Determinants of collective marketing performance: Evidence from Kenya's coffee cooperatives

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1 Introduction

Smallholders in developing countries face numerous constraints due to the pervasive imperfections of markets. Increasing evidence shows that through collective action smallholders can reduce the transaction costs of accessing input and output markets, adopt efficiency-increasing and value-adding technologies, and tap into high-value markets associated with certification and labeling (Kersting and Wollni, 2012; Wollni and Zeller, 2007; Gruere et al., 2009; Devaux et al., 2009; Narrod et al., 2009). Additionally, collective marketing can lead to improved bargaining power in negotiations with buyers and intermediaries (Markelova et al., 2009; Stockbridge et al., 2003). Against the background of these potential benefits, the support of farmer groups and community associations is high on the policy agenda (Bernard and Spielman, 2009). Success stories of farmer organizations, cooperatives or alternative forms of collective action are documented in several studies: coffee cooperatives in Costa Rica (Wollni and Zeller, 2007), green bean marketing cooperatives in Kenya (Narrod et al., 2009), banana farmer organizations in Kenya (Fischer and Qaim, 2012), and dairy marketing cooperatives in Ethiopia (Holloway et al., 2000). However, these success stories cannot simply be generalized. Cases are documented where farmer organizations did not improve the farmer's situation and where forms of collective action eventually collapsed (Markelova et al., 2009; Poulton et al., 2010; Vandeplas et al. 2013).

The failure of many collective action initiatives can be partly attributed to the little attention that was given to understanding how collective action works (Meinzen-Dick et al., 2004). Agrawal (2001) based on the earlier work of Wade (1998), Ostrom (1990), and Baland and Platteau (1996) distinguishes three broad categories of variables, including group characteristics, institutional arrangements, and the external environment that determine the functioning of collective action and are relevant in the context of smallholder market access. A critical aspect of the functioning of collective action concerns the extent to which group members are committed to their cooperative. Member commitment can be considered an antecedent attitude of loyal behavior, which might determine the actual loyalty of members (Cechin et al., 2013). Group characteristics, institutional arrangements and the external environment affect the functioning of collective action via formal institutions, such as rules, fines, and regulations or via informal social constraints, such as norms, shared values and conventions. Formal institutions directly create incentives and control, inducing group members to behave towards a common interest or purpose (Stockbridge et al., 2003). First,

informal institutions strengthen internal cohesion, which is characterized by a common sense of purpose and accountability. Second, informal institutions enforce the mechanism of reciprocity (Habyarimana et al., 2009). In other words, in order to maintain their reputation and to increase the likelihood of receiving help from someone else, individuals in a close-knit social network repeat loyal behavior (and, thus, avoid opportunistic behavior) (Collier, 1998). When members are committed to their cooperative, i.e., collective action functions well, this is likely to have a direct effect on the performance of the group: committed members are less likely to 'sell outside', when better prices or services are offered by alternative buyers; commitment also reduces transaction costs associated with sanctions and regulations of the cooperative due to a lower likelihood of opportunistic behavior (Cechin et al., 2013).

Several case studies investigate the determinants of performance in marketing cooperatives. Based on 34 farmer groups in Tanzania, Barham and Chitemi (2009) show that different group characteristics (e.g. origin, and structural and cognitive social capital) affect the marketing performance of the group. Devaux et al. (2009) highlight the importance of the coexistence of external facilitation and support and institutional arrangements, such as a strong leadership, as in the case of the Papa Andina network in Peru and Bolivia. Fewer quantitative studies on factors that affect the success of collective action in sub-Saharan Africa have been conducted. One of them conducted by Bernard and Spielman (2009) analyzes the relationship between characteristics of membership (heterogeneity), governance and performance based on data from 160 marketing cooperatives in Ethiopia. Their analysis demonstrates the trade-off between the extent of inclusiveness associated with members' heterogeneity and the cooperative's performance.

In this study, we use original survey data from 120 Kenyan coffee cooperatives to analyze the determinants of perceived member commitment and marketing performance. Coffee is traditionally the backbone of Kenya's highland economy. It is mostly produced by smallholders with 75% of the coffee area under smallholder production system (Mude, 2005). Smallholder coffee producers are legally bound to market their coffee through cooperatives (Mude, 2007). Triggered by low and volatile coffee world market prices and political reforms in the Kenyan coffee sector in the 1990's, national coffee production and productivity decreased considerably in the last two decades while coffee prices have continuously increased since 2003. The political reforms came along with an increase in corruption and patronage in Kenya's coffee cooperatives (Mude, 2007). Yet, until now a systematic analysis of the determinants of collective action and of the marketing performance of Kenyan coffee

cooperatives has been lacking. Based on Agrawal (2001), we first estimate the effect of group characteristics, institutional arrangements and external factors on members' commitment to their cooperative. In the second stage, we identify the effect of commitment on different indicators of cooperative marketing performance.

The remainder of this paper is structured in the following manner. In the next section, we provide background information on the Kenyan coffee sector and coffee cooperatives. Section 2 gives details on the original survey data used in this study. In section 3 and 4, we present and discuss results of the econometric analyses on the determinants of perceived commitment and on collective marketing performance, respectively. The last section concludes.

2 Background: Coffee cooperatives in Kenya

Since its introduction as a cash crop in the early 1900s, coffee has traditionally been the backbone of Kenya's highland economy. Until the global coffee crisis in 1933, when Brazil released its surpluses onto the world market and prices plummeted, coffee was grown exclusively by European settlers around Nairobi. Starting in Kisii and Meru districts, smallholders were allowed to produce coffee on an experimental basis. In 1944, smallholders were required by law to join local cooperatives run by the government. The growth of the smallholder coffee sector was accompanied by the exclusive control over production and marketing by the Coffee Board of Kenya (CBK) and the Coffee Marketing Board (CMB) (Hyde, 2008). Today, there are around 600,000 smallholder coffee farmers[1] in Kenya (Ministry of Agriculture, 2010) who farm about 75% of the coffee area (Mude, 2005). Smallholders are legally bound to deliver their coffee cherries to cooperatively owned factories for primary processing. Each cooperative runs one or more factories within a certain catchment area defined by natural borders, political boundaries and/or generally accepted informal boundaries. Coffee farmers within a catchment area hold shares of the cooperative's capital and are, thereby, obliged to deliver their coffee to the factories of that particular cooperative. Primary processing at the factory level, known as wet processing, involves the sorting of coffee cherries, pulping, fermentation, drying and storage and results in parchment coffee. The parchment coffee is marketed collectively, either at the cooperative or factory level. The coffee produced at each factory or cooperative is pooled so that one farmer's

[1] Farmers who have less than five acres of coffee are defined as smallholders (Ministry of Agriculture, 2010).

contribution is not discernible from another's. The parchment coffee is delivered to the miller, where the secondary processing takes place. It involves hulling, grading, milling of coffee and final grading. Currently there are six main millers in Kenya (Nyambene, Thika Coffee Mills, Sasini, Kofinaf, Central Kenya and KPCU). After milling, the coffee is supposed to be passed on to the marketing agent. Coffee producers are paid twice per year. In the beginning of the season producers receive the coffee advance payment, which is the lowest expected payment per kilogram of the season (Mude, 2007). The calculation of the second and final payment is based on the revenue received from coffee sales. The cooperative management then deducts all of its operating costs, including maintenance and service expenses, loan repayments and salaries. The final payment can either be done at the cooperative level or the factory level. The second method allows for inter-factory, intra-cooperative price variation. Besides primary processing and marketing, cooperatives provide inputs as well as education and extension services to their members.

Coffee production has declined over the past 20 years while coffee area remained at around 150,000 to 160, 000 ha over the same period (FAOSTAT, 2013, Figure 1).

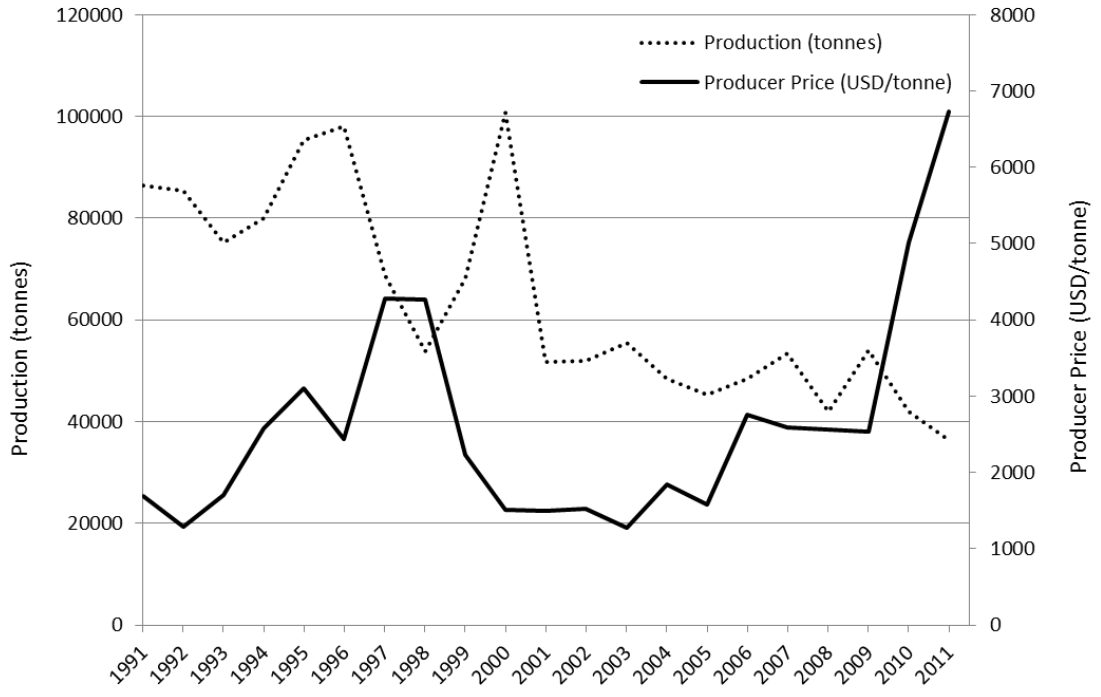

Figure 1: Development of producer price (USD/tonne) and production (tonnes) from 1991-2011

The decline in production has been more pronounced among smallholders, whose average production decreased by 41% while the average production of estates declined by 29% in the last decade (Ministry of Agriculture, 2010).

The weak performance of Kenya's coffee sector in terms of declining production contradicts increasing performance in terms of rising coffee prices. This suggests that additional circumstances specific to the Kenyan coffee sector contribute to low levels of coffee production and productivity.

Since the early 1990s, the liberalization of the Kenyan coffee sector has fundamentally altered the structure of the coffee value chain. As well as the dismantling of the monopoly power of the Coffee Board of Kenya as a marketing agent, it also led to the removal of all policy-making jurisdictions over the economic activities of cooperatives. On one hand, the reforms encouraged farmer and private sector participation through the reduction of government involvement in the coffee sector. Processing costs and statutory deductions, especially at the milling and marketing stages, decreased substantially due to increasing competition in the coffee value chain. On the other hand, problems of corruption, political opportunism, and mismanagement have increased across all institutions in the coffee sector, especially in coffee cooperatives (Karanja and Nyoro, 2002; Mude, 2007).

While Karanja and Nyoro (2002) and Mude (2007) have identified factors explaining the low performance of Kenyan coffee sector based on case studies, we investigate determinants of members' commitment and its impact on the marketing performance based on a representative data set which includes 120 coffee cooperatives.

3 Study design and empirical data

In this paper, we use data from a representative survey of coffee cooperatives in the Central and Eastern provinces of Kenya. Around 50% of all Kenyan coffee cooperatives are located in these two provinces, which account for approximately 50% of the national coffee production (Ministry of Agriculture, 2010). In preparation for the survey, a list of all cooperatives in this region was compiled in collaboration with the Ministry of Agriculture and with coffee cooperative unions at district level. Out of a total of 180 coffee cooperatives, 120 cooperatives were randomly selected, ensuring an equal ratio of around 70% of the total population selected in each district. The survey was conducted between January and March 2011.

