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Determinants of Commitment to Agricultural Cooperatives: Cashew Nuts Farmers in Benin

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Abstract

Forming and using cooperatives as marketing channel is usually advised to African smallholder farmers for overcoming the constraint of market access. However, limited evidence of cooperative behavior in marketing has been observed. In this paper, we estimate a two-stage model of commitment to cooperatives by cashew nut farmers in Benin, West Africa. In the first stage, we use data on 109 non-members and 168 members and estimate a binary Logit model of farmer's discrete choice with respect to committing to membership. In the second stage, we use the members' data to estimate a Tobit model of the proportion of produce delivered to the cooperative, after controlling for the endogeneity of the proportion of presales. Empirical results reveal that the commitment to membership depends on the assessment of prices offered by the marketing channels, the farmer's preferences for the specific attributes of the channels, the total farm size, and some psycho-sociological factors; the commitment to business depends on prices and transaction costs in the channels. Our findings call cooperatives for improving commitment by considering the subjective and economic reasoning of the farmers, and setting formal contracts between members and their organization.

Keywords: Benin; contracts; cooperatives; market access; prices; transaction costs.

1. INTRODUCTION

Increased encouragement of farmers to participate in the market through cooperatives puts a premium on understanding farmer's commitment to cooperatives. In Sub-Saharan African countries, farmers face high transaction costs which prohibit their access to better-paying markets and worsen their poverty level (Barret, 2008). Lack of information on prices, lack of linkages between farmers and other market actors, credit constraints and other market imperfections lead peasants to sell their crops at the farm gate to intermediaries, often at a low price, and to not take advantage of market opportunities (De Janvry et al., 1991, Fafchamps and Vargas-Hill, 2005). To address the problem of high costs in the agricultural exchanges, there have been suggested a number of strategies, among which, the formation of farmer organizations for collective action. Farmer cooperatives have been promoted as an efficient mechanism for increasing market access and reducing poverty (Birchall, 2003; Poulton et al., 2006).

There is evidence of the marketing performance of collective action (Kaganzi et al., 2009; Okello and Swinton, 2007). Though, farmers have to strongly commit to their group to let it perform well.

Farmers face commonly three levels of commitment to the cooperative organization (Hakelius, 1996; Staatz, 1987a), which are quite important for the performance of the cooperatives. The first level of commitment is about whether or not to become a member of the cooperative. Without sufficient membership, the cooperatives would not get the operational size to profit from potential economies of size and decrease the potential market power of their trading partners (Bruynis *et al.*, 2001; Schrader, 1989; Sexton and Iscow, 1988). The second level of commitment regards how much business the member decides to do with the cooperative and hence, whether or not to commit deeper. The cooperatives need their members to do business exclusively with the cooperative channel for the sake of increased market share and financial performance (Fulton and Gibbings, 2000). The third level of commitment concerns the member's involvement in the democratic process by attending meetings, voting at member meetings, becoming an elected representative, etc. The control of the cooperative business requires democratic governance for setting consensual price strategies and income distribution and obtaining better joint benefits (Hakelius, 1996). After becoming members of the cooperative, the worst case of member commitment would be to entirely commit democratically without committing to the cooperative business at all.

Accordingly, the present paper addresses the factors explaining the first and second levels of commitment to cooperatives. This study intends to shed more light on 1) why some farmers join cooperatives while others don't; 2) why cooperative members don't trade exclusively with their organization. It therefore aims at providing ways for improving commitment to cooperatives and hence increasing the marketing performance of farmer cooperatives. The survey focuses on cooperatives operating cashew nut marketing in the main cashew nut growing areas in Benin.

Though the literature has long addressed the heterogeneity of farmers with respect to cooperatives, there has been limited research on the factors for this heterogeneity along the commitment continuum, especially in developing country settings where the expectations on commitment to cooperatives are high. Knowledge regarding agricultural cooperatives, systematically reviewed by Staatz (1989) and Cook et al. (2004), has evolved in four major approaches of cooperative over the years;: 1) an extension of the farm; 2) a firm; 3) a coalition of firms; and 4) a nexus of contracts. In the pre 1990s, the dominant economic models of cooperatives were the extension of the farm, the firm, and the coalition of firms. In the post 1990s, the earlier view of farm extension was abandoned. Recent cooperative studies have centralized the debate on the approaches of a coalition of firms and a nexus of contracts. These approaches of cooperatives analyze membership issues by comparing the attractiveness of cooperatives, investor-owned firms (IOFs) and other alternative organizations. According to the coalition approach, joining a cooperative as well as doing business with the cooperative is based on economic benefits, therefore it is suggested for the cooperative the use of pricing schemes as incentives to attract farmers and coordinate conventional problems in cooperatives. The approach of cooperative as a nexus of contracts recognizes that transaction costs affect the choice of cooperatives and suggests contracting relationships among cooperative stakeholders. Yet, studies implicitly model the discrete cooperative choice simultaneously with the continuous decision about volumes purchased or sold with the cooperative.

The contribution of our study to the literature is threefold. First, the estimation method we employ has the value to allow for the sequential decision of cooperative behavior. Second, we reduce the lack of empirical studies in the thin literature on the determinants of farmers' cooperative behavior in developing countries, in our case looking at cashew nuts farmers in Benin. Finally, our study also raises interesting empirical evidence such as the importance of non-price or subjective factors for the first

level of commitment, but the importance of price or economic factors for the second level of commitment.

The paper is organized as follows. Section 2 introduces the cashew nut cooperatives in Benin. Section 3 exposes the theory and derives the research hypotheses. Section 4 presents the experimental procedure. Section 5 provides the results on the determinants of commitment to the cooperatives. Section 6 contains a discussion of our main findings ending with some concluding remarks and policy implications in Section 7.

2. BACKGROUND

In Benin, agricultural cooperatives were established in 1961 by law and early put under State control. In the era of State control lasting up to the early 1990s, African cooperatives emerged from a top-down policy in which membership was mandatory and cooperatives met external socio-political goals. In the current era of liberalization, there are mixed cooperative ventures (Wanyama et al., 2009). The two largest farmer organizations in Benin are the cotton cooperatives characterized by a mandatory membership to all cotton farmers and the cashew nut cooperatives characterized by an open membership. Cashew nut cooperatives like any other agricultural cooperative in Benin derived from earlier multi-cooperatives in which the management decisions were influenced by the cotton sector, as cotton constitutes the most traditional crop for all farmers and the ordinary focus of the policies of agricultural marketing (www.hubrural.org/pdf/benin_diagnostic_filiere_anacarde_padse.pdf).

Cashew nut cooperatives have been gradually formed from 1994; there are about 593 cashew nut cooperatives at the village level, 43 unions at the communal level, and 4 unions at the district level by 2005. Even though they federate at the national level in 2006, all the management decisions remain

centralized at the district level. At the village level, the cooperatives are headed by their members elected as representatives. At the district level, there is one manager and the elected board of member representatives.

No formal contract is signed up between the farmer and its cooperative when joining the organization, and the members participate weakly in their cooperatives (see endnote 1). The major district cooperatives locate in Zou-Collines and Atacora-Donga as these two districts represent respectively 55% and 30% of the national production of raw cashew nuts (www.unctad.org/infocomm/francais/anacarde/Doc/Benin.pdf).

Cashew nut cooperatives in Benin constitute some bargaining cooperatives that aim at achieving better prices, facilitating access to credit and providing technical assistance to their members (URPA-ZC, 2008). As described by Hollaway et al. (1999), such cooperatives assemble the volume of produce of their members and handle output marketing by finding market outlets and negotiating quantities and prices with their selling partners. The price paid to farmers is divided into a first payment and a later patronage refund when management costs permit to have some remaining money. To decrease the serious lack of credit access to individual farmers without collateral, cooperatives negotiate group loan and collective repayment with formal micro-credit institutions for the intended members. To prevent members from defecting to repay and penalizing the renewal of the credit, cooperatives consider the potential default risk of small farmers and credit amounts are relatively small (see endnote 2). With the funding from development agencies and the public extension services, the cooperatives also organize some training sessions on production and quality issues to their members.

Every year, the commercialization of raw cashew nuts starts officially by a ministerial decree specifying the floor product price (often between 175 and 250 FCFA/kg; 0.35 and 0.50 USD/kg) in agreement with all actors in the marketing chain. However, as reported by Sossou (2004), producers already contract or

pre-sell significant quantities of their produce to traders, exporters, and domestic processors at prices often between 150 and 200 FCFA/kg (0.30 and 0.40 USD/kg) to finance farm operations and smooth household consumption before the cashew nut marketing season (from November to January). During the proper marketing season, from February to May, producers bargain both with their cooperatives for the price of one part of the remaining production and individually with the alternative buyers for the price of the other part. Collective commercialization of raw cashew nuts in Benin is permanently hampered by the individual commercialization.

3. THEORY AND HYPOTHESES

3.1. Joining a cooperative

Farmers cooperate because they perceive a certain benefit from cooperating. Earlier game-theoretic attempts (Staatz, 1984 and 1987b; Sexton, 1986) modeled cooperative choice by setting a game in which every farmer-player will not cooperate unless he is better-off under that strategy than any other alternative. Coalition then is formed, provided that it yields a possible allocation of payoffs making every individual player better-off by remaining in the group. Those games were criticized for their unrealistic assumptions and the numerous calculations needed; however the conclusion that the decision to join the group lies in the economic benefits of cooperation persists (Fulton and Giannakas, 2001; Karantininis and Zago, 2001).

Price assessment alone may drive the individual farmer's choice to participate in an existing cooperative, although the economic advantages cooperatives may offer farmers are various and an exhaustive list includes: creation of competitive yardstick, correction of market failure, market power avoidance, provision of missing services, economies of size, profits from another level of the supply chain,

guarantee of supplies or markets, risk reduction, and gain from coordination (Schrader, 1989). Price is a very important factor in farmer's decisions to join cooperatives. There are some farmers who will choose their organization on the best price basis. Thus, if cooperatives often offer the best price, these people will likely decide to become members. Still, farmers may prefer to weigh prices and some specific attributes of the alternative organizations (Fulton, 1999). In fact, choosing the cooperative rather than alternative choices supposes some preference for the cooperative's attributes which differentiate it from its competitors. Our first hypothesis for cooperative membership then can be stated as:

Hypothesis 1a: Commitment to cooperative membership varies with price factors. Price factors include assessment of price levels in the alternative channels facing the farmer and the preference of the channels' attributes. Hence farmers believing that the cooperative offers higher product prices than in the other channels are expected to become members. The same expectation goes for farmers preferring patronage refunds (an attribute of the cooperative) to higher product price, but not preferring trade credit (an attribute of the spot-market alternative) to higher product price.

Moreover, the horizon problem and the portfolio problem are common in cooperatives and influence farmers' motivations towards cooperatives. The horizon problem is related to the time-period expected to patronize the cooperative and arises when farmers tend to prefer current cash flows to investments for future higher cash flows (Cook, 1995). Older farmers may not be interested in patronizing a cooperative because when cooperative members retire, they only get the nominal value of their invested money. Thus, according to the horizon problem argument, the second hypothesis is:

Hypothesis 1b: Commitment to cooperative membership varies with the farmer's age (as a proxy of horizon). Older farmers are expected to be less positive to the cooperatives than younger farmers who would likely not retire soon.

As for the portfolio problem, it emerges when risk averse members influence the management board to carry a reduced risk in a way that expected returns to investment decrease (Cook, 1995). In fact, by

choosing a cooperative rather than other business ventures, members have all their eggs in one basket (Staatz, 1984). A farmer has put all his cashew tree farm at stake when involving in cashew nut cooperative. This way, farmers with more diversified farming enterprises would have higher risk preferences (less risk-averse) than farmers owning few farm assets. Hence, according to the portfolio problem argument, the third hypothesis is:

Hypothesis 1c: Commitment to cooperative membership varies with the farm size (as a proxy of portfolio). Larger farmers would be less positive to the cooperatives than smaller farmers.

Beside these economic potential factors for joining or not a cooperative, farmers may choose to belong to a cooperative on the basis of subjective considerations. In theory, the decision to cooperate is not independent of sociologic and psychological considerations. An earlier model of reasoned-action in decision-making has been improved into a more formal theory of planned behavior and suggests that behavioral beliefs, normative beliefs, and control beliefs explain human behavior (Ajzen, 1991).

Behavioral beliefs constitute the individual's belief about the likely outcome of the behavior. Normative beliefs are associated with the perceptions of significant others (parents, spouse, friends, etc.) on the behavior. Control beliefs are related to the presence of factors that may facilitate or hinder performance of the behavior. Consequently, we formalize the following fourth hypothesis:

Hypothesis 1d: Commitment to cooperative membership varies with psycho-sociological factors.

Cooperative membership may be explained by what farmers themselves think about cooperatives, what others around them say about cooperatives, and second-hand information about cooperatives.

3.2. Trading with the cooperative already patronized

A farmer-member fails to do much business with his cooperative than with other alternatives because by doing so, he has better payoffs, even though playing selfishly reduces the payoffs of the other

cooperative members. The formal incentives to free ride are either better prices (Staatz, 1987b; 1989) or reduced transaction costs (Bardhan, 1989; Williamson, 1989). Accordingly, we set the two following hypotheses:

Hypothesis 2a: Price levels determine the commitment to cooperative business. Higher cooperative prices lead to greater member commitment while higher prices in the alternative channels lead to lower member commitment.

Hypothesis 2b: Transaction costs determine the commitment to cooperative business. The more the costs of information, negotiation, monitoring, coordination, and enforcement are reduced in the cooperative channel, the greater the member commitment to the cooperative business.

Another basic argument is that members express high commitment to the cooperative when they perceive the cooperative acting as their effective agent (Fulton and Giannakas, 2001). As well, mismanagement of the cooperative is connected to a lack of member commitment (Fulton and Adamowicz, 1993). Members may go selfish sometimes to discipline the management of the cooperative (Staatz, 1987a). Hence, we have two additional hypotheses:

Hypothesis 2c: Effectiveness of the cooperative determines the commitment to cooperative business. When farmers assess that using the cooperative makes farm operations more profitable than other alternatives, they will market importantly their farm output to the cooperative.

Hypothesis 2d: Satisfaction with the cooperative management determines the commitment to cooperative business. When farmers assess that the overall cooperative management is satisfying, they will market importantly their farm output to the cooperative.

4. SURVEY DATA AND METHODS

To test the hypotheses above, a questionnaire was administrated to 277 cashew nut farmers in the two major districts of cashew nut farming in Benin. The sample of producers comprised of 171 cashew farmers in Zou/Collines and 106 cashew farmers in Atacora/Donga. The sampling strategy followed a stratified random method weighted by the importance of producers at the district level and by the importance of cashew nut production at the municipality level within the district. In a given municipality, the producers were selected randomly from the list of producers available in the agricultural extension offices and interviewed in their villages. In total, 109 respondents (71% in Zou-Collines and 29% in Atacora-Donga) were non-members and 168 respondents (56% in Zou-Collines and 44% in Atacora-Donga) were members. Within the group of members, 46% were elected representatives and 54% were simply members. The survey was carried out in the first quarter of 2010. The primary data collected concerned the variables required for the analysis of membership commitment and business commitment.

4.1. Variables and analytical methods for the determinants of commitment to membership

In the aim to analyze membership commitment, we used a Logit analysis like in some prior studies (Wadsworth, 1991; Fulton and Adamowicz, 1993). In a Logit regression, probability to observe a specific category of the discrete dependent variable is explained by some independent variables (Wooldridge, 2006). The equation for the binary Logit model is written below:

$$P(y = 1|x) = \frac{\exp(\beta_0 + x\beta)}{1 + \exp(\beta_0 + x\beta)} \quad (1)$$

Where y is membership commitment noted MBERSHP (1=member, 0=non-member), β represents the parameters to estimate, and x denotes the full set of independent variables listed in Table 1 with their expected signs according to the literature and the background information in Appendix; in the

measurement column, computation made for transforming some variables is written in italics. Summary data show that nearly all variables can discriminate non-members and members (Table 2). Backward elimination was processed on the model with all independent variables. The retained membership model was the optimal model which minimized the Akaike Information Criterion (AIC). Goodness of fit and prediction was examined by considering the McFadden's pseudo-R², the cutoff, the percentage of observations correctly specified, and the ROC curve (Kleiber and Zeileis, 2008).

4.2. Variables and analytical methods for the determinants of member commitment to business

To obtain the factors for trading exclusively with the cooperative channel, we used the approach in Hobbs (1997) where the proportion of cattle marketed to a specific channel is explained by transaction cost instruments and farm characteristics, using a two-limit Tobit model. We therefore measured business commitment by the proportion of cashew nuts sold to the cooperative (PROPCOOP) in 2008 and 2009. The choice of a two-limit Tobit Maximum Likelihood Estimation (MLE) was more appropriate than the Ordinary Least Squares (OLS) estimation because during both years, more than one-third of the members did not sell at all to the cooperative while about one fifth of them sold their entire farm output to the cooperatives. PROPCOOP was treated as a censored variable, with the desired proportion observed only when it fell between 0 and 100 %. For values below 0, we observed 0%; for values above 100, we observed 100%. Denoting the desired proportion PROPCOOP*, the model is specified as follows:

$$PROPCOOP^* = \beta'X + u \quad (2)$$

$$\begin{cases} PROPCOOP = 0 & \text{for } PROPCOOP^* \leq 0 \\ PROPCOOP = PROPCOOP^* & \text{for } 0 \leq PROPCOOP^* \leq 100 \\ PROPCOOP = 100 & \text{for } PROPCOOP^* \geq 100 \end{cases}$$

Where X is the vector of explanatory variables, β' the parameters to estimate, and $u \sim N(0, \sigma^2)$.

Retained variables for the Tobit model of PROPCOOP are presented in Table 3 with their expected signs, and the computation made for their transformation is written in italics in the measurement column. The endogeneity of the proportion of presales (*PROPOUT1*) in the model defined in (2) made convenient to run a Two Stage Least Squares (2SLS) estimation of PROPCOOP by using the proportion of presales fitted from a preliminary one-limit Tobit model and getting a more appropriate composite error term. Double censoring for *PROPOUT1* was not made because significant members (57% of the members) did not pre-sell at all their farm output outside the cooperative while very few members (3% of the members) presold their total farm output outside the cooperative. Denoting the uncensored proportion of presales *PROPOUT1**, the first stage regression is presented below:

$$PROPOUT1^* = \alpha Z + v \quad (3)$$

$$\begin{cases} PROPOUT1 = 0 & \text{for } PROPOUT1^* \leq 0 \\ PROPOUT1 = PROPOUT1^* & \text{for } PROPOUT1^* \geq 0 \end{cases}$$

Where Z is the vector of explanatory variables used in that stage (Table 4), α the parameters to estimate, and $v \sim N(0, \sigma^2)$.

In the pooled sample of members, before the cashew nut season, the average member delivered 15% of the farm output outside the cooperative and in the proper season, he delivered 44% of the farm output to the cooperative and 41% outside the cooperative (Table 5). Cashew nut price in pre-season was lower than prices in the proper season and cooperative price was lower than the price in the spot market in cashew season. On the spot market, monitoring costs were important because the product quality grade could be underestimated; however, the spot market was nearer the members than the cooperative. Besides, members did not find that selling to the cooperative was less profitable than operating on the spot market. They were also satisfied with the management of the cooperative. This description based on Table 5 provides a certain summary of the data on commitment to the cooperative business. In the

results section, the Tobit models are presented with their benchmark OLS models. In Tobit models, the marginal effects are simply the MLE estimates scaled by the proportion of uncensored data (McDonald and Moffit, 1980). Validation of the 2SLS estimation of PROPCOOP was made after testing for endogeneity and overidentifying restrictions (Wooldridge, 2006).

5. RESULTS

5.1. Modeling commitment to cooperative membership

Eight factors were found as the determinants of membership commitment (Table 6). They included price assessment in the alternative channels (PCOOPH); the preferences of patronage refunds (POREF) and trade credit (POTCR); the total farm size (LogTotFSIZE); the satisfaction in agricultural cooperatives in the past, based on self-experience (OWNSCOOP) as well as the experience from others (OTHSCOOP); the assessment of current cashew cooperative leaders being cotton cooperative leaders in the past (CTINFL); and the membership coverage among the surrounding cashew nut farmers (MCPROD). MCPROD and PCOOPH represented the determinants with the greatest positive marginal effects on the likelihood of becoming a member while POREF and CTINFL constituted the determinants with the greatest negative marginal effects on the probability of becoming a member.

Oppositely to non-members' profile, the most likely profile of members was the following. Members believed that raw cashew nut price was not lower within the cooperative than in the other channels. They disagreed with the statement that higher price was preferred to patronage refunds while they agreed that higher price was preferred to trade credit. They were small farmers. They were satisfied with their self-experience in agricultural cooperatives in the past and believed their closest network was not dissatisfied with their experience. They disagreed that current cashew cooperative directors were cotton cooperative directors in the past, therefore not believing in some influence of past management

of cotton cooperatives on current cashew nut cooperative management. In addition, they had significant proportion of members in their surrounding area.

To provide the greatest proportion of correctly classified observations, our membership model classified cashew nut farmers as members (respectively non-members) when the predicted probability was higher (respectively lower) than 0.679 (Figure 1). The probability to correctly classify members by the model was 0.865 while its probability to correctly classify non-members was 0.932. The area under the ROC curve (0.947), which is the overall measure of the model's accuracy, was greater than 0.5 and then, better than a random guessing of membership. It was also very close to 1 and then, justified that the model performed well.

5.2. Modeling commitment to cooperative business

Failure to commit to cooperative business started with the presales of some part of the raw cashew nut production. The Tobit determinants of the proportion of farm output presold to traders and processors (PROPOUT1) was the price negotiated for the raw commodity presold (LogPOUT1). The higher this price was, the higher the proportion of presales made by the cooperative members (Table 7). The marginal effect of this price on PROPOUT1 was substantial. For 1% increase in the product price in cashew pre-season, there was 9.4 percentage points increase in the proportion of presales.

The proportion of presales (PROPOUT1) was a determinant of the proportion of raw commodity delivered to the cooperative (PROPCOOP). Other determinants of commitment to cooperative business were the product price outside the cooperative during the cashew season (LogPOUT2); the product price in the cooperative channel during the cashew season (LogPCOOP); the grade uncertainty outside the cooperative (GRUNCOUT); and the district (DISTRICT). These variables had different effects on the proportion of raw commodity delivered to the cooperative (Table 8).

Two variables influenced positively the commitment to cooperative business, namely LogPCOOP and GRUNCOUT. The cooperative price was a positive determinant of the proportion of raw commodity delivered to the cooperative and had the biggest marginal impact among all determinants of PROPCOOP. For a 1% increase (respectively decrease) in the cooperative price (PCOOP), the proportion of produce delivered by the members to their organization increased (respectively decreased) by 14.2 percentage points.

The other positive determinant was the uncertainty that the product quality would not be graded as expected when selling individually outside the cooperative. Formal quality standards for the raw cashew nuts do not exist whereas international standards do exist for the cashew kernels and drive raw cashew nut prices. Even though, the floor price of cashew nut set by the Government is irrespective of quality specifications. As a result, buyers applied informal standards for the raw nut using a formula which differed from buyer to buyer and very often led to purchase the informal grade B product (lower grade) at price lower than the floor price or than the price of the informal grade A (higher grade) of cashew nut. Selling via the cooperative ensured a price for grade A which was at least as high as the floor price. This explained why, everything else being constant, concerns regarding grade uncertainty outside cooperative increased the proportion of quantity sold to cooperative by 4.8 percentage points.

Three variables decreased significantly the commitment to cooperative business. For an increase of 10 percentage points in the proportion of presales, the dependent variable PROPCOOP decreased by 1.30 percentage points (Table 8). This was to say that for 1% increase in POUT1, PROPCOOP decreases by 1.22 percentage points, using the marginal effect of LogPOUT1 on PROPOUT1 in Table 7. When buyers (traders/exporters/processors) offered 1% increase in the price to individual members, the proportion of raw commodity delivered to the cooperative decreased by 3.8 percentage points. The third significant negative determinant regarded the district. Members of Zou-Collines district cooperatives committed

5.5 percentage points less than their counterparts in Atacora-Donga district cooperatives. The difference between the distance from the farm to the cooperative store and the distance from the farm to the usual selling place outside the cooperative (dLogDIST) was higher in Atacora-Donga than in Zou-Collines ($t=4.802$; $p<0.001$), meaning that the cooperative stores were nearer the members in Atacora-Donga than it was the case in Zou-Collines.

The accuracy of the models used to analyze the commitment to cooperative business was conditional on the relevance of the constructed instrument for the proportion of presales (PROPOUT1), the endogeneity of PROPOUT1 in the structural equation of PROPCOOP, and on the assurance that PROPOUT1 was indeed the only endogenous variable. In fact, the significance of LogPOUT1 in the Tobit model of the proportion of presales (Table 7) satisfied already the relevance of the fitted PROPOUT1 used in the Tobit model of PROPCOOP. Moreover, performing Hausman test for PROPOUT1 yielded a heteroskedasticity-robust Chi-square =4.418 and $p<0.05$, thus justifying the endogeneity of PROPOUT1 in explaining PROPCOOP. Furthermore, to test for overidentification, successive regressions considering other variables as endogenous were estimated and yielded marginal effects not very different from those obtained in Table 8. This permitted to conclude on their exogeneity and validate the two-stage least square estimation.

6. DISCUSSION

6.1. Factors for becoming a cooperative member

Regarding the decision to join the cooperatives, the hypothesized factors were price factors (1a), farmer's age (1b), farm size (1c), and psycho-sociological factors (1d). Evidence from the membership commitment model confirmed the hypotheses 1a, 1c, and 1d, but infirmed the hypothesis 1b in connection with the farmer's age.

Farmers would likely become cooperative members if cooperative prices were generally higher than in the individual market. This reinforces Schrader (1989)'s statement that cooperative patronage could be based on price alone. However, as the cashew nut cooperatives related to bargaining cooperatives and there still were farmers who did not attribute higher prices to the cooperative, it meant that this type of cooperative was not successful. Forming rather a processing cooperative should be considered to stimulate farmer commitment to cooperative membership (Sexton and Iscow, 1988). By adding value to the product, processing activity would increase price, thereby improving the cooperative advantage. Beside price, the cooperative organization and its alternatives had their specific attributes which appealed the farmers according to their preferences. Farmers manifesting a strong preference for patronage refunds become members while farmers tied to trade credit which they received from the competitors of the cooperative become non-members. These elements confirming Hypothesis 1a are also supportive to the analytical commitment model set by Fulton and Giannakas (2001), in which the benefits associated with either the cooperative or the IOF include price and other factors based on farmer preferences.

Farmer's age was not retained in the model of commitment to cooperative membership, implying that older and younger farmers are equally expected to be positive to cooperatives. Hypothesis 1b then is rejected and aligns with the studies finding the insignificance of farmer's age regarding cooperatives (Burt and Wirth, 1990; Wadsworth, 1991). The lack of evidence of the horizon problem in this study may be explained by the fact that bargaining cooperatives require very few significant investments for farmers (Sexton and Iscow, 1988); thus, leaving such Sapiro I cooperatives (Cook, 1995) will have inconsiderable loss from investments to justify disincentives for older farmers. In any case, identifying the horizon problem in empirical research is critical and not straightforward. Fulton and Adamowicz (1993) did not find age significant in their commitment model, but ran a model of the importance of patronage refunds on farmer's age before finding that older farmers preferred strongly patronage

refunds, thereby somewhat positive to cooperatives. Hence, there still is interesting to dig into the causal relation between farmer's age and cooperative membership to know whether it is driven by some specific factors.

Cashew nut farm size and cotton farm size were irrelevant in patronizing the cashew cooperative while surprisingly, the overall farm size influenced negatively the commitment to cooperative membership. This evidence indicated that non-members had more diversified farm assets and could bear more credit risk. The higher risk preferences of large farmers did not match with the constraint of low credit amount within the cooperative channel. Thus, large farmers were less positive to cooperatives because of the reduced risk portfolio within the cooperatives (Cook, 1995). Therefore, Hypothesis 1c is confirmed. The negative farm size effect found enhances the critical issue of farm size towards cooperatives. For Burt and Wirth (1990), farm size is irrelevant while for Klein *et al.* (1997) and Gray and Kraenzle (1998), larger farmers commit better to cooperative patronage than smaller farmers do. Hence, there is need to investigate the farm size bias within the cooperatives and increase the understanding of the low interest of large farmers in becoming cooperative members.

Evidence that farmers used self-learning, learning from others, and the proportion of members among farmer companions to join the cooperatives connects with the importance of social learning and network to ensure more trust and success in the cooperatives (Hakelius, 1996; Hansen *et al.*, 2006; Karantininis, 2007). This is even more important as the cooperatives investigated had some history that made fear farmers to become members of cashew nut cooperatives run by former representatives of cotton cooperatives. Golovina and Nilsson (2009) and Wanyama *et al.* (2009) report in the ex-Soviet Union and Africa respectively the negative influence of farmer's past experience in agricultural cooperatives on current motivations to join and trust cooperatives. However, our findings did not relate to their argument of top-down approach, but to the improper management within the cooperatives. In

definitive, psycho-sociological factors affected membership decisions, thus Hypothesis 1d is confirmed and emphasizes non-financial reasons for joining the cooperative.

6.2. Factors for trading with the cooperative

Regarding the commitment to cooperative business, the hypothesized factors concerned price levels in the different channels (2a), transaction costs (2b), profitability of farm operations (2c), and satisfaction with the cooperative management (2d). Evidence from the estimation of the proportion of raw commodity delivered to the cooperative only confirmed the hypotheses in connection with prices and transaction costs.

As higher cooperative price and lower prices in the competing channels (before and during cashew season) were significant to increase the proportion of quantity delivered to the cooperative, Hypothesis 2a is confirmed. These findings emphasized the relationship between the free-rider problem and member commitment (Cook, 1995; Fulton, 1999) because delivery rights and penalty did not rule the cashew nut cooperatives and prevent members selling less or not at all to the cooperative from increasing the marketing costs shared in by those selling the most or totally to the cooperative. By selling less to the cooperatives, members decrease the bargaining power of the cooperatives and hence lower their marketing performance.

Considering the finding that pre-selling the raw commodity meant weaker member commitment to the cooperative, the study strengthened that temporal asset specificity is significant to explain the mixed choice of organizational structures for selling the farm output (Williamson, 1989). The implicit significance of shorter distance to the cooperative market and the explicit significance of grade uncertainty outside the cooperative for greater cooperative member commitment supported Hobbs (1997) who noted the importance of transaction cost variables in the farmer's choice of marketing channels. Hypothesis 2b then is confirmed. However, the reduced transaction costs for commitment to

cooperative business may be critical for the cooperative. Grade uncertainty outside the cooperative, though providing risk reduction incentives for member commitment to cooperative business, may favor adverse selection and moral hazard problems if the cooperative usually averages over product quality grades.

The missing evidence that greater member commitment was ensured when members believed in the profitability of trading with the cooperative or when they felt strongly satisfied with the ongoing management of the cooperative led to infirm Hypothesis 2c and Hypothesis 2d. The cooperative might be perceived as an effective agent, not when it maximizes member surplus, but when it chooses other cooperative objectives such as the maximization of the net price received by cooperative members (Schmiesing, 1989). Besides, after members had already considered their satisfaction with the past cooperative management to join the cooperative, the current management might become less relevant in the business decision. Hence the traditional control problem in cooperatives (Cook, 1995) might have different levels of importance for the different levels of farmer commitment to cooperatives.

6.3. Synthesis

Evidence from this survey finds some place in Markelova et al. (2009)'s extensive discussion of what matters for collective marketing. These authors suggest that the group characteristics, the institutional arrangements, the types of products and markets, and the external environment constitute four categories of factors affecting collective action in marketing.

Unlike recent studies such as Barham and Chitemi (2009) and Wambugu et al. (2010) that proved specifically the role of social capital in collective marketing, findings of the present study do not show neatly that the group characteristics affect the commitment to the group and to the collective commercialization. However, evidence highlights that social norms influence the commitment to cashew nut cooperative.

In regard to the institutional arrangements, the lack of membership contracts and penalty rules for defecting members, in the management of the cashew nut cooperatives, does not ensure less free-riding and less opportunistic behavior. This institutional path, while favoring the low commitment of members to the cooperative business, also affects the decision to join cooperatives, as it creates negative perceptions about cooperatives. Under this context, observing high commitment is difficult because getting the institutional environment right requires ten to hundred years (Williamson 2000).

The external environment can play a significant role in the institutional setting. Cooperatives need the State to create an enabling environment for the cooperative movement and their marketing performance. Without violating the major cooperative principles

(<http://www.ica.coop/calendar/ga2005/birchallkey.pdf>), laws and policies on agricultural commercialization should favor market linkages between the cooperatives and their trading partners to induce cooperation amongst farmers and increase their market access.

In relation to the types of products and markets, the farmers in this issue trade a high-value commodity with partners that operate mainly in export markets. Cooperatives are suggested to such smallholder farmers (Okello, 2005). It is much more the case for cashew nut cooperatives which would achieve greater commitment if they engaged in processing activities and adapted to the challenges to comply with quality and grade standards for better market access to their members.

The findings of the survey also support some distinctive features between the part of story about committing to membership and the part of story about committing to business with the cooperative.

While non-price factors were revealed important for the first level of farmer commitment to cooperatives, the second commitment level emphasized the price effects. In fact, in the commitment model of Meyer and Allen (in Lang and Fulton, 2004), farmers possess an affective commitment related to the degree to which they “want” to remain with the cooperative and a continuance (or calculative)

commitment related to the degree to which they “need” to operate with the cooperative. Hence the present study may suggest that becoming a cooperative member is an affective commitment driven by psycho-sociological factors while trading with the cooperative already patronized is a calculative commitment driven by prices and transaction costs. Further, the evidence that member behavior towards cooperatives responded to price changes in the marketing channels enhanced the economic development literature arguing for the hypothesis that peasants are rational and do respond to changes in economic conditions (Ozanne, 1999; Schiff and Montenegro, 1997; and Schultz, 1979).

7. CONCLUSION

Cooperative literature lists considerable potential benefits to farmers forming such organizations. In Africa, one of the major benefits of agricultural cooperatives lies in the improvement of market access to smallholder farmers, seriously constrained by a low level of commercialization. Consequently, it is important to investigate the drivers of commitment to cooperatives to devise and support the promotion of collective commercialization. Quantitative analysis has been made at a first level for becoming a cooperative member and at a second level for doing business with the cooperative.

Evidence is the following:

First, farmers committing to membership believe in the bargaining power of the cooperative, prefer patronage refunds, don’t prefer trade credit, are smallholder farmers, and have some psycho-sociological reasons to join the cooperatives. The farmer’s age is not conclusive on the likelihood of becoming a cooperative member. Second, members committing significantly to business with their cooperative perform a low proportion of presales, face a low product price on the spot market but a higher price within the cooperative, and have reduced transaction costs within the cooperative channel.

The profitability of farm operations with the cooperative and the satisfaction with the cooperative management are not conclusive on a high proportion of farm output delivered to the cooperative.

These findings reveal that the cooperative organization has to offer attractive prices and differentiate itself from the alternative marketing channels to have and keep farmers committed. Cooperatives should choose either to attract only small-scale farmers or to devise ways for keeping small and large farmers agreed on the same interests and cooperative objective for homogeneous farmer groups.

Formal contracts between the member and its organization should exist and be enforced to maintain both parties function well for joint benefits. The findings also pose some challenges to address further.

One challenge consists of investigating the preferences of farmers classified as cooperative members and non-members within different age groups. Another challenge is to check if the pecuniary reasons for committing to cooperatives outweigh the reasons based on the social capital of the farmers and the organizational characteristics of the cooperatives.

Notes:

1. The leader of the National Federation of Cashew Producers of Benin finds critical the lack of institutional arrangements within their organization.
2. Personal interviews at both household and cooperative levels have indicated that credit amounts vary between 50,000 and 200,000 FCFA/member (roughly 100-400 USD).

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Table 1: Independent variables of membership commitment

Variable name	Measurement	Expected sign for members
PCOOPH	Cooperative offers higher cashew nut price to the farmer than the other channels (1-3) ^a	+
POREF	Higher product price at selling time is preferred to patronage refunds (1-3) ^a	-
POTCR	Higher product price at selling time is preferred to trade credit (1-3) ^a	+
LogAGE	Age of the cashew producer (in years) <i>Log(Age)</i>	-
LogCASIZE	Cashew tree area (in hectares) <i>Log(Area + 1)</i>	-
LogCTSIZE	Cotton area (in hectares) <i>Log(Area + 1)</i>	-
LogFSIZE	Total farm area (in hectares) <i>Log(Area + 1)</i>	-
OWNSCOOP	In the past, my own experience in agricultural cooperatives or alike was satisfying. (1-3) ^a	+
OTHSCOOP	My closest network (parents, relatives, friends, etc.) was satisfied with their experience in agricultural cooperatives or alike in the past. (1-3) ^a	+
CTINFL	Cashew farmer representatives have been cotton farmer representatives in the past. (1-3) ^a	-
SOCONFL	Your ethnicity has a social conflict with the common ethnicity of the producers in your village-based cooperative? (1-3) ^a	-
MCPRO	Percentage of cashew cooperative members over cashew farmers within 1 km (%) <i>Ratio</i>	+
EDUC	School attendance (0= never attended school, 1=have attended school and finished at any level)	+

^a Possible responses are: 1=Disagree, 2=Unsure, 3= Agree

Table 2: Descriptive statistics of the independent variables of membership commitment

Independent variables	Total sample			Non-Members			Members			Were Non-Members significantly different from Members? ^a	
	N	Mean	SD	N	Mean	SD	N	Mean	SD	t-stats	Prob.
PCOOPH	277	2.14	0.76	109	1.75	0.67	168	2.39	0.71	-7.60	0.000
POREF	277	2.55	0.77	109	2.71	0.67	168	2.44	0.81	2.97	0.003
POTCR	277	2.39	0.80	109	2.17	0.83	168	2.54	0.76	-3.67	0.000
LogAGE	261	3.83	0.24	101	3.80	0.24	160	3.86	0.23	-1.85	0.066
LogCASIZE	277	1.67	0.79	109	1.70	0.88	168	1.64	0.72	0.61	0.542
LogCTSIZE	276	0.22	0.43	108	0.19	0.41	168	0.24	0.44	-0.85	0.397
LogFSIZE	277	2.34	0.75	109	2.47	0.88	168	2.25	0.64	2.30	0.022
OWNSCOOP	276	2.11	0.87	108	1.52	0.72	168	2.48	0.74	-10.67	0.000
OTHSCOOP	277	2.05	0.83	109	1.67	0.78	168	2.30	0.76	-6.72	0.000
CTINFL	271	2.01	0.92	103	2.28	0.86	168	1.84	0.92	4.01	0.000
SOCONFL	269	1.40	0.62	101	1.53	0.66	168	1.32	0.58	2.69	0.008
MCPRO	277	0.35	0.34	109	0.14	0.25	168	0.49	0.33	-10.22	0.000
EDUC	270	0.57	0.50	106	0.52	0.50	164	0.60	0.49	-1.37	0.173

^a Results from Two Independent Samples Test.

Source: Own results

Table 3: Independent variables in the retained model of commitment to cooperative business

Variable name	Measurement	Expected sign
PROPOUT1	Proportion of presales to alternative buyers (%)	-
LogPOUT2	Price outside the cooperative in cashew season <i>Log(Price in FCFA)</i>	-
LogPCOOP	Cooperative price in cashew season <i>Log(Price in FCFA)</i>	+
GRUNCOUT ^a	Is it a problem that your cashew nuts may not grade as expected when selling directly to the buyers? (1=Yes, 0=No)	+
dLogDIST ^a	Distance from the farm to the cooperative store in km [<i>Log(Distance + 1)</i>] minus Distance from the farm to the usual selling place outside the cooperative in km [<i>Log(Distance + 1)</i>]	-
DISTRICT	District cooperative (1=Zou-Collines; 0= Atacora-Donga)	-
YEAR	Year (1=2009, 0=2008)	?

^a GRUNCOUT stands for monitoring cost variable and dLogDIST for negotiation costs (Hobbs, 1997)

Table 4: Independent variables for the proportion of presales (PROPOUT1)

Variable name	Measurement	Expected sign
LogPOUT1	Price outside the cooperative in cashew pre-season <i>Log(Price in FCFA)</i>	+
COOPMTB	All in all, it is more profitable for me to operate with the cooperative than individually with the other buyers (1-3) ^a	-
SMANAG	The overall cashew cooperative management is satisfying (1-3) ^a	-
MER	Member elected representative (1=Yes, 0=No)	-
YEAR	Year (1=2009, 0=2008)	?

^a Possible responses are: 1=Disagree, 2=Unsure, 3= Agree

Table 5: Descriptive statistics of the variables (excluding dummy controls) of business commitment

Variables	N	Mean	SD
PROPOUT1	335	14.53	23.10
PROPCOOP	335	43.84	40.54
LogPOUT1	335	2.20	2.53
LogPOUT2	335	3.62	2.51
LogPCOOP	335	3.34	2.63
GRUNCOUT	335	0.60	0.49
dLogDIST	333	0.48	0.77
COOPMTB	335	2.33	0.71
SMANAG	335	2.53	0.71

Source: Own results

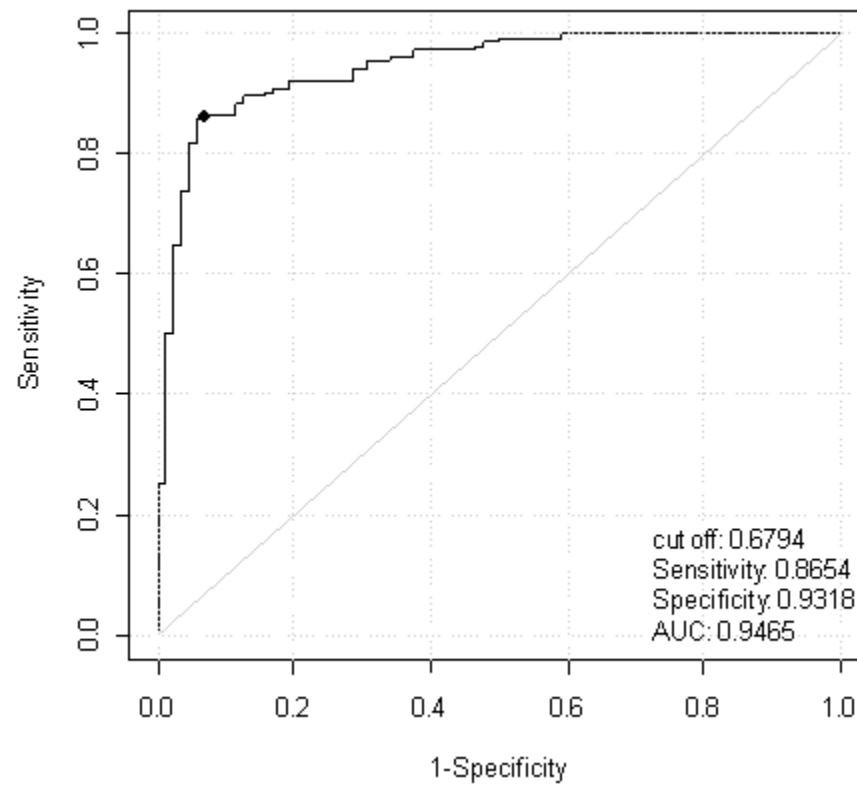
Table 6: Logit analysis of membership commitment

Dependent variable: MBER2GR (1=member, 0=non-member)		
Independent variables	Coef. (Std. Err)	Average marginal effects
(Constant)	-1.795* (1.052)	
PCOOPH 2	2.084*** (0.604)	0.197
PCOOPH 3	3.318*** (0.689)	0.314
POREF 2	-0.079 (1.036)	-0.008
POREF 3	-2.298** (0.711)	-0.217
POTCR 2	0.956 (0.744)	-0.090
POTCR 3	2.057** (0.627)	0.194
LogTotFSIZE	-0.779** (0.351)	-0.074
OWNSCOOP 2	1.220 (0.746)	0.115
OWNSCOOP 3	1.291** (0.618)	0.122
OTHSCOOP 2	1.341** (0.675)	0.127
OTHSCOOP 3	2.800*** (0.775)	0.265
CTINFL 2	-0.604 (0.705)	-0.057
CTINFL 3	-1.312** (0.564)	-0.124
MCPROD	4.081*** (0.880)	0.386
Valid observations: 244		
Log-Likelihood value: -69.19 (df=15)		
Mc Fadden's Pseudo-R ² : 0.57		
AIC: 168.38		

*Reference category for ordinal independent variables is their first level (Disagree with the statement). Significance at 1%, 5%, and 10% levels is denoted respectively by ***, **, *.*

Source: Own results

Figure 1: ROC graph for the model of commitment to cooperative membership



Source: Own results

Table 7: Tobit analysis of presales outside the cooperative

Dependent variable: proportion of raw cashew nuts presold (PROPOUT1) in %			
	OLS	MLE (Tobit)	
Independent variables	Coef. (Std. Error)	Coef. (Std. Error)	Marginal effects
(Constant)	-3.003 (3.887)	-82.346*** (23.262)	
YEAR	-0.196 (1.717)	0.521 (3.886)	0.224
MER	3.098* (1.846)	5.446 (4.561)	2.341
COOPMTB 2	-0.243 (2.723)	-0.587 (5.460)	-0.252
COOPMTB 3	-4.539* (2.711)	-8.860 (5.701)	-3.808
SMANAG 2	2.174 (3.096)	2.352 (6.161)	1.011
SMANAG 3	5.220* (2.750)	7.838 (5.949)	3.369
LogPOUT1	6.634*** (0.352)	21.934*** (4.274)	9.428
Adjusted R-squared = 0.537		$\hat{\sigma} = 23.28$	
Range of predicted PROPOUT1 (%): [-7.54 43.18]		Wald test: 35.56*** (df=7)	
Total Observations: 335		Observations: % Left-censored = 57;	
		% Uncensored = 43; % Right-censored = 0	

*Reference category for COOPMTB and SMANAG is their first level (Disagree with the statement). Standard errors are heteroskedasticity-robust. Significance at 1%, 5%, and 10% levels is denoted respectively by ***, **, *.*

Source: Own results

Table 8: Tobit analysis of member commitment to cooperative business

Dependent variable: proportion of raw cashew nuts delivered to cooperative (PROPCOOP) in %			
	OLS	MLE (Tobit)	
Independent variables	Coef. (Std. Error)	Coef. (Std. Error)	Marginal effects
(Constant)	43.331*** (2.248)	-92.017 (64.616)	
YEAR	-1.117 (1.414)	-1.899 (2.849)	-0.782
DISTRICT	0.549 (1.710)	-13.442** (4.629)	-5.537
GRUNCOUT	5.710*** (1.531)	11.721*** (3.257)	4.828
LogPCOOP	9.109*** (0.339)	34.495** (12.202)	14.210
LogPOUT2	-7.249*** (0.368)	-9.118*** (0.676)	-3.756
PROPOUT1	-0.468*** (0.034)	-0.315*** (0.026)	-0.130
Adjusted R-squared = 0.898		$\hat{\sigma} = 17.64$	
Range of predicted PROPCOOP (%): [-28.63 100.87]		Wald test: 337.3*** (df=6)	
Total Observations: 335		Observations: % Left-censored = 38.21%; % Uncensored = 41.19; % Right-censored = 20.60	

Reference category for COOPMTB and SMANAG is their first level (Disagree with the statement)

Standard errors are heteroskedasticity-robust

*Significance at 1%, 5%, and 10% levels is denoted respectively by ***, **, *.*

Source: Own results