. Their activities shall be carried out without state intervention, subject to the provisions of this law and its implementation decree, or to agreements freely entered into and that may be freely denounced. Section 2 of law No. 92 states that persons shall be free to set up a cooperative society or a CIG. This shall be a right enjoyed by citizens who have attained legal majority or who have been granted waivers in accordance with the laws in force. These organizations are created to solve their members' socio-economic problems. Membership within these bodies shall be governed by provisions of the articles of association and shall not be based on ethnic or tribal backgrounds, political or trade union affiliations, or religion or philosophical convictions. Liberalization has also been accompanied by the redefinition of the missions of support structures for farmers.

With regard to the cocoa chain, liberalization began in 1991 with the dissolution of the Office National de Commercialization des Produits de Base (ONCPB) on 28 January 1991, and the creation of the Office National du Cacao et du Café (ONCC) concomitantly with the Conseil Interprofessionnel du Café et du Cacao (CICC) on 12 July 1991. One of the objectives of liberalization was to "professionalize" the operators of the cocoa

chain. On the one hand, traders should organize themselves to be able to negotiate for contracts with importers, to negotiate financing means with banks, and ensure the marketing of products in strict compliance with international rules. On the other hand, producers should organize themselves to ensure efficient negotiations with traders through grouped sales, control the quality of their products and supply themselves with inputs by open market offers. Within this framework, the ONCC and the CICC had the role of guaranteeing the environment of this "professionalization" of actors. In parallel, the Société de Développement du Cacao (SODECAO) and the Programme Semencier Cacao Café (PSCC) were withdrawn gradually from the direct functions they exerted in support of the cocoa chain and their duties (commercial, drying, storage, treatment, research/development, technical vulgarization/ technical advise) transferred to farmers' organizations. Their activities were reduced to only minimum production of planting material since the capacities to produce were not exploited, and supply always remained much lower than demand.

Beyond this institutional framework, FOs plan to create a unique dialogue framework at the national level for all products. Because of the non-existence of an organization that brings together all FOs in Cameroon, it is difficult to obtain statistics on these organizations at a national level (for FOs that have them). Nevertheless, one can count about 6,400 FOs that could be gathered at a national level under three different structures, which are fighting for leadership: i) Conseil des Fédérations Paysannes du Cameroun (CFPC), ii) Confédération Nationale des Organisations Paysannes du Cameroun (CNOP-Cam), and iii) Conseil National des Organisations Paysannes des petits producteurs du Cameroun (CONOPROCAM). This high number of FOs is due to the fact that some of these organizations are created by the elites so that farmers from their areas benefit from possible subsidies from NGOs or the state. The grouping of FOs in national structures is not always achieved.

We can distinguish two categories of FOs at the basic level: CIGs and cooperatives. In the cocoa sector, FOs primarily survive thanks to development projects such as the Sustainable Tree Crop Program (STCP) based at the International Institute of Tropical Agriculture (IITA). In the Southwest region, former cooperatives (such as the Southwest Farmer Cooperative Union based in Kumba) have been passed over to cocoa buyers (who are often producers). Even if they sometimes seem to be FOs, these CIGs and "purchasers' cooperatives", pre-financed by official partners or exporters, are in fact purchasing centres acting on behalf of the buyers. In the absence of projects to support producers' initiatives, no FO has been able to emerge in the Southwest region.

The existence of FOs in the Centre region of Cameroon can be explained as an attempt to fill the gap left by the state in supplying farmers with inputs and marketing operations. But, according to Folefack and Gockowski (2004), only 40% of cocoa farmers in the Centre region effectively take part in collective sales organized by FOs. One, therefore, questions why, despite the existence of FOs, some cocoa farmers opt for collective marketing while others do not. This raises the following main question, which justifies our study: what are the effects of collective marketing through FOs on cocoa farmer's price in Cameroon? This question refers to the control of functional and operational costs of the cocoa market in Cameroon through collective sales by FOs. Many studies that highlight the effects of collective marketing on farmers are generally biased (Bernard

et al., 2008b). The impact analysis, which arouses the interest of many economists, has an important methodology debate. The particularity of this study is to try to isolate this bias by comparing cocoa farmers in Cameroon who sell collectively (treatment group) with those who sell individually (control group) in the Centre region, who have some common characteristics.

Objectives of the study

In this study, we seek to highlight the effects of collective marketing by FOs on the price received by the cocoa farmers of Centre region in Cameroon through the non-experimental method of impact evaluation which uses "Propensity Score Matching" techniques. To the best of our knowledge, few empirical studies have so far analyzed the impact of rural organizations on farmers' marketing.

2. Literature review of FOs and cocoa marketing in Cameroon

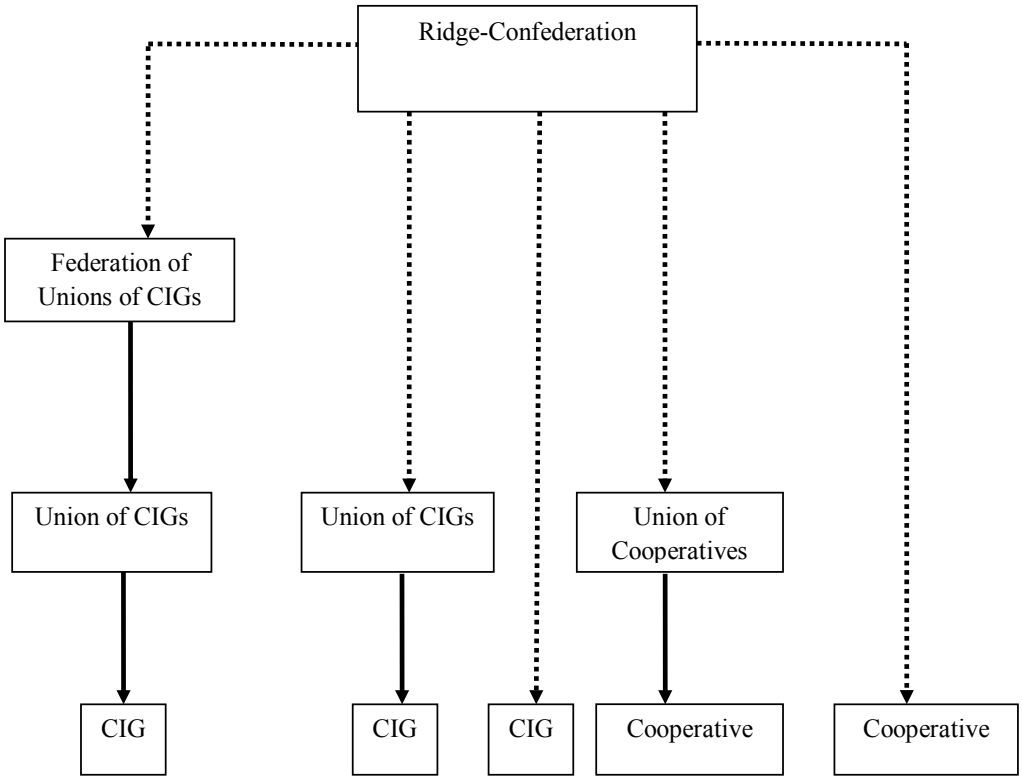
This literature review is presented in three points: first, the general overview of the structure of cocoa farmers' organizations in Cameroon; secondly, the empirical evidence of the impact of farmers' organizations; and thirdly, the overview of the organization of cocoa marketing in Cameroon.

Structure of cocoa farmers' organization in Cameroon

The structure of FOs is more pyramidal, with CIGs and cooperatives at the basic level. CIGs and cooperatives can be grouped into unions of CIGs or cooperatives, respectively. Then, federations are groups of unions of CIGs. At the top, there is a confederation ridge, which is linked to federations of unions of CIGs, unions of CIGs, unions of cooperatives, CIGs and cooperatives (Figure 1).

The differences between collective and individual sales are particularly relevant for seven variables. These are: price (higher for collective sale), sold quantity per transaction (higher for collective sale), total quantity sold (higher for collective sale), distance to sale point (higher for collective sale), speed of payment (fastest for individual sale), membership fees (only for collective sale) and quality (relatively good for collective sale compared to individual sale). Moreover, collective and individual sales have similarities only on three variables. These are: credit received by farmers, inputs supply by buyer and training received. The price difference between collective and individual sales is the main target in this work. Thus, the other variables that differ between individual and collective sales may constitute explanation channels of price difference. The price used in the analysis has been corrected for quality. This quality differs in general between individual and collective sales. Quality concerns mainly humidity levels. The buyer measures the level of humidity as this gives an idea of the weight the cocoa loses during the drying process. According to official standards, the normal level of humidity is 8%. For every additional 1% in humidity, the buyer deducts one kilogramme of cocoa per 75 kg bag – this is the discount. Only legal (approved) buyers have hygrometers; the coxeurs (main buyers for individual sales) estimate the level of humidity in a more subjective manner by breaking open the beans. Legal (approved) buyers are stricter in quality than private buyers. This explains the difference in quality between collective and individual sales (better quality for collective sales compared to individual sales).

Figure 1: Structure of cocoa farmers' organizations in Cameroon



Source: Constructed by authors
Note: _____ Dependency link; - - - - - - - Possible dependency link

In cocoa marketing in Cameroon, individual and collective sales have similarities and differences on a number of variables (Table 1).

Table 1: Differences between collective and individual marketing

Characteristics	Individual sales	Collective sales
Price	529	592
Credit received	Yes	Yes
Input supplied	Yes	Yes
Quantity per transaction	224.4 kg	272.06 kg
Total quantity	515.8 kg	642.7 kg
Distance	0.34 km	0.665 km
Speed of payment	Immediately	2 days
Membership fees	No	Yes
Training received	Yes	Yes
Quality	Poor	Good

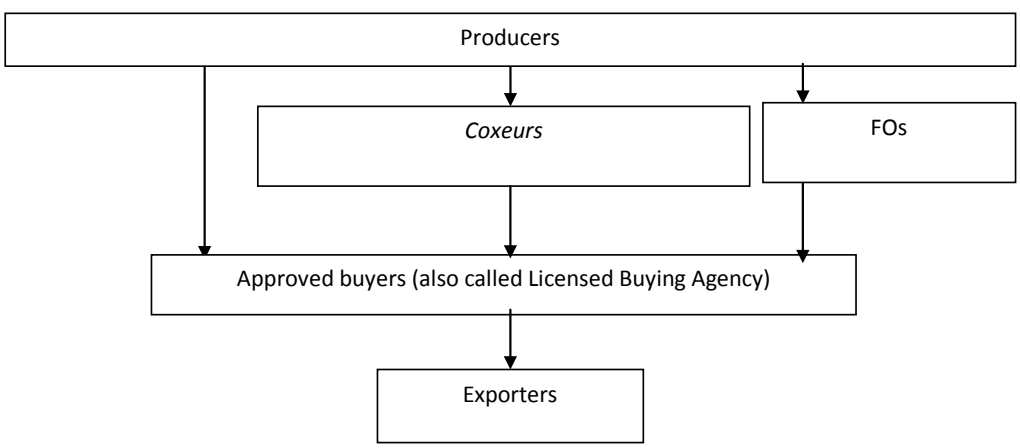
Empirical evidence of the impact of farmers' organizations

The impact analysis of farmers' organizations is relatively new. Thus, a certain number of studies have been carried out on the importance of FOs in marketing their members' products (Gadzikwa et al., 2006; Hellin et al., 2009; Devaux et al., 2009; Kruijssen et al., 2009; Catacutan et al., 2009; Gian and Ruerd., 2007; Barham and Chitemi, 2009). However, very few studies use the impact methods analysis (randomized evaluations, matching methods, specifically Propensity Score Matching, double-difference methods, instrumental variable methods, regression discontinuity design and pipeline methods, distributional impacts and structural approaches) to highlight the existence of bias in the impact analysis of FOs on marketing. Hence, the studies of Bernard et al. (2008a) use the method of Propensity Score Matching (PSM) to show that the impact of FOs in Ethiopia (credit and infrastructures access to their members) is limited on the one hand by the weak capacity of FOs' management, and on the other hand by the availability of financial resources. In addition, the studies of Bernard et al. (2008b) in Ethiopia, using the same method, show that despite the fact that FOs negotiate better prices for their members, they do not always succeed in increasing the quantity of products marketed. However, the studies of Bernard and Spielmen (2009) in Ethiopia conclude that FOs' actions generate some profits even for non-members.

Organization of cocoa marketing chain in Cameroon

The cocoa marketing chain is organized in a fairly simple way [Figure 2 from Kamdem (2010)]. Thus, according to a study by Kamdem (2010), farmers can either sell to "coxeurs" (who usually come to buy cocoa from farmers), or directly to approved buyers (though this often requires a long trip) or sell through FOs in the Centre region (only because there is really no FO in the other region of production, the Southwest region).

Figure 2: Organization of cocoa marketing chain in Cameroon



Source: Kamdem (2010)

The first channel of marketing (direct sale to approved buyers) is mostly utilized by large farmers. It is not very common in the Centre region, but is very widespread in the Southwest region. The second channel (sale to coxeurs) is very widespread in the Centre as well as Southwest regions. The third channel (sale via FOs) exists only in the Centre region. The approved buyers resell the cocoa bought to exporters. Faced with these multiple channels of marketing, it arises that farmers generally need to choose between selling collectively or selling individually. Faced with this choice, many farmers still choose to sell their cocoa individually. If the principal reason remains the comparison of satisfaction that they draw from the two options, many studies show that, beyond this satisfaction, many other factors influence farmers' choices. Indeed, Bernard et al. (2007) show that the higher the level of education of the farmer and the size of the farm (in hectares), the higher the probability of selling to an FO. In addition, a study by Sinja et al. (2006) on milk farmers in Kenya shows that the probability of their taking part in collective marketing is identical when one considers their sex, age and level of education. Moreover, the results of a study carried out by Gadzikwa et al.(2006) show that the participation in FOs in the province of KwaZulu-Natal in South Africa is positively determined by the growth of net benefit and negatively determined by the growth of household size. Thus, the consideration of various variables suitable for assigning farmer participation in FOs generally reduces the biases of impact evaluation. For this reason, in this study, we deployed the technique of Propensity Score Matching to reduce the possible effect of bias in the results.

The importance of linked credit access on transactions

Braverman and Stiglitz (1981) try to answer the question of transaction links by showing that existing contracts in a context of moral hazard behaviour enable one to identify potentially credible debtors. In situations of transactions on credit with other markets, the borrower provides the maximum effort to repay a debt. So when the number of borrowers is high, the interest rate is close to the interest rate offered in a competitive market. Empirically, Artle & Berglund (1959) and Baligh & Richartz (1967) focused on the impact of vertical integration within a single marketing channel. Some authors such as Jeuland & Shugan (1983), McGuire & Richard (1983) and Zusman & Etgar (1981) are interested in the contracts between members of a marketing channel. Thus, Jeuland & Shugan (1983) showed, in their studies, that the relationship between members of a channel is not natural, but they are influenced by incentives. For the cocoa sector in Cameroon, the producer can be bound to a buyer if the latter grants him or her credit in the form of cash or inputs ("bound transactions"). Gockowski's (2008) study on the impact of credit on cocoa marketing in Cameroon shows that producers who receive credit from a buyer obtain prices that are significantly lower than 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. The question of credit-linked transactions in the Cameroon cocoa sector happened only between individual farmers and individual buyers since FOs did not provide credit to their members.

3. Methodology

The methodology adopted in this study can be presented in five categories. The first category discusses the principle and stakes of the impact evaluation method. The second is based on the justification of the choice of method. The third presents the framework of modelling the Propensity Score Matching method. The fourth category relates to the estimation method, and the fifth presents the sampling strategy.

Principle and stakes of impact evaluation

The impact evaluation method presents empirical difficulties. Indeed, the alternative situation to the design (the counterfactual) is difficult to define (Heckman et al., 1997). This can be explained by the fact that individuals in the control group can also participate in other equivalent programmes as those provided by the studied design. This difficulty reinforces the necessity to better understand the mechanism of design. Moreover, the control group is built with the objective that, on average, non-participants have identical characteristics as those of the participants. But it also presents heterogeneous elements unobserved by the evaluator which can have an influence on their probability of participating in the evaluated programme. This is the problem of selectivity bias. It makes the identification and correction of selection mechanisms in the design participation necessary, since one could produce bias estimations of participation effects to the programme by directly comparing the situations of the two groups (participants and non-participants) if one does not consider this selectivity bias. To avoid these difficulties, the method of Propensity Score Matching, which is one of the impact evaluation methods, is used.

Justification of method

The impact evaluation can be done through three methods: experimental or randomized method, quasi-experimental method, and non-experimental method. Experimental method consists of setting up, in a random way, two groups of the studied population: one without the programme and other with the programme. Thus the impact is measured by comparing the results of the two groups. The experimental method is regarded as more robust, but its implementation is very difficult or impossible[2]. Therefore, one generally uses the quasi-experimental method. This method (quasi-experimental) consists of building a group of control resembling as much as possible the treated group (in

terms of characteristics observed). The construction of the control group can be done through four different techniques: pairing (matching) or the Propensity Score Matching, exploitation of longitudinal data (diff-in-diff), the model of selection and method with instrumental variables.

In this study, we used the Propensity Score Matching (PSM) technique to build the control group. The importance of this method is to avoid modelling the selection process on a design based on too heavy assumptions. PSM is also chosen because it makes it possible to remove bias due to observable individual characteristics. We use the PSM techniques to identify the effects of collective marketing on cocoa farmer's price in Cameroon. The methodology will consist of presenting, firstly, the modelling framework, then the analysis method, and finally the sampling strategy.

Modelling framework of Propensity Score Matching

The Propensity Score Matching (PSM) is a refined technique of pairing for economic impact. This technique consists of building a group of statistical comparison founded on the probability of participating in the programme. $P(X) = \Pr(d = 1/X)$.

The technique of PSM, which originally belongs to Rosenbaum and Rubin (1983), enables us solve the problem of dimensionality[3] of direct pairing by showing that, under certain assumptions, pairing on the basis of P (X) is as good as direct pairing on the whole of X.

Method principles

This method assumes that differences between both populations, treated and untreated, come from their individual characteristics and the treatment. If one neutralizes the differences according to the characteristics, then there remains only the effect of the treatment. The participation in the programme is represented by a random variable. For each individual *i*, we have

$$\begin{cases} T_i = 1 : \textit{if individual participates in the programme} \\ T_i = 0 : \textit{if no individual participates in the programme} \end{cases}$$

The effectiveness of the programme is measured by the result variable, Y_i, known as a latent variable:

$$\begin{cases} Y_{Ti} \quad \textit{if individual receives treatment } T = 1 \\ Y_{NTi} \quad \textit{if individual receives treatment } T = 0 \end{cases}$$

These two variables correspond to the potential results of the programme. They are never simultaneously observed for the same individual. For a treated individual, Y_{Ti} is observed while Y_{NTi} is unknown. In this case, the variable Y_{NTi} corresponds to the result, which would have been carried out if the individual had not been treated (counterfactual). For an untreated individual, one instead observes Y_{NTi}, while Y_{Ti} is unknown.

The result variable observed for each individual can thus result from the potential variables and the treatment variable by the following relation:

$$Y_i = T_i Y_{Ti} + (1 + T_i)\, Y_{NTi} \tag{1}$$

where only the couple (Y_i, T_i) is observed for each individual. Thus, the causal effect of treatment is defined for each individual by:

$$\Delta_i = Y_{1i} - Y_{0i} \tag{2}$$

This effect is the difference between what would be the individual's situation if he or she was treated and what it would be if he or she was not. Since the estimation of treatment effect for each individual makes the analysis difficult[4], it is the estimation of two average treatment effects which seems logical:

– The average treatment effect of the global population

$$\Delta^{ATE} = \mathrm{E}(Y_T - Y_{NT}) \tag{3}$$

– The average treatment effect for the population of treated individuals

$$\Delta^{ATT} = E(Y_T - Y_{NT} \mid T = 1) \tag{4}$$

These two effects are equal if the result variables are independent of access variable to the programme. In this case, we have:

$$\Delta^{ATE} = \Delta^{ATT} = E(Y \mid T = 1) - E(Y \mid T = 0) \tag{5}$$

However, in reality, the decision of treatment determines also the result variable. Indeed, in this case, the estimator formed below by the difference of the average of the result variable is affected by selection bias:

$$E(Y|T=1) - E(Y|T=0) = E(Y_T|T=1) - E(Y_{NT}|T=0) = E(Y_T|T=1) - E(Y_{NT}|T=1) + E(Y_{NT}|T=1) - E(Y_{NT}|T=0) = \Delta^{ATT} + B^{ATT} \quad (6)$$

where B^{ATT} is the selection bias. This bias is related to the fact that the average situation of individuals who received the treatment would not have been the same as that of those who did not receive treatment. Thus, since the counterfactual average of individuals treated $E(Y_{NT}|T=1)$ is not observed, one must choose a substitute to estimate the average treatment effect of being treated. That is possible only under these assumptions: the assumption of interdependence, and the assumption of common support.

Propensity Score Matching assumptions

Assumption 1: *Observable selection and conditional independence.*
The matching based on the assumption that all the variables producing selection bias (control variables) are observed (Rosenbaum and Rubin, 1983; Rubin & Thomas, 1996; Imbens, 2004; Dehejia and Wahba, 2002; Smith and Todd, 2005). Given *Xi*, the vector of observed variables, the assumption of selection on observables means that the latent result variables (Y_{NT} ,Y_T) are orthogonal to the conditional participation of characteristics (X). Under this assumption, it is possible to cancel selection bias by comparing individuals with identical observed characteristics.

Assumption 2: *Existence of common support.*
The application of matching techniques is only possible if there exists untreated individuals with characteristics identical to those of treated individuals $0 < P(T=1|X) < 1$. The test of this assumption is based on the estimation of common support zone (Todd, 2007). The assumption of common support means that the probability associated with participation, noted $P(T=1|X) < 1$, is not zero: for any *i*, there exists a positive probability to participate.

Assumption 3: *SUTVA (stable unit value assumption).*
This assumption assumes that the treatment only affects the outcome variable of those who participate. This means that there are no indirect effects from the participants at collective sales to farmers who sell individually (control group).

Estimating method

The principle of estimating method is to use collected information about untreated individuals to build a counterfactual for each treated individual. Thus, the average treatment effect on treatment is:

$$\Delta^{ATT} = E(Y_T - Y_{NT} \mid T = 1) = E(Y - Y \mid T = 1)$$

$$= E[Y - E(Y \mid X, T = 0)\ T = 1]$$

$$= [E(Y_T \mid T = 1, X = x) - E(Y_{NT} \mid X, T = 0, X = x)] \quad (7)$$

The estimator Δ^{ATT} is obtained as the average of all differences between the situation of treated individuals and the built counterfactual.

The problem becomes estimating $E(Y_{NT} \mid X = x_i, T = 0) = f(x_i)$, for each treated individual with characteristics x_i. To reach the result, one must first make pairings on the base of Propensity Score Matching. Then the next step will just be a question of defining the common support and calculating the variations.

Propensity score estimation

Propensity Score Matching is used to select observable characteristics under the assumption of conditional inter-dependence. Hence this estimation is made from probit or logit models of participation in the programme by controlling all the variables X which affect, in the meantime, the "participation" and "result" variables. Indeed, estimators of PSM are less biased when X includes variables that both affect participation in the programme and its result (Heckman et al., 1998). Predicted values (*propensity score:* $P_i = P(T = 1/X)$) are then obtained. These values of propensity score represent the probability distribution for each farmer and for each transaction to participate in the programme, i.e. selling through FOs. This predicted probability of participation is conditional to exogenous characteristics. The interest in estimating this predicted probability to take part in the programme is to make the pairing of individuals having propensity scores that are close; this explains the necessity to build a common support.

Common support determination

After the estimation of the propensity score for all individuals in the sample, one determines the common support to make sure that for each individual who participates

in the programme, one can find at least an individual who did not participate and who has the same propensity score. To build the common support of propensity score, two approaches can be adopted. The initial method of pairing is from Rubin (1977)[5]. Though it looks simple, many critics point out the problems of dimensionality, the nature of process and the unknown properties of its estimators. More details can be found in Crepon (2000)[6]. This method corresponds to the method of pairing of nearest neighbour. The studies of Heckman et al. (1997; 1998) wipe out the limits of the Rubin (1977) method through the method of Kernel and locally weighted regressions. This method consists of generating, for each observation of the group of treatment, an observation which is a weighted average of control group observations (either the unit, or a given interval). These weightings are inversely proportional to the distance between observation *i* (in terms of Pi) and control group observations. The results can be sensitive to the choice of interval and the weighting function. This is the method used in this study.

Estimating of standard error

The standard error estimation is obtained by applying the methods of "bootstrap", which consists of replicating the entire estimation procedure on a random sample, with handing-over in the initial sample and determining the standard error of the entire distribution of estimators obtained. This estimation of standard error considers the fact that the propensity score has been estimated. Hence, each bootstrap must take into consideration not only the pairing on the random sample, but also the estimation of the score.

Estimating FO impact using a "Naïve" approach

After the estimation of the FO impact by Propensity Score Matching method, it will also be necessary to estimate the impact of FOs using a simple approach called "Naïve". This approach consists of making a simple comparison between collective sales and individual sales. The results obtained by this method will then be compared and discussed with those obtained by the method of Propensity Score Matching.

Data

This study aims at evaluating the effect of cocoa collective marketing on cocoa farmer's price in Cameroon. It is based on 601 farmers in the Centre region of Cameroon. These data result from a baseline survey carried out by IITA[7] in 2006. The first step will consist of highlighting the direct effect of collective sales on cocoa farmer's price by comparing collective and individual sales in Centre region. The sampling strategy that we adopted aims at circumventing the various sources of selection bias. Initially, the transactions on collective sales are different from the transactions on individual sales on a certain number of characteristics (which can have effects on cocoa farmer's price) which are linked to the transactions themselves on the one hand and to the farmers on the other hand. Thus, the price differences between individual and collective sales can be completely or partially attributed either to the difference between these transactions,

or to the effect of collective marketing. Then, the source of selection bias can come from certain non-observable characteristics at the regional, farmer or transaction level. At the level of the region, the dynamics of FOs in marketing can come partly from the elites. Lastly, the source of selection bias can come from externalities exerted by FOs on marketing capacity and/or the choice of non-members. The FOs can, for example, positively influence selling price through their bargaining power. This is profitable to farmers, even for those who do not sell through FOs.

With the aim of minimizing these biases, we use matching techniques. These techniques, which were intensely developed in many economic impact evaluation theories, are still not quite applied in empirical studies (Jalan & Ravallion, 2003a). Concerning our study, application of these techniques starts with previous studies as: impact evaluation of farmer field schools (Gotland et al., 2004), impact social fund development (Rao & Ibanez, 2003), impact evaluation of piped water (Jalan & Ravallion, 2003b), impact evaluation of road rehabilitation (Van de Walle & Cratty, 2002), and impact evaluation of cooperatives (Bernard et al., 2008; Bernard et al., 2009a; Bernard et al., 2009b) . Our approach in one step consists, firstly, in matching collective transactions with similar individual transactions in the Centre region. This matching enables us consider one of the three forms of bias. Indeed, this method only minimizes selection bias. Bias due to unobservable characteristics and externalities cannot be controlled because of lack of data. To be sure of the validity of these techniques, it is necessary that the treatment sample and comparison sample both operate in the same market (Heckman et al., 1998). For our case, we make sure that in the matching framework, transactions are sufficiently similar by considering various price determinants (marketing quantities, farmer size in term of total quantity sold, farmer age, farmer level of education, roads quality, etc.).

However, the limit of this method is that the application of the Propensity Score Matching technique does not enable minimizing all three categories of biases. Indeed, the second and the third category of bias are not minimized by this technique. This technique only enables minimizing the first category of bias (i.e., related to the observable characteristics).

This study uses data collected through a questionnaire administrated by IITA for a "baseline survey" of STCP[8]. This survey covered the period running from 15 March to 15 April 2006 and concerned cocoa farmers. The survey was carried out by 15 surveyors selected from among 40 people who took part in four days of training. During this training, there was a pretest of the questionnaire in the field in a locality (Mengan) approximately 40 km from Yaoundé. Accounting for more than 85% of cocoa national production in Cameroon, the Centre and Southwest regions, having to shelter the STCP project, constituted the survey base for sample selection. Thus, 83 villages were selected according to a seven-point criteria, namely: i) rural areas of departments concerned with the project; ii) uniformity of the agro-climatic conditions in intervention sites for the project; iii) presence of structures of proximity and accompaniment of local populations; iv) agricultural prevalence of production systems; v) accessibility in any season; vi) stepping of certain zones with the activities with execution agency IITA (particularly in the Centre region); vii) sufficient population density to reach a ration cost/benefit of project satisfactory.

With regard to the farmers' sampling, according to the estimated relative density

of a village compared to the others, the number of farmers to interview was affected. Thus, the selection of farmers surveyed was randomly done at the village level from a list of farmers compiled with the traditional authorities. Data was collected on farmers as well as their transaction characteristics. From both regions, data was collected on 904 producers having carried out 2,487 cocoa transactions. To better comprehend the impact of collective marketing, we exploited only the data on 601 farmers from the Centre region where there exists individual and collective sales at the same time (Table 2). We followed different surveyors' teams in the field as supervisors and coordinated data entry surveys.

Table 2: Statistics of data collected by region and selling channel

Titles	Farmers			
	Individual sales	Collective sales	Individual and collective sales	Total
Number	369	214	18	601
Price mean (FCFA/kg)	529	592	549	552
Price standard deviation	54.81	55.79	39.53	62.35
Quantity per transaction	224.5	272.1	295.4	243.6
Total quantity	515.8	642.7	844.8	570.8
Number of farmers who have received credit from anyone	113	61	8	182
Number of farmers who have received credit from buyer	113	0	8	121
Distance to market (km)	0.3	0.7	0.8	0.5

Source: IITA survey 2006.

From the distribution of farmers by sales category, we combined other statistics such as mean price and standard deviation of price (Table 2). In this table, we have distinguished number of farmers who have received credit from anyone and number of farmers who have received credit from buyers. We can observe that farmers who sell individually receive their credit from buyers.

The data collected has helped to make a description of variables on farmers' characteristic transactions, as well as variable results (Table 3).Thus, one can distinguish the variable result (OUT) from the farmers and transactions characteristic variables (CAR) as well as the participation variable for logit regression (PART). In this study, the participation variable is collective sale or not, while the result variable is farmer's price. Concerning result variable, other variables (inputs supplied by FOs, training facilitated by FOs) could be associated. But the fact that we only have data on farmer's price forces us to use only this variable as a result variable. It is important to note that the question of collective marketing effects on cocoa farmer's price implies also world market instability. This influences, in a decisive and exogenous way, the price receive by cocoa farmers (both in collective and individual sales). This can also substantially decrease the significance of PSM method when it is not taken into account in the analysis. Indeed, FOs do not have any control on international cocoa market trends. Thus, this method integrated instability of international cocoa market price by the variable "Monthly Variation Coefficient of international cocoa market prize (CIF[9] price)

for the corresponding monthly cocoa farmer's price". In fact, price instability can affect differently individual farmers and FOs. FOs receive price information from ONCC, while individual farmer do not. Thus, individual farmers have less price information and high prices are insufficiently transmitted.

Table 3: Description of the variables used in the analysis

Variables	Description of the variable	Unit	Categories
Pp	Price received by the farmer	FCFA/kg	OUT
TypeTransac	Type of sales: via a PO versus individual exclusively	1 = if Collective	PART
Gender	Gender of farmer	1 = if Male	CAR
Age	Farmer age		CAR
Educ	Farmer level of education	1 = if has been in school	CAR
Farmsize	Farm size of farmer	in hectares	CAR
$(Farmsize)^2$	Farm size of farmer square	in hectares	CAR
Hseholdsize	Household size		CAR
$(Hseholdsize)^2$	Household size square		CAR
RentScol	Selling during the period of start of the school year	1 = if Yes	CAR
Cred1	Credit received from anyone (either for individual or collective sales)	1 = if Yes	CAR
Cred2	Credit received from buyer (either for individual or collective sales)	1 = if Yes	CAR
TotInc	Farmer total income	in 10000 FCFA	CAR
IndDivers	Index of the producer's income diversification (the smaller the index, the more the producer is diversified)	between 0 and 1	CAR
DistProd	Distance from the house to the point of sale	Km	CAR
QTransac	Quantity per transaction	Kg	CAR
NbTransac	Number of transactions per producer during the campaign		CAR
NbBuyers	Number of approved buyers in the village		CAR
HarvestSeason	Season of abundance	1 = if Yes	CAR
QTot	Producer's production	Kg	CAR
$(QTot)^2$	Producer's production square	Kg	CAR
InfoP	Information about the CIF price (international market price)	1 = if Yes	CAR
DistBuyer2_	Number of non-tarmac km between the point of sale and the port of Douala	Km	CAR

continued next page

Table 3 Continued

Variables	Description of the variable	Unit	Categories
CVPCaf	Monthly Variation Coefficient of CIF price		CAR
DumLékié	Dummy for Lékié Division	1 = if Yes	CAR
DumMbam	Dummy for Mbam Division	1 = if Yes	CAR
DumMefou	Dummy for Mefou Division	1 = if Yes	CAR
DumNyong	Dummy for Nyong Division	1 = if Yes	CAR

4. Empirical results

This study aims at measuring, in a robust way, the effect of farmers' organizations through collective sales on cocoa farmer's selling price. The challenge faced here consists of reducing considerably the measurement bias by using the technique of Propensity Score Matching. Our study enables us quantify, by minimizing bias, the impact of collective sales of farmers' organizations on cocoa farmer's price in Cameroon. Table 4 presents descriptive statistics of variables used in the analysis.

Table 4: Descriptive statistics of variables used in the analysis

	Individual sales					Collective sales				
Variables	**Obs**	**Mean**	**Std Dev**	**Min**	**Max**	**Obs**	**Mean**	**Std Dev**	**Min**	**Max**
Gender	369	0.88	0.318	0	1.00	214	0.957	0.2011877	0	1
Age	369	51.91	14.75	19	100.0	214	47.453	14.10874	20	88
Educ	369	0.91	0.277	0	1.00	214	0.95	0.2115526	0	1
Farmsize	369	1.76	1.619	0.5	22.00	214	2.177	1.997295	0.5	22
$(Farmsize)^2$	369	5.73	26.78	0.25	484.0	214	8.7137	34.73092	0.25	484
Hseholdsize	369	4.46	1.90	1	7.00	214	4.71	1.9063	1	7
$(Hseholdsize)^2$	369	23.51	16.91	1	49.00	214	25.803	16.75532	1	49
Cred1	369	0.30	0.461	0.00	1.00	214	0.285	0.4524952	0	1
Cred2	369	0.30	0.461	0.00	1.00	214	0	0	0	0
RentScol	369	0.56	0.496	0.00	1.00	214	0.61	0.4873009	0	1
TotInc	369	41.79	32.22	7.5	300	214	49.75	32.06665	7.5	185
IndDivers	369	0.58	0.307	0.00	1.00	214	0.61	0.2386325	0	1
DistProd	369	0.34	2.01	0.00	32.00	213	0.665	1.456645	0	10
QTransac	369	224.4	229.5	17.5	2000	214	272.06	249.5884	16.5	2000
NbTransac	369	2.17	0.99	1.00	6.00	214	2.80	1.152961	1	7
NbBuyers	369	3.29	2.55	1.00	10.00	214	6.574	3.71667	1	10
HarvestSeason	369	0.78	0.41	0.00	1.00	214	0.836	0.3707352	0	1
QTot	369	515.7	650.0	40.0	6320	214	642.65	503.6043	40.5	3315
$(QTot)^2$	369	687473.5	2837148	1600.	39900000.0	214	665431.2	1239015	1640.2	1.10E+07
InfoP	369	0.33	0.472	0.00	1.00	214	0.462	0.4997696	0	1
DistBuyer2_	369	21.57	32.95	1.00	90.00	214	18.574	24.94523	1	90
CVPCaf	369	0.019	0.012	0.009	0.046	214	0.0212	0.0137453	0.009	0.046429
DumLekié	369	0.371	0.483	0	1	214	0.228	0.4211	0	1
DumMbam	369	0.078	0.269	0	1	214	0.5420	0.4211	0	1
DumMefou	369	0.067	0.251	0	1	214	0.1308	0.3380	0	1
DumNyong	369	0.482	0.500	0	1	214	0.098	0.298	0	1

Estimation of the probability propensity score

The results of probit estimation of collective marketing participation are presented in Table 5. These results show that household size, average quantity per transaction, number of transactions, total quantity sold and information received by farmer on the international price significantly influence cocoa farmers' participation in collective marketing.

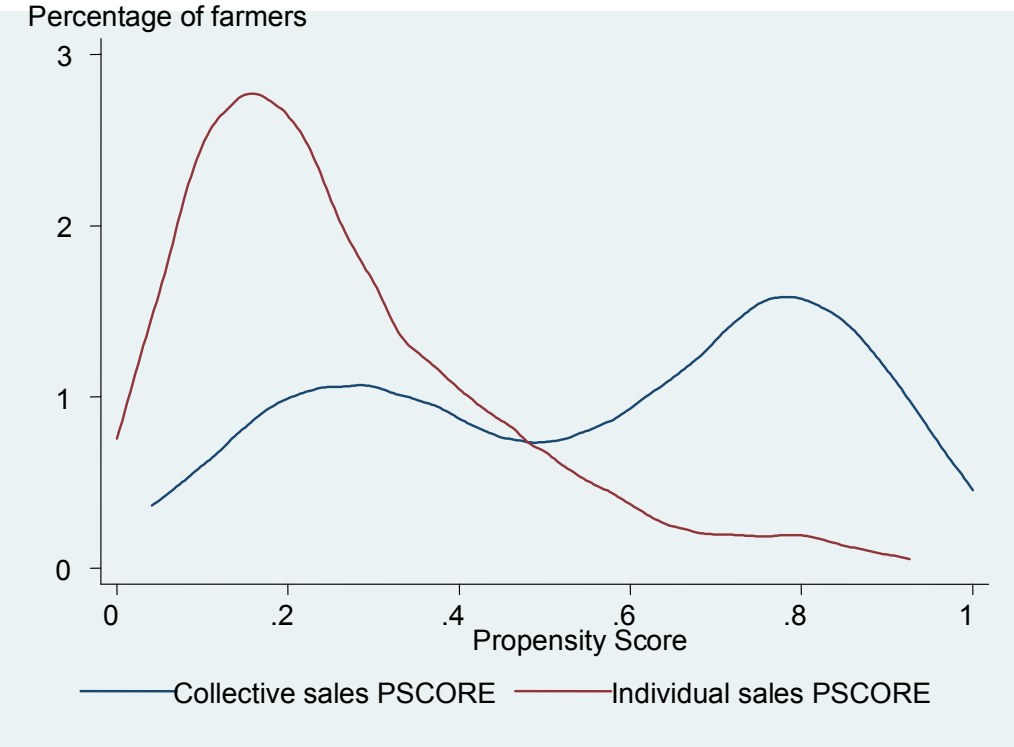
Table 5: Probit estimation of determinants of collective marketing participation

Variables	Coefficients	P-value
Gender	0.1601641	0.490
Age	-0.0009543	0.839
Educ	0.0563414	0.836
Farmsize	-0.068306	0.360
$(Farmsize)^2$	0.0029866	0.434
Hseholdsize	-0.0754195	0.646
$(Hseholdsize)^2$	0.0043589	0.816
RentScol	-0.1168202	0.469
TotInc	0.0043536	0.035**
IndDivers	-0.0148825	0.951
QTransac	0.0004455	0.087*
NbTransac	0.1534755	0.030**
NbBuyers	-0.0421646	0.503
HarvestSeason	0.0316	0.870
InfoP	0.2246105	0.086*
DistBuyer2_	-0.006151	0.050**
CVPCaf	2.723656	0.583
DumLekié	-0.5202449	0.060*
DumMbam	1.133912	0.062*
DumNyong	-1.279896	0.000***
Constante	-0.3532635	0.543
Observations		583
Pseudo-R2		0.30

***Significant at 1% level, **significant at 5% level, and *significant at 10% level

The distribution of propensity scores between treatment and control groups is shown in Figure 3. This figure clearly shows that the two distributions are different.

Figure3 : Propensity score distribution between treatment and control groups



To ensure the robustness of our estimations, several techniques can be used. We focus on two commonly used methods: non-parametric Kernel regression matching proposed by Heckman et al. (1998), and five nearest neighbours matching. In the first technique, each treated producer is matched with the entire sample of comparison. However, for each observation in the treatment group, an observation which is the weighted average of observations in the control group is generated. Those weights are made inversely proportional to the distance between each observation concerned and the control group observations, on the base of propensity score distribution. In the second technique, each treated observation is paired with the average of its five nearest neighbours of comparison sample, always based on propensity score distribution. To ensure maximum comparability of treatment and comparison groups, the sample is restricted to the region of common support defined by the values in the range of propensity score in which treatment and control observations can be found.

Table 6: Balancing test of samples

Variables	Unmatched sample			Kernel-based matching			5 nearest neighbours matching		
	Means		P-value	Means		P-value	Means		P-value
	Treated	Control		Treated	Control		Treated	Control	
Gender	0.95794	0.88618	0.003	0.95652	0.94547	0.604	0.95652	0.93816	0.404
Age	47.453	51.913	0.000	47.585	48.082	0.728	47.585	49.013	0.329
Educ	0.95327	0.91599	0.090	0.95169	0.96887	0.373	0.95169	0.97874	0.134
Farmsize	2.1779	1.7654	0.007	2.1815	2.5352	0.114	2.1815	2.3721	0.378
Hseholdsize	4.7103	4.4607	0.128	4.6763	4.4222	0.180	4.6763	4.3082	0.047
RentScol	0.61682	0.56098	0.188	0.61353	0.49689	0.017	0.61353	0.54783	0.176
TotInc	49.757	41.792	0.004	48.444	54.718	0.076	48.444	52.383	0.248
IndDivers	0.61828	0.58803	0.216	0.61708	0.60188	0.565	0.61708	0.60702	0.698
QTransac	272.06	224.49	0.020	272.92	270.65	0.931	272.92	284.44	0.658
NbTransac	2.8084	2.1762	0.000	2.7246	2.7787	0.608	2.7246	2.742	0.866
NbBuyers	6.5748	3.2981	0.000	6.4589	6.6083	0.684	6.4589	6.6995	0.510
HarvestSeason	0.83645	0.78049	0.103	0.83575	0.70094	0.001	0.83575	0.72754	0.008
InfoP	0.46262	0.33333	0.002	0.44928	0.47677	0.576	0.44928	0.4628	0.783
DistBuyer2_	18.575	21.577	0.249	19.169	26.439	0.003	19.169	26.754	0.002
CVPCaf	0.02125	0.01907	0.048	0.02102	0.02015	0.506	0.02102	0.01982	0.354
DumLekié	0.22897	0.37127	0.000	0.23671	0.24249	0.891	0.23671	0.26377	0.526
DumMbam	0.54206	0.07859	0.000	0.52657	0.53673	0.837	0.52657	0.53527	0.860
DumMefou	0.13084	0.06775	0.011	0.13527	0.10734	0.386	0.13527	0.10242	0.303
DumNyong	0.09813	0.48238	0.000	0.10145	0.11344	0.695	0.10145	0.09855	0.922

The right way to test the validity of matching is to compare average characteristics of farmers in the treated sample with the corresponding characteristics of the control group generated. Therefore, the absence of significant differences between treatment and control groups confirms the validity of matching. Thus, we undertook a series of statistical tests of farmers' characteristics and trading difference in three samples: the sample of unmatched farmers, the sample of farmers matched with the Kernel technique, and the sample of farmers matched with the five nearest neighbours technique. Table 6 shows the significant difference in the vast majority of characteristics in farmers' sample unmatched (collective sales with those who sell individually). In the unmatched sample, we have 14 farmers' characteristics that differ between collective and individual sales. After matching, only four of 14 farmers' characteristics for Kernel-based matching and three for five nearest neighbours matching differ between collective and individual sales. In summary, matched samples ensure the validity of comparability required to minimize bias, but cannot erase the bias.

Average effect of collective marketing

The indicator of cocoa collective marketing impact is the net price received by farmers. The impact of collective marketing on the net price paid to farmers shows whether collective sales (compared to individual sales) enable farmers to get a higher price. This certainly goes through the reduction of transaction costs and the increase of bargaining power. Table 7 presents the results of average treatment effects estimation for collective marketing in terms of price received by cocoa farmers. To ensure the robustness of this estimation, we first calculated the difference in the output variable (net farmer cocoa price) between treatment group and the control group. Then, for the standard error, we made 100 replications bootstrap using Stata Software.

Table 7: Average effect of collective marketing on price after two stapes replication (Outcome variable: Net price received by farmers)

	Kernel-based matching	5 nearest neighbours matching
ATT	32.04826	34.28749
Std error	6.112***	6.628***
Number of observations of treated group	214(7)	214(7)
Number of observations of control group	369	369
Total number of observations	583(7)	583(7)

Note: Observations in parentheses were not used in the estimate due to the common support condition stratified. Bootstrap with 100 replications are used to estimate the standard errors.
***Significant at 1% level

The results of average effects estimation for both methods (for Kernel matching and five nearest neighbours matching) show that farmers who sell collectively receive about 33 FCFA per kilogramme more than those who sell individually, which represents a premium of 6%. This effect is statistically significant at 1% and robust across the two forms of matching.

Given these estimations, we find that the two matching methods (for Kernel matching and five nearest neighbours matching) lead to similar results as much in the matching test as in the average effects estimation.

Moreover, whatever the matching technique used, a comparison of Propensity Score Matching method with the Naïve method is necessary to better assess the contribution of this method to impact evaluation of collective sales (Table 8).

Table 8: Comparison of average effects using Naïve and PSM methods

Titles	Values
Average Price in individual sales (FCFA per kg)	529
Average Price in collective sales (FCFA per kg)	592
Average effects using Naïve method (FCFA per kg)	63
Average effects using PSM method (FCFA per kg)	33
Average effects difference of two methods used (FCFA per kg)	30

The results in Table 8 show that the difference between the average effect by Naïve method and Propensity Score Matching method is 30 FCFA per kg. Application of Naïve method is biased because of non-consideration of individual characteristics of farmers and transactions. This difference is the result of bias reduction by applying Propensity Score Matching method.

It is possible to test the significance of the difference between the two methods the following ways: H0: $\mu = \mu 0$; H1 : $\mu \neq \mu 0$. Then we use the statistic Z to conclude:

$$Z = \frac{\mu - \mu_0}{\sqrt{\frac{S^2}{n}}} = \frac{63 - 33}{3.7} = 8.08 > 1.96 \quad (8)$$

H0 is rejected. 63 FCFA is significantly different from 33. Since the impact of collective marketing is positive and significant, what could be the source of this impact?

What explains the high price FOs fetch?

The fact that the price is high in collective sales by FOs compared to individual sales can be explained by some specific variables, such as input supply, training organized by FOs, the speed of payment to farmers, credit received and distance to the sale point. Given the non-existence of data on all these variables, we will focus only on two of them: credit received and distance to the sale point. Thus, we consider each of these two variables as outcome variables and we apply the PSM.

Are high prices from FOs explained by distance to the sale point?

The application of PSM on the data using the distance to the sale point as a variable result allows us to obtain the results contained in Table 9.

Table 9: Average effect of collective marketing on distance after two stapes replication (Outcome variable: Distance to the sale point)

	Kernel-based matching	5 nearest neighbours matching
ATT	-0.039025	0.0158424
Std error	0.5698031	0.8344157
Number of observations of treated group	213(7)	213(7)
Number of observations of control group	369	369
Total number of observations	582(7)	582(7)

Note: Observations in parentheses were not used in the estimate due to the common support condition stratified. Bootstrap with 100 replications are used to estimate the standard errors.

This table allows us to conclude that the distance from the sale point has no effect on collective sales. What about credit?

Are high prices from FOs explained by credit?

The application of PSM on the data using credit as a variable result allows us to obtain the results contained in Tables 10 and 11.

Table 10: Average effect of collective marketing on credit from anyone after two stapes replication (Outcome variable: Credit received by farmers from anyone)

	Kernel-based matching	5 nearest neighbours matching
ATT	0.1115156	0.1246377
Std error	0.537053**	0.054965**
Number of observations of treated group	214(7)	214(7)
Number of observations of control group	369	369
Total number of observations	583(7)	583(7)

Note: Observations in parentheses were not used in the estimate due to the common support condition stratified. Bootstrap with 100 replications are used to estimate the standard errors.
**Significant at 5% level

This table allows us to conclude that the credit received by producers from anyone has a significant and positive effect on collective sales.

Table 11: Average effect of collective marketing on credit from buyer after two stapes replication (Outcome variable: Credit received by farmers from buyer)

	Kernel-based matching	5 nearest neighbours matching
ATT	-0.1686776	-0.1555556
Std error	0.0304205***	0.0322013 ***
Number of observations of treated group	214(7)	214(7)
Number of observations of control group	369	369
Total number of observations	583(7)	583(7)

Note: Observations in parentheses were not used in the estimate due to the common support condition stratified. Bootstrap with 100 replications are used to estimate the standard errors
***Significant at 1% level

This table allows us to conclude that the credit received by producers from buyers has a significant and negative effect on collective sales.

5. Conclusion and recommendations

The importance of collective marketing carried out by farmers' organizations (FOs) is to give farmers positive benefits generated from externalities for those who participate. The objective was to assess the impact of cocoa collective marketing on the net price received by farmers. An analysis of the data collected by STCP-IITA in 2006 enables us draw the main conclusion: the impact of collective marketing on price received by cocoa farmers in the Centre region of Cameroon is a reality. This effect is positive and statistically significant. It is estimated at 33 FCFA per kilogramme by PSM method, and represents an increase of 6% of average sale price (comparing collective with individual sales). This increase is the same order of magnitude as that found in other countries for other farmers (Bernard et al. 2008b). Furthermore, the use of the Naïve method enables us be aware of the bias that this method contains. Thus, we note that there is a difference of 30 FCFA per kilogramme between the two methods. This difference can be attributed to the existence of bias in the Naïve method. However, applying PSM enables minimizing bias due to observed characteristics, while bias due to non-observed characteristics cannot be minimized. Despite the fact that all the biases cannot be minimized, this does not affect the importance of collective marketing impact. In addition, other results variables aside from price can explain the participation of farmers in FOs. Examples are input supply, credit and training facilitated by the FOs.

Given this conclusion, the main recommendation is to promote the development of collective marketing by FOs. The reason that some farmers do not sell through FOs (although this would allow them to get a better price) may be partly related to credit access (Kamdem et al., 2009; 2010). Indeed, one can assume that farmers who need urgent cash advances cannot sell to FOs because they need credit (private buyers only offer them for individual sales) or because they cannot wait for market days to sell their cocoa to the FOs. We have estimated PSM on effect of collective sales on credit received from anyone and from buyer. The evidence is that the effect is positive for credit received from anyone and negative for credit received from buyer. This confirms the fact that the reason some farmers do not sell through FOs may be partly related to credit access.The development of credit systems available to farmers (or the creation of credit systems by FOs) obviously would significantly increase the share of supply captured by FOs.

In addition, future studies may be conducted to analyse the conditions for the emergence of FOs to understand why they appeared in some areas and not in others. Indeed, the creation of FOs definitely needs to support a number of costs and constraints (awareness, logistics, costs for offices or headquarters of FOs, etc.). These costs and constraints can be different, depending on whether the creation of FOs is exogenous

or endogenous. It is exogenous when creating the FO is an initiative of one or more external(s) elite(s) of the area or an NGO. In this case, the costs and constraints of set up are almost entirely supported by the donor. Regarding an endogenous creation of an FO, it is initiated by one or more members of the locality. In this case, costs and constraints are supported by members. Moreover, the legal framework supports the creation of FOs (Law No. 92/006 of 14 August 1992 relating to cooperatives and CIGs). Thus, the challenges in creating FOs need to be known more in future studies. It would also be appreciable in future studies to identify factors that lead farmers to join or not join an FO. This may also help to identify the factors that guide farmers who are members of FOs to choose to sell their products through these organizations or not. Such studies would help to guide policies to facilitate the development of FOs and strengthen their impact on the prices received by farmers. However, to make a robust conclusion on the impact of FOs marketing on cocoa price, we suggest further research must be based on panel data (before and after). In fact, cross-sectional data surveys may not clearly show cocoa price effects from FOs' marketing.

Notes

1. International Institute of Tropical Agriculture.

2. This impossibility is related to the fact that impact analysis method of a given programme is generally done after the programme was implemented. However, to be effective, experimental method must be set up and part of the data collected before the programme. Since it is not generally the case, it is obviously impossible after the programme to observe each participant in the situation where it would not have followed the programme. It is the case of our data, which is out of cross-sections data and is collected after the programme.

3. The dimensionality curse is related to the fact that there exist a great number of dependent variables, or the number of dependent variables is higher than the sample size.

4. This difficulty is related to the fact that the control groups are built with the objective that, on average, they have identical characteristics to those of participants. It thus seems too tiresome and not relevant to estimate the treatment effect for each individual.

5. This method consists of associating with each treated observation, an untreated observation whose characteristics are identical.

6. Crepon, B. 2000. Méthodes d'appariement dans l'évaluation des politiques de l'emploi. Communication aux Journées de Méthodologie Statistique. Mimeo. INSEE.

7. International Institute of Tropical Agriculture.

8. Sustainable Tree Crop Program.

9. Cost, Insurance and Freight.

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