The target person for the interview was the secretary manager of the cooperative who is employed by the cooperative and was chosen for two main reasons: (1) the secretary manager is responsible for the accounting and bookkeeping and, thus, best knows the data and figures associated with the cooperative; and (2) because -the secretary manager is employed by the

cooperative and not elected, he/she is considered the most objective person among possible interviewees. The interviews comprised a standardized questionnaire that included sections on the following aspects*: (*1) general information; (2) certification; (3) input provision; (4) education provision; (5) processing; (6) milling/marketing; (7) payment to farmers; (8) organizational structure; (9) institutional arrangements; (10) financial status; and (11) social capital among members and between members and millers/marketers. In general, the data collected refers to the coffee year 2009/10[2]. Key data, such as the final payment to members, delivered quantity, and marketing strategy, were also recorded for a recall period of five years (2005/06 - 2009/10). These years represent a period of relatively steadily increasing prices for Kenyan coffee on the world market.

In addition to the cooperative survey, four expert interviews were carried out to make tacit knowledge more explicit. These included interviews with representatives of two public institutions: the Ministry of Cooperative Development and Marketing in Nairobi, and the Kenyan Coffee Board in Thika. Furthermore, to cover a traditional intermediary between the private and the public sector, managers of Mugama Farmers' Cooperative Union in Muranga were visited. Finally, we interviewed a more recently-emerged stakeholder of the coffee sector ─ Sustainable Management Services in Nyeri, which is a service provider in the coffee sector and belongs to the international coffee trader ECOM. They provide training and extension services to seven coffee cooperatives in collaboration with the Dutch development organization HIVOS (Humanist Institute for Development Cooperation).

4 Determinants of perceived commitment in Kenyan coffee cooperatives

(a) Methodology

We estimate the effect of various potential explanatory variables on the extent of perceived member commitment as rated by the secretary manager using an ordered logit model. In our survey, the secretary manager was asked to indicate on a five-point-Likert scale whether or not members of the cooperative contribute time and money towards common development goals. Thus, perceived commitment is measured as a categorical variable ranging from one (very low levels of perceived commitment) to five (very high levels of perceived

[2] The coffee year 2009/10 includes the time from 1st October 2009 to 30th September 2010.

commitment). We assume that there is a continuous level of commitment underlying this perception, which is, however, difficult to quantify and, therefore, is unobserved. The underlying level of perceived commitment is modeled as:

$$Y^* = X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \varepsilon \quad (1)$$

where Y^* is the latent outcome variable; X_1, X_2 and X_3 are vectors of independent variables related to group characteristics, institutional arrangements, and the external environment, respectively; β is a parameter vector to be estimated; and ε is a random error term. While we do not observe the underlying level of commitment, we observe that

$$y = \begin{cases} y = 0 \text{ if } y^* \leq \alpha_1 \\ y = 1 \text{ if } \alpha_1 < y^* \leq \alpha_2 \\ y = j \text{ if } y^* > \alpha_j \end{cases} \quad (2)$$

$$with\ j = 5$$

where α_j are unknown threshold parameters to be estimated.

The first set of variables included in X_1 relates to the characteristics of the group. We consider five main aspects: the size of the group, the age of the group, the origin of the group, the number of factories belonging to the group and the extent of democratic decision-making.

The size of the group is measured by the number of active members. The effect of group size on commitment is controversially discussed in the literature (Meinzen-Dick et al., 1997). On one hand, larger groups can exploit economies of scale and, thus, be associated with positive incentives for collective action (e.g. Stringfellow et al., 1997). On the other hand, increasing group size also increases transaction costs associated with monitoring the actions of other group members and may, thus, lead to lower levels of commitment (e.g. Coulter et al., 1999).

The age of the group is often used as a proxy for experience-based trust. According to Meinzen-Dick et al. (1997), individuals in older groups know what to expect from other group members because they have already built collective cognition associated with shared norms and values. Hence, we expect that older groups receive higher levels of commitment.

Regarding the origin of the group, we include a dummy variable that equals one if the cooperative is a split-off[3]. In the last two decades, many cooperatives have split from their mother cooperatives, mostly due to internal disputes among members of the original cooperative. This process is often accompanied by a financial liquidation (Karanja and Nyoro, 2002). Thus, on one hand, the split-off of a cooperative can be associated with a strengthening of shared norms and trust among members through a process of self-selection. On the other hand, in the Kenyan cases, financial constraints associated with the split-off have often reduced payments to members and may adversely affect members' commitment to contribute time and money to the cooperative.

The number of factories is used as an indicator reflecting social heterogeneity of the membership base. Larger numbers of factories are usually a result of factories being maintained due to intra-cooperative political dissent. Hence, a larger number of factories can be associated with higher variability in social background and objectives among members and is, therefore likely to result in lower levels of perceived commitment[4] (Habyarimana et al., 2009; Baland and Platteau, 1999).

To measure the extent of democratic decision-making we include a dummy variable that equals one if the cooperative has an above average rate of participation in meetings. In addition, we include a variable on the number of special resolutions contributed by members in the last five years. Special resolutions can be contributed by any member of the cooperative and need to be passed by two thirds of the attending members in a special general meeting. We expect that higher levels of democratic decision making within a cooperative have a

[3] Note that all Kenyan coffee cooperatives were founded by the government and, therefore, it is of little relevance to make a distinction between state-founded and e.g. farmer-founded groups in this context.

[4] Another potential explanation for a larger number of factories is a higher demand for processing capacities. However, in the case of Kenyan coffee cooperatives the processing capacity of the factories is only used up to 20% on the average.

positive effect on members' identification with the decisions taken by the group and, thus, a positive effect on perceived commitment (Stockbridge et al., 2003).

In successful cooperatives or farmers organizations, informal social mechanisms are often embedded within institutional arrangements, including formal rules and organizational structures (Ostrom, 1990; Agrawal and Ostrom, 2001; Shiferaw et al., 2008; Stockbridge et al., 2003). Therefore, the second set of variables included in X_2 relates to the institutional arrangements governing the relationships within the cooperative. We add a dummy variable that equals one if fines for breaching the by-laws exist. To ensure continuous cooperation, members need the assurance that other members of the cooperative meet their side of the bargain (Ostrom, 1990). Hence, we expect that the existence of fines positively effects the perceived commitment of members.

Furthermore, we include a variable on the extent of price differentiation implemented by the cooperative. In general, all coffee delivered to the cooperative is pooled and a final producer price is paid that depends on the average coffee quality produced by all members. This allows members with low coffee quality to benefit from high coffee qualities delivered by other members. Given that members with high quality coffee do not receive an adequate price for their product, their commitment to the cooperative decreases. In this context, if the final price is paid at the factory rather than the cooperative level, it allows for intra-cooperative, inter-factory price discrimination. A high value of the included variable indicates that heterogeneity in the delivered coffee quality among members is mediated by price differentiation across factories and is, therefore, expected to result in an increased likelihood of members' commitment at the cooperative level.

Finally, the variables included in X_3 refer to the external environment in which the cooperative operates. Three variables are included to reflect the distance to markets. First, we measure the average distance in kilometers from members' farms to an agro-vet shop reflecting farmers' access to input markets. Second, we include two variables on the travel time from the cooperative headquarters to the district headquarters and to Nairobi, respectively.

Last but not least, we include two variables to control for the personal characteristics of the secretary manager that might influence his or her ability to estimate member commitment. The first variable measures the experience of the secretary manager in years. The second variable is a dummy variable that equals one if the secretary manager holds at least a college

degree. Table 1 provides descriptions and summary statistics for the variables included in the econometric model on the extent of the perceived commitment.

Table 1: Description and summary statistics for the variables included in the model on the extent of perceived commitment

Variable	Measurement	Number of observations	Mean	Standard Deviation	Measurement scale
Perceived commitment	Do members of the coop. contribute time and money towards common development goals? (1= very low level of commitment; 2= low level of commitment; 3= average level of commitment; 4= high level of commitment; 5= very high level of commitment)	119	2.88	1.14	Categorical
Group characteristics					
Size (members)	Number of active members [a]	119	2071	1905.02	Continuous
Age	Years since cooperative has been founded	119	20	16.93	Continuous
Offspring	Cooperative is split-off from mother cooperative	119	0.76	0.43	Dummy
Number factories	Number of factories belonging to cooperative	119	3.24	2.56	Continuous
Democratic decision-making	Participation rate in meeting is above average [b]	120	.44	.50	Dummy
	Number of special resolutions contributed by members in the last five years	114	7.97	3.58	Continuous
Institutional arrangements					
Fixation of fine	Fixation of fines in by-laws	117	.78	.42	Dummy
Intra-cooperative price differentiation	Relative distribution of the final payment across factories over last five years [c]	120	.90	1.09	Continuous
External environment					
Distance to markets	Average distance (km) from members' farms to nearest agrovet shop [d]	119	3.5	3.19	Continuous
	Travel time (in minutes) from the cooperative headquarters to district headquarters [e]	119	66	39.56	Continuous
	Travel time (in minutes) from the cooperative headquarters to Nairobi [e]	119	264	88.99	Continuous
Experience secretary manager	Number of years secretary manager employed in cooperative	102	5.91	4.35	Continuous
Education secretary manager	Secretary manger holds at least college degree	112	0.62	0.49	Dummy

[a] Active membership requires the delivery of at least one kilogram of coffee cherries to the cooperative within one year. It authorizes the member to receive inputs and further services from the cooperative.

[b] The term for committee membership is fixed at three years. Each year a certain share of members is up for re-election. The election takes place either at the cooperative level or at the factory level. Each cooperative has five, seven or nine committee members, depending on the group size. This implies, considering a three-year rotation term that one, two, or three committee members are re-elected every year. Across all cooperatives, the average participation rate of cooperative members in the election of committee members is 24%. Descriptive statistics show no link between the numbers of committee members that face re-election, the number of factories that vote and the average number of participants in the election. Hence, we use a dummy variable that equals one as an indicator, if the cooperative has an above average rate of election participation.

[C] The relative distribution is calculated as the highest final price paid by a factory minus the lowest final price paid by a factory divided by the average final price across all factories belonging to the cooperative.

[d] The data are based on estimates from the secretary manager.

[e] The calculation of the travel time is based on the market accessibility analysis developed by the International Center for Tropical Agriculture. The accessibility surface is derived by running a cost distance analysis on the friction surface. The friction surface is a grid where each cell's value represents the cost of traversing that particular cell. The cost calculation takes into account the road condition, slope of the road, land use class (agriculture/non agriculture), urban areas, rivers and barriers. Further information on this methodology can be found at http://gisweb.ciat.cgiar.org

Source: Authors' own survey

(b) Results and discussion

Figure 1 shows the distribution of the levels of perceived commitment. The level of perceived commitment of cooperative members to contribute time and money towards common development goals differs considerably among the coffee cooperatives in our sample. While in 31.7% of the cooperatives, the secretary manager stated a very high or high level of commitment of the cooperative members, in 31.7% of the cooperatives they reported low or very low levels of commitment.

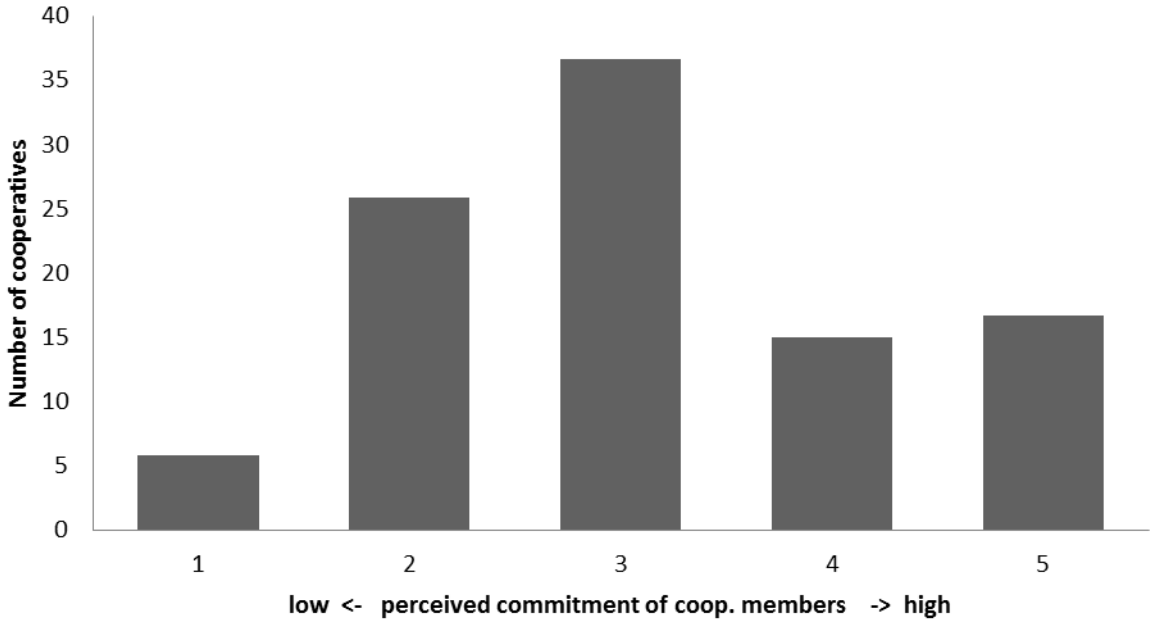

Figure 2: Distribution of the levels of perceived commitment

Source: Author's own survey

Table 2 presents the results of the econometric analysis on the determinants of perceived commitment. The ordered logit model relies on the underlying assumption of proportional odds across response categories. We use an approximate likelihood ratio test to test the null-hypothesis that there is no difference between the coefficients across categories. The null-

hypothesis of proportional odds cannot be rejected indicating that the ordered logit model is an appropriate specification. An odds ratio greater than one indicates a positive association between the independent variable and the outcome variable. Accordingly, if the value of the independent variable increases, the likelihood of being in a higher category, versus the combined middle and lower categories increases, *ceteris paribus*. An odds ratio smaller than one implies that an increase in the value of the independent variable is associated with an increase in the likelihood of being in a lower category of perceived commitment. In addition, we apply a likelihood ratio (LR) chi-square test to test the null-hypothesis that all coefficients are equal to zero, i.e., the model has no explanatory power. The test statistic is significant at the 1% level, indicating that at least one of the regression coefficients is not equal to zero. We calculate variance inflation factors, which are smaller than ten, indicating that multi-collinearity is not a problem.

Table 2: Results of the ordered logit models on the extent of perceived commitment

Dependent variable: perceived commitment (categorical)	Odds ratio
Group characteristics	
Size (no.)	1.00**
	(.00)
Age (years)	.98
	(.01)
Offspring (0/1)	.21**
	(.14)
Number of factories (no.)	.60***
	(.11)
High participation in meeting (0/1)	1.69
	(.73)
Special resolutions contributed by members in last five years (no.)	1.10***
	(.03)
Institutional arrangements	
Intra-cooperative price differentiation	1.52*
	(.37)
Fixation of fines in by-laws (0/1)	3.30**
	(1.84)
External environment	
Distance from members´ farm to nearest agrovet shop (km)	.92
	(.06)
Travel distance from coop. headquarters to district headquarters (min.)	1.00
	(.00)
Travel distance from coop. headquarters to Nairobi (min.)	1.00*
	(.00)
Experience of secretary manager (years)	1.02
	(.05)
Education secretary manager (0/1)	.80
	(.35)
Number of observations	96
LRchi2 (13)	41.27
Prob>chi2	.00
Likelihood-ratio test of proportionality of odds LRchi2 (39)	50.04
Prob>chi2	.11

Notes: *p<0.10, **p< 0.05, ***p<0.01. Standard errors in parenthesis

Source: Authors' own survey

Regarding group characteristics, we find that group size, group origin, the number of factories, and the number of special resolutions, have a significant effect on commitment. The results show that with a larger group size the probability of high levels of commitment increases. This indicates that, in Kenyan marketing cooperatives, scale economies play an important role and seem to outweigh the effect of increasing transaction costs associated with a larger membership base. Our results further reveal that, for cooperatives that are a split-off from a mother cooperative, the probability of high levels of commitment is significantly lower. These findings indicate that the debt burden that is usually associated with such a split-off poses a significant challenge to the coherence of the cooperative reflected in lower member commitment (Nyoro and Ngugi, 2007; Karanja and Nyoro, 2002).

Moreover, we find that with an increasing number of factories per cooperative, and thus with increasing heterogeneity in social background and objectives of members, the likelihood of lower levels of commitment increases. Three main mechanisms that link homogeneity of social background and objectives with successful collective action may contribute to explaining this finding: (1) individuals of a similar social background are more likely to take each other's welfare into account, due to strong social cohesion; (2) the probability of repeated interactions and, thus, reciprocity is more likely among members with similar objectives; and (3) monitoring and enforcement of rules is likely to be more efficient within homogenous groups (Habyarimana et al.. 2009).

As expected, with an increasing number of special resolutions contributed by members in the last five years, the level of perceived commitment increases. This is consistent with the idea that through democratic decision-making individuals develop shared values, resulting in increased collective cognition and, therefore, in an increased probability of members' commitment (Kruijssen et al., 2009; Stockbridge et al., 2003). Additionally, democratic decision-making processes acknowledge the inherent worth of members, which is also likely to result in member satisfaction and increased commitment towards cooperative goals (Robertson and Tang, 1995).

With respect to the institutional arrangements governing the relationship between members and their cooperative, findings suggest that the existence of fines has a positive and significant effect on the commitment of members. As expected, our results show that the definition of clear rules and penalties for non-compliance with these rules can be an important factor contributing to the success of collective action. Our results further indicate that, with increasing intra-cooperative producer price differentiation, the level of perceived commitment

increases. This also indicates that if suitable mechanisms to deal with heterogeneity are implemented by the institution, the commitment of cooperative members can effectively be increased.

Finally, among the variables reflecting the external environment, only the distance to Nairobi is statistically significant. Unexpectedly, we find that, with an increasing distance to Nairobi, the likelihood of high levels of perceived commitment experienced by the cooperative decreases. This is contrary to previous studies that have argued that due to relaxed social ties and high opportunities for off-farm employment, the commitment of cooperative's members is likely to be less prevalent in areas located in close proximity to markets (Ostrom and Gardener, 1993; Meinzen-Dick et al., 1997). In our study, the negative effect of distance on commitment might be explained by the fact that, in those districts located further away from Nairobi, coffee has successively lost importance during recent years and farmers have replaced their coffee trees with *Miraa*[5] cultivation instead (Mude, 2007).

5 Determinants of the marketing performance of Kenyan coffee cooperatives

(a) Methodology

Next, we analyze the effect of the perceived commitment of cooperative members on the marketing performance of Kenyan coffee cooperatives. Two different indicators are used to measure marketing performance: the delivered quantity of coffee cherries per active member, which is measured as the turnover of the cooperative divided by its membership base, and the final price paid to members. Marketing performance is modeled as a function of perceived commitment and various other potential explanatory variables:

$$y_{1t} = y_{2t}\,\beta_1 + x_{1t}\,\beta_2 + \varepsilon_t\,, \qquad t = 1, \ldots \tag{3}$$

Where y_1 is the marketing performance of cooperative i, y_2 is the level of commitment experienced by cooperative i, x_1 is a vector of exogenous variables and β_1 and β_2 are parameter vectors to be estimated. While we expect commitment to have a positive effect on performance, the direction of causation is not straight forward and problems of reverse

[5] Mirraa (also known as *khat)* used as a stimulant is mainly exported to Nairobi or Somalia.

causality may exist, which would lead to biased estimates in an ordinary least squares estimation. In particular, it may be the case that low performance levels at the cooperative level increase the probability of low levels of commitment among members. As a result, parameter estimates for commitment in a simple regression framework would be biased upward. In order to control for potential endogeneity of the variable commitment, we apply an instrumental variables approach, where the first stage equation is specified as:

$$y_{2t} = x_{1t}\pi_1 + x_{2t}\pi_2 + v_t \qquad (4)$$

where x_2 is a vector of instruments for the endogenous regressor, perceived commitment, that satisfy $E(\varepsilon_i \mid x_{2i})=0$ (Cameron and Trivedi, 2010). The two equations are estimated by two-stage least squares[6]. As exclusion restrictions, we include the number of special resolutions contributed by members during the last five years and a dummy variable on the fixation of fines in the by-laws. While both variables have a significantly positive effect on commitment, they are not expected to directly influence marketing performance other than through their indirect effect through commitment.

Farmers are usually paid in two or three installments. The first installment is usually paid at the beginning of the season, and later installments are made as the cooperative is marketing the coffee. At the end of the season, after all operating costs, including maintenance and service expenses, loan repayments and salaries, are deducted from total coffee revenues, the final payment is made to members. This final payment can be done either at the cooperative (paying the same final price to all members) or at the factory level (paying the same final price to members delivering to each factory). In our analysis, the final price per kilogram of

[6] We use a linear regression in the first stage of the IV model. According to Angrist and Krueger (1991) the application of a probit or logit in the first stage is not necessary and is even self-defeating due to the fact that in a two-stage least square model the consistency of the parameter estimates in the second stage does not depend on the suitable functional form of the first stage. In addition, plugging the fitted values of a non-linear estimation in the first stage directly into a linear regression in the second stage ─ with the exception of when the assumption of linearity is exactly right ─ can cause inconsistent estimates (Roy and Thorat, 2008).

coffee is calculated as the sum of all installments throughout the coffee year. If the final payment is implemented at the factory level, we use the non-weighted average final price across all factories of the cooperative.

Most importantly, we expect that high levels of perceived commitment increase marketing performance and, thus, the average quantity of coffee cherries delivered per active member, which is used as an indicator for the marketing volume of the cooperative. Variables included as explanatory factors are the marketing strategy of the cooperative, management skills, and market access. Furthermore, we include a dummy variable that equals one if the cooperative is located in an area that has suitable agro-climatic conditions for coffee production. Agro-climatic suitability results in a higher productivity potential and is, therefore, expected to have a positive impact on the average quantity of coffee delivered. Furthermore, we include a number of variables that reflect input and service provision by the cooperative. The provision of farm inputs refers to inorganic fertilizers, pesticides, herbicides, equipment for pruning and chemical applications, and plant material, such as coffee and shade tree seedlings. Chemicals and seedlings are mainly provided to members on credit. We, therefore, also include a variable that measures the average deduction per active member for inputs on credit in our model. District-level dummies are included to control for regional heterogeneity.

The second model identifies the factors influencing the final price paid to members. We expect that high levels of perceived commitment increase marketing performance and, thus, the final price paid to members. Furthermore, we account for the level at which the payment is implemented (factory or cooperative level); the share of the total revenue that is transferred to members, and the share of coffee graded as high quality (grades AA/AB). Green coffee in Kenya is sold by grades[7], and coffee prices paid at the auction decrease considerably with a change from grade AB to C. Therefore, we include the share of green coffee graded as AA/AB in the regression as a proxy for coffee quality[8]. Furthermore, marketing strategy,

[7] In the mills, the green coffee is graded. Currently, twelve different coffee grades are traded at the auction (AA/AB/C/E/MH/ML/PB/T/TT/UG/UG1/UG2).

[8] Due to the lack of record keeping by the interviewed cooperatives, it was not possible to obtain data on the produced coffee quantity by coffee grade. Hence, the data are based on estimates of the individual secretary managers.

management skills, and market access are likely to be important determinants of the final price paid to farmers. Regarding the marketing strategy, new opportunities have emerged during recent years. This includes certification at the cooperative level, which allows cooperatives to access high-value niche markets. Moreover, the option to directly market coffee (bypassing the auction) was introduced in 2005/2006. This gives cooperatives the opportunity to obtain a marketing license authorizing them to bargain directly with coffee exporters or marketing agents. To control for these marketing strategies, we include two dummy variables that capture whether or not the cooperative has obtained certification and a direct marketing license. Further variables that are important in the context of the marketing strategy relate to the relationship with the miller to which the cooperative delivers. This is especially critical because in many cases the marketer, who sells the green coffee to exporters at the coffee auction in Nairobi, is a sub-company of the miller[9] and, therefore, marketer choice is determined by miller choice. Since the monopoly formerly held by Kenya Planters Cooperative Union (KPCU) was abolished during the liberalization of the milling sector, coffee milling is now dominated by six companies. However, the qualitative interviews show that lack of transparency[10] and poor services have resulted in low levels of trust between millers and cooperatives and, thus, in relatively short-term relationships. We account for this in our analysis by including a variable that captures the share of seasonally changing millers that the cooperative delivers to. At the cooperative level, the choice of the miller is determined through democratic elections, where each member can vote for their preferred miller. In practice, farmers are often offered bribes by millers to buy their votes, resulting in pressure among members to vote for a specific miller. We include a dummy variable in our model that captures this aspect of stated election capture by the secretary manager. We expect that in the case that election capture exists, miller choice is driven by factors other than good performance and will, therefore, result in lower marketing performance. Finally, district dummies are included in the model to control for regional heterogeneity. Table 3 describes the variables included in the marketing performance models and provides summary statistics.

[9] Around 83% of the cooperatives in our sample state that at least one of the marketers they worked with was a sub-company of the miller they delivered to in 2009/10.

[10] Lack of transparency is an issue e.g. with respect to the exchange rate between US dollars and Kenyan shillings or with respect to the extent of processing losses.

Table 3: Description and summary statistics for the variables included in the marketing performance models

Variable	Measurement	Number of observations	Mean	Standard Deviation	Measurement scale
Average turnover	Average quantity of coffee cherries delivered per active member (kg)	116	309.44	140.05	Continuous
Final price	Logarithm of final price paid to members (KSh/delivered kg of coffee cherries)	117	3.83	.33	Continuous
Perceived commitment	Do members of the coop. contribute time and money towards common development goals? (1= very low level of commitment; 2= low level of commitment; 3= average level of commitment; 4= high level of commitment; 5= very high level of commitment)	119	2.88	1.14	Categorical
Payment level	Payment occurs at the cooperative level	119	.37	.48	Dummy
Revenue share	Revenue share paid to members	118	80.74	5.69	Continuous
Quality share	Share of green coffee graded as AA/AB	102	53.85	16.40	Continuous
Suitability coffee	Land suitable for coffee cultivation [a]	110	.83	.38	Dummy
Input/service provision					
Input provision	Input provision through cooperative	119	.90	.30	Dummy
Input quantity	Average deduction (KSh) per active member for inputs on credit	112	825.15	1054.95	Continuous
Advance payment	Provision of advance payments	119	.78	.41	Dummy
Transport services	Provision of transport facilities of coffee cherries from members´ farm to factories	119	.14	.35	Dummy
Trainings index (member)	Number of training days received by the members/(number of active members/average number of participants per training day)	113	.03	.08	Continuous
Marketing strategy					
Certification	Cooperative is certified	119	.05	.22	Dummy
Direct marketing	Cooperative used direct marketing channel	112	.35	.48	Dummy
Instability of marketing strategy	Share of seasonally changing millers over last five years	116	1.11	.78	Continuous
Election capture	Pressure among members concerning the vote of the miller exists	115	.54	.50	Dummy
Management skills					
Rotation factory manager	Factory managers rotate among the cooperative´s factories	119	.40	.49	Dummy
Trainings index (committee members)	Number of training days received by the management/(number of committee members/average number of participants per training day)	119	.19	.24	Continuous
Education cooperative´s leader	Highest educational level of secretary manager or chairman college or university	115	.76	.43	Dummy
Market Access					
Village distance	Average distance (km) from members' farms to nearest agrovet shop	119	3.5	3.19	Continuous
District headquarters distance	Travel hours (minutes) from the cooperative`s headquarters to district headquarters	119	66	39.56	Continuous
Instrumental Variables					
Special resolutions	Special resolutions contributed by members in the last five years	114	10.30	6.79	Continuous
Fixation of fines	Fixation of fines in by-laws	117	.78	.42	Dummy

[a] This dummy variable considers various agro-ecological aspects, as average annual rainfall of 1200-2500ml, mean annual temperature of 15-24 Celsius, altitude 1100-2073m above sea level and loamy fertile soil of well-drained clay. The GPS coordinates of the cooperatives' headquarters were used.

Source: Authors'own survey

(b)Results and discussion

Table 4 presents the results of the OLS and two-stage least square estimations for the two marketing performance models[11].

Table 4: Results of the 2SLS and OLS regressions for marketing performance

	Average delivered quantity of coffee cherries per active member (kg/active member)		Log of final price paid to members (KSh/delivered kg coffee cherries)	
	OLS	2SLS	OLS	2SLS
Perceived commitment	16. 54	37.31**	.05**	.088342*
	(11.00)	(17.84)	(.02)	(.04)
Payment level (0/1)			.06	.04
			(.06)	(.05)
Revenue share			.02***	.02**
			(.00)	(.00)
Quality share			-.00	-.00
			(.00)	(.00)
Suitability coffee production (0/1)	31.65	47.70		
	(36.46)	(32.54)		
Input/service provision				
Provision farm inputs (0/1)	94.39**	80.55**		
	(45.80)	(40.02)		
Extent of farm input provision	.03**	.03***		
(KSh/active member)	(.01)	(.01)		
Provision advance payment (0/1)	39.16	54.36*		
	(29.49)	(27.90)		
Provision transport services (0/1)	-35.50	-32.26		
	(36.19)	(31.30)		
Trainings index members	205.61*	211.14**		
	(118.74)	(102.48)		
Marketing strategy				
Certification (0/1)	115.13	106.06*	.12	.11
	(71.91)	(62.00)	(.14)	(.12)
Direct marketing (0/1)	14.88	9.95	.01	.00
	(23.83)	(21.27)	(.05)	(.04)
Instability of marketing strategy	-40.03***	-40.90***	-.06**	-.06**
	(14.79)	(12.98)	(.03)	(.03)
Election capture (0/1)	-17.80	-9.95	-.10*	-.09*
	(23.83)	(20.64)	(.05)	(.05)
Management skills				
Rotation factory manager (0/1)	-19.96	-21.82	.06	.05
	(24.08)	(21.13)	(.05)	(.05)
Trainings index committee members	37.62	36.40	.14	.16*
	(41.78)	(35.92)	(.09)	(.08)
Education cooperative´s leader (0/1)	21.00	23.48	-.04	-.03
	(26.94)	(24.21)	(.05)	(.05)
Market Access				
Distance from members´ farm to	-2.47	-2.15	-.02**	-.02*
nearest agrovet shop (km)	(3.88)	(3.34)	(.01)	(.00)
Travel distance from coop.	.65*	.76**	-.00	-.00
headquarters to district headquarters (min.)	(.38)	(.32)	(.01)	(.00)
Number of observations	86	84	89	87
F	(25,60) 6.23	(25, 58) 5.92	(22,66) 7.95	(22,64) 7.80
Prob>F	.0000	.0000	.0000	.0000
Adj R2/ Centered R2	.61	.95	.64	.73

[11] Results from the first stage linear regression on commitment are provided by the authors on request.

Wu-Hausman F test			
	F	(1/57) 1.40966	(1/62) 1.20
	p-value	.24	.27
Under-identification test	p-value	.0000	.0000
Stock-Yogo weak ID test	F statistic	11.12	11.11
Sargan statistic			
	p-value	.54	.48

Notes: *p<0.10, **p< 0.05, ***p<0.01. Depicted are coefficients; Standard errors in parenthesis
District dummies are included. Full model results including first-stage regression results are available from the authors on request.
Source: Authors' own survey

A Wu-Hausman F test is applied to test the null-hypothesis that the OLS estimator yields consistent estimates, i.e., the variable commitment is exogenous in the models. For both models, we cannot reject the null-hypothesis and, hence, in the following, we focus on the discussion of the OLS results.

The first two columns in Table 4 report the results of the marketing performance model using the average volumes marketed through the cooperative as an outcome measure. With respect to this outcome measure, the perceived commitment does not have a significant influence on performance. We further find that the instability of the marketing strategy reflected by frequent changes of the miller has a significantly negative effect on the average quantity of coffee delivered per member. This confirms that insecurity in the marketing relationship decreases collective marketing performance in terms of both marketed quantity as well as final price. Furthermore, the average quantity delivered is influenced by the services provided by the cooperative to its members. Accordingly, we find that the extent of input provision, as well as the provision of advance payments, both have a significantly positive effect on the average quantity of coffee delivered to the cooperative. In addition, the number of trainings provided to the cooperative´s members positively affects the delivered amount of coffee. Finally, with an increase in the distance of the cooperative headquarters to the district headquarters, the delivered quantity of coffee cherries increases significantly. For the performance of the organization, this provides some evidence for the importance of geographical proximity of the cooperative headquarters to the rural areas where members are located.

Concerning the final price paid to members, the regression results show that, with increasing levels of perceived commitment of cooperative's members, marketing performance increases, resulting in higher final prices paid to members. Consistent with expectations, we also find that higher revenue shares transferred to members are associated with higher final prices paid

per kilogram of coffee. With respect to the marketing strategy, we find that the marketing relationship with the miller has an important effect on the final price. Both the instability of the marketing strategy reflected by the frequent change of millers as well as the existence of election capture are significantly and negatively related to the final price paid to members. Finally, access to input markets measured as the distance from members´ farms to the nearest agrovet shop is negatively associated with the final price paid to members. This indicates that cooperatives operating in more remote, less connected areas pay lower final prices to their members, which may be partly due to higher operating costs incurred by those cooperatives.

6 Conclusions

In this article, we use survey data from 120 coffee cooperatives located in two provinces of Kenya to analyze the determinants of collective marketing performance. In particular, we investigate the factors influencing commitment at the cooperative level and the impact of commitment on the performance of coffee cooperatives in terms of final price paid to cooperative members as well as the average quantity delivered to the cooperative per active member. Performance is measured by two indicators; the quantity of coffee cherries delivered per active member and the final price paid to members.

The results of an ordered logit model show that member heterogeneity with respect to social background and objectives, measured by the number of factories, has a negative effect on commitment. However, the results also suggest that institutional mechanisms, such as intra-cooperative, inter-factory price differentiation, can mediate the negative effect of heterogeneity on commitment. Our findings further suggest that democratic decision-making processes, measured as the number of special resolutions contributed by group members, positively affect commitment. Finally, we find that the existence of sanctions and fines is associated with higher levels of commitment. Hence, our findings emphasize the importance of democratic-decision-making on one hand that empowers members to govern their cooperative, and strong institutional arrangements on the other hand that legitimize leadership to take disciplinary action against ‘non-loyal’ behavior.

Member commitment has a significant and positive effect on the final price paid to members. Since the liberalization of the coffee sector, the organizational structure of the milling and marketing sector has changed dramatically. Recently, the supply relationship between coffee cooperatives and millers or marketers has increasingly been characterized by low levels of

trust and a lack of transparency, resulting in short-term relationships. The payment of bribes by millers at the farm level results in pressure on committee members from other cooperative members trying to influence the choice of the miller. Instable marketing relationships measured in this study as the share of seasonally changing millers over the last five years results in decreased marketing performance in terms of the final producer price and the average quantity delivered per active member. The results of this study support the need to facilitate an institutional environment that fosters transparency, not only within cooperatives, but also between different stages of the coffee value chain.

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