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Smallholder Farmers and Collective Action: What Determines the Intensity of Participation?

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Summary: *Collective action has become an important strategy for smallholders in developing countries to remain competitive in rapidly changing markets. However, within farmer groups, the commitment of individual members can vary, as the expected net benefits are not the same for all individuals, and opportunities to free-ride exist. Since the benefits of collective action emerge primarily through the exploitation of economies of scale, low participation rates in joint activities may put a serious threat to the success and viability of farmer groups. This article investigates determinants of smallholder participation intensity and free-riding, using the example of banana groups in Kenya. The results suggest that family labor availability and previous benefits that members received through the groups positively influence their intensity of participation in group meetings and collective marketing. Free-riding can mostly be attributed to structural and institutional conditions, such as group size and the timing of payments. More diversified farmers are less likely to sell collectively. Since smallholders are often highly diversified in their agricultural activities, farmer groups should also diversify, focusing on more than a single crop. Further policy implications are discussed.*

Key words: collective action, participation intensity, smallholder farmers, Kenya

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Smallholder Farmers and Collective Action: What Determines the Intensity of Participation?

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1 Introduction

Smallholder organization in farmer groups is seen as a possible institutional solution to overcome high transaction costs and other market failures in developing countries (Markelova et al. 2009). In addition, farmer organizations can provide important platforms for capacity building, information exchange, and innovation in rural settings (Bingen et al. 2003). Recently, the promotion of farmer collective action has gained high popularity in the context of the agri-food system transformation, as a response to stringent quality and food safety standards and new procurement systems (Narrod et al. 2009). For example, group contract arrangements can improve smallholder market power and ensure a more equitable distribution of benefits (Key and Runsten 1999). Moreover, peer pressure through farmer groups may reduce the likelihood of

opportunistic behavior in contracting, such as side-selling (Fafchamps 2004). However, farmer groups are not always successful, and there is a need to better understand under what conditions collective action is useful and viable (Markelova et al. 2009; Poulton et al. 2010).

Several recent studies have analyzed related issues. One literature strand has examined determinants of group membership, focusing on farm and household characteristics, such as farm size, wealth, education, or gender (La Ferrara 2002; Wollni and Zeller 2007; Bernard and Spielman 2009). This partly overlaps with studies on the impacts of group membership in terms of market access, prices, and income (Wollni and Zeller 2007; Bernard et al. 2008; Roy and Thorat 2008). Another literature strand has scrutinized structural and institutional aspects of farmer groups, such as group size, stringency of rules, commodity focus, and market conditions (Hellin et al. 2009; Barham and Chitemi 2009; Narrod et al 2009). Yet, one aspect that has hardly been analyzed empirically is the intensity of participation of individual members in different group activities. This is considered a research gap, which we address in the present article. Since active members contribute much more to shared goals than passive members, the intensity of participation may crucially affect group success.

Costs and benefits of collective action may be perceived very differently by farmers, so that varying intensities of participation are observed, even among those who have decided to formally join a group. In addition, without adequate sanction mechanisms, group members may have an incentive to free-ride on the efforts of others. For example, a group may provide certain services to its members, which are financed through a tax on collective sales. When members do not honor this reciprocal agreement, the viability of collective action may be seriously threatened. Moreover, market access is facilitated through the exploitation of economies of scale, which depends on the extent of member participation. Shiferaw et al. (2009) identified low volumes as

one of the major limiting factors for the success of smallholder marketing groups in Kenya. Hence, understanding the factors that contribute to high or low participation in collective marketing and other group activities is important to predict and enhance group performance.

Here, we analyze the determinants of participation intensity in banana producer and marketing groups in Kenya. In particular, we examine the frequency of member participation in group meetings and the degree of collective marketing to assess individual commitment and contribution to shared goals. The remainder of this article is organized as follows. In the next section, we discuss the possible benefits and problems of collective action from a theoretical perspective. Moreover, we provide some background on the banana farmer groups in Kenya. Then, we describe the farm survey data and the methodologies used, before regression results are presented and discussed. The last section concludes and discusses policy implications.

2 Background

2.1 Potential benefits and problems of collective action

Collective action is defined as voluntary action taken by a group of individuals, who invest time and energy to pursue shared objectives (Markelova et al. 2009). It plays an important role in the context of family farms and agricultural production. For example, cooperative organization has helped to maintain the dominance of family farms in developed countries by offsetting some of their disadvantages related to size and bargaining power (Valentinov 2007). In developing countries, the disadvantages of family farms are further exacerbated by various forms of market failure, which are particularly severe in areas with poor infrastructure and communication networks. As a result, smallholders face high transaction costs that significantly reduce their incentives for market participation (Poulton et al. 2010). Through achieving economies of scale,

farmer groups can countervail some of these disadvantages, particularly those related to high external transaction costs and market power.

But the success depends on member commitment. Commitment can be described as acting towards fulfilling mutual, self-imposed or explicitly stated obligations. It has received much attention in the social sciences, particularly in the literature strands of organizational behavior and rational choice (Robertson and Tang 1995). Organizational behavior focuses on the factors influencing the quality of an individual's involvement and performance in organizations. It includes attitudes, identification with the group, its objectives and values, as well as loyalty and affection. Rational choice theory focuses on how an individual's decision to engage in collective action depends on a comparison of the expected benefits and costs. Rational, self-interested individuals will act to achieve their personal rather than group interests, and have an incentive to free-ride if they can (Olson 1971). Therefore, groups have to implement mechanisms that punish opportunistic behavior; otherwise they will cease to exist if enough members are disloyal (Fulton and Adamowicz 1993). The success of collective action depends on the ability of individuals to make credible commitments. Therefore, rational choice theory also acknowledges the presence of informal social mechanisms, such as norms, shared values, and conventions, which make individuals not renege on a commitment. Underlying both strands of literature is the notion that individuals with higher levels of commitment to collective action are more likely to contribute towards the achievement of shared goals.

Olson (1971) provides important insights into the dilemma of collective action from a rational choice perspective, particularly about the relationship between group size and the behavior of individual members. The main function of organizations is the provision of collective goods for their members. A collective good is defined as any good in which a group of individuals is

interested and the consumption of which is non-excludable. Olson proposes a formal model, in which individual group members produce a certain amount of a collective good. The total amount is the sum of all individual contributions. While individuals derive utility from the collective good, they also bear costs from its production. Individuals will only participate if their gain in utility exceeds the costs of participation. Based on utility maximization, the individual will produce the collective good up to the point where the marginal utility gain equals the marginal cost.

As individuals maximize their own net utility without taking into account utility gains of other group members, the model implies that the collective good is undersupplied. The problem of undersupply increases with group size. Moreover, the problem of free-riding is more pervasive in larger groups, where individuals have a higher incentive to shirk. The free-rider does not bear the full cost of reducing his or her contributions, which leads to collective good provision below the optimal level. However, the negative relationship between group size and effectiveness in collective good provision depends on the assumption that the good has to be divided between group members, or that the private cost of collective good provision increases with group size. Other researchers have pointed out that the relationship between group size and effectiveness is reversed when the collective good produced is public; in other words the individual's payoff is unaffected by the number of group members (Esteban and Ray 2001). Then, a larger group is able to produce higher levels of the collective good. Hence, the intensity of member participation in group activities is likely to depend on both individual and group characteristics, which we will take into account in our empirical analysis.

2.2 Collective action in the Kenyan banana sector

The banana sector in Kenya provides an interesting example to analyze the intensity of participation in farmer collective action. Bananas provide an important source of food and income for millions of smallholders in East Africa and other developing countries (Arias et al. 2003). However, over the past decades, there has been a decrease in banana yields of African farmers, which is largely due to pests and diseases and threatens household food security. At the same time, due to urbanization processes, demand for high-quality bananas is growing. Hence, many smallholder producers have become more reliant on the cash income generated from banana sales, especially in areas that were negatively affected by declining incomes from traditional cash crops such as coffee (Wambugu and Kiome 2001).

This trend of declining yields has been reversed more recently in Kenya, especially in regions where development initiatives were implemented to distribute improved banana planting material and support good agronomic practices. Recognizing the problem of low banana yields and the opportunities of rising demand, Africa Harvest and TechnoServe – two international non-governmental organization (NGOs) – have launched a joint initiative to improve banana production and marketing in Kenya. The project was started in 2003 with the overall goal to improve the welfare of smallholder banana-producing households. As a central part of the initiative, the formation of farmer groups dedicated to the production and marketing of fresh dessert banana was encouraged. Many of the new groups build on existing local networks and social ties. Members agreed on a group constitution, membership fees, and they also elected their own leadership. The groups had to be legally registered as a pre-condition for further support by the two NGOs, such as provision of improved banana planting material and training on issues of banana production, marketing, and related business skills.

In the initial stages of group formation, member farmers were trained by NGO representatives in group organization, leadership, and group dynamics, in order to build a solid foundation of social capital for future joint efforts. To plan joint activities and handle routine group business, groups hold regular group meetings, usually once a month. Participation in these meetings is voluntary, although the attendance of members is recorded. The actual group services can broadly be subdivided into production-related and marketing-related types. Production-related services focus on improved access to information, inputs, and innovation for the banana crop. For instance, NGOs carry out special technical training sessions for proper plantation establishment, maintenance, and pest control. In addition, group members were introduced to improved tissue culture (TC) planting material. Traditionally, bananas in Kenya are propagated by suckers from old plantations, a procedure through which pathogens are spread. TC banana plantlets are propagated in the lab, so that plantlets are free from pests and diseases. Farmer groups are linked to TC labs, nurseries, and markets for complementary farm inputs through NGO support; some of the groups have even established small-scale TC banana nurseries themselves.

Market-related services are mostly in the form of organized group market days. To participate in these market days, members have to deliver their bananas to designated collection centers, where they are weighed, graded, bulked, and sold to wholesale traders. Farmers keep individual accounts; that is, sales revenues from market days are distributed according to actual delivery. They only have to pay a small tax of 1 Kenyan Shilling (KSh.) per kilogram of collectively marketed banana. Beyond the membership fee, this tax revenue is an important source of revenue for the groups to finance its service activities. But members are not formally required to market collectively; they are also allowed to sell bananas individually. Traditionally, most small-scale banana producers in Kenya have sold their marketable surplus to itinerant traders at the farm

gate. The expected advantage of collective marketing is a higher sales price, because economies of scales can be realized and transaction costs reduced (Ouma et al. 2010). However, effective price differences and individual benefits depend on a number of additional factors. In addition to the extra transport and time costs incurred, a disadvantage of collective marketing is also that group payments are often delayed by a few days.

Using Olson's (1971) terminology, these production- and market-related services are the collective goods that the groups produce. These are public goods, since no member can be excluded and their "consumption" is non-rival. For some of the services, benefits may even increase with the number of "consuming" members, because of higher economies of scale and lower average transaction costs. However, since participation in regular group meetings and group market days is voluntary, the costs of producing these collective goods may be unequally distributed among members.

3 Data and methodology

3.1 Household survey

The data used to analyze the intensity of member participation in group activities were collected in June and July 2009 in the central highlands of Kenya, where the NGO support of banana farmer groups had started. Using a carefully designed and tested questionnaire, we conducted structured, household-level interviews with banana growers in the districts of Muranga, Nyeri, Embu, and Meru. These districts are located within the same agro-ecological zone, have similar access to road infrastructure, and are classified as high-potential banana-growing areas.

We randomly sampled banana growers who are members of farmer groups.[1] For this purpose, we first obtained a complete list of 240 banana farmer groups in the four districts. Out of these 240 groups, 17 were randomly selected in different sub-locations. Within each of these 17 groups, around 12 members were then randomly selected, resulting in a total of 201 banana-growing households in our sample. As agro-ecological and socio-economic conditions vary across different banana-growing areas of Kenya our sample is not representative for the country as a whole, but it is representative of members of banana farmer groups in the central highlands. Sample descriptive statistics are provided further below.

3.2 Methodology

We use regression models to analyze the factors that influence the intensity of member participation in certain group activities. Ostrom et al. (1994) distinguish between collective action in day-to-day operational situations and collective action in rule-making situations. In operational situations, members act within a set of pre-defined rules. For example, in group marketing activities, members collectively sell their harvest following the procedures and arrangements they have agreed upon earlier. In rule-making situations, members decide on measures and rules that influence their actions in future operational situations. We build on this differentiation and use member participation in regular group meetings and in collective marketing as dependent variables to represent collective action in rule-making and operational situations, respectively.

In principle, participation in group meetings can be represented as a binary variable: a farmer attends or does not attend group meetings. However, farmers who decide to participate may still not attend all meetings, so that the frequency of attendance is also of interest. We categorize

[1] We also sampled and interviewed non-members, who are not used for the purpose of this analysis however.

farmers into low, moderate, and high-degree meeting participants and estimate a multinomial logit model, in order to determine what factors influence the probability of falling into each of these categories. Details of this categorization are discussed further below.

Participation in collective marketing can also be represented by a binary variable. But those who participate may not make all their banana sales through the group. We use a double-hurdle (DH) model (Cragg 1971; Langyintuo and Mungoma 2008), which implies that the decision to sell through the group and the decision of how much to sell are two separate decisions. These decisions are made in a sequential manner and can be subject to two very different decision-making processes.[2] The DH model therefore combines a binary model to predict zero values and a zero-truncated continuous distribution to predict non-zero values. For the second hurdle, we use two different specifications, one with the quantity and the other with the share of collectively sold bananas as dependent variables.

As elaborated above, the intensity of participation is expected to be a function of personal commitment, individual cost-benefit considerations, and group features. Therefore, we use a set of farm, household, and group characteristics as explanatory variables. Farm size may be an important determinant. Moreover, the size of the banana holding is likely to matter. Farmers with a large banana plantation can benefit more from improved access to banana input and output markets, and related information and innovation. On the other hand, very large farms may also suffer less from high transaction costs and lack of economies of scale, so that the additional benefits of participation are lower. To test this, we include banana area and a square term as covariates in our models.

[2] Indeed, Bellamare and Barrett (2006) showed that marketing decisions are often made sequentially rather than simultaneously.

The degree of specialization may also influence the incentive to participate in joint activities. More diversified farmers may generate only a relatively small share of their income from bananas. Hence, the fixed costs of participation in terms of time and effort may exceed the benefits. We capture this by including a variable that measures the number of different crops grown by a farmer. Furthermore, we use physical asset variables as well as engagement in other cash crop production and non-farm income activities to proxy wealth levels and access to cash resources. One major service of the banana groups is the provision of TC planting material and related technical information. We use the level of TC adoption, measured as the area grown with TC bananas, as one indicator of how much a member has already benefited from the group. Members who have benefited substantially in the past may be willing to contribute more to collective goals through a higher intensity of participation in group activities.

Participation in other social groups, such as church associations, self-help groups, or savings clubs, may affect attitudes towards collective action and increase the familiarity with general group procedures. Likewise, education and age of group members are expected to influence attitudes towards collective action (Ouma and Abdulai 2009). We also include an indicator of the farmers' perceived degree of exploitation by traders, which we measure based on a four-point Likert scale. We expect members who feel more exploited to exhibit higher participation rates in collective marketing. Furthermore, gender may have an effect on participation intensity, because of the traditional division of labor and different responsibilities in food and cash crop production (Pandolfelli et al. 2007).

We include household size as a proxy for the availability of family labor, which may be relevant for attending group meetings, market days, and for transporting bananas to the collection center. And finally, we account for the distance of households to the group collection center, which is

equivalent to the meeting place for regular group meetings, and is a proxy for the transportation time and cost.

In terms of group characteristics, we consider group size in terms of the number of group members. As explained, larger groups may increase the benefits but also the probability of free-riding. Another group level variable of importance could be the timing of payments for collectively marketed bananas. Members are mostly resource-poor farmers, who have a high preference for immediate cash when selling their harvest. Delayed payments are therefore likely to decrease the intensity of participation in collective marketing. Finally, group dummies are included in the regressions to account for unobserved group fixed effects, such as the quality of leadership.

3.3 Descriptive statistics

Table 1 reports mean values of group and member characteristics, which we use as dependent and independent variables in our regression models. Participation in group meetings is relatively high: 90% of the members in our sample participated at least once in a group meeting over the 12 months prior to the survey. Group meetings are typically held on a monthly basis.[3] On average, members participated in 7.6 of these regular meetings. By contrast, only 59% sell bananas collectively through the group. This includes members from three groups that were founded very recently and that had not yet started collective marketing at the time of the survey. In new banana groups, joint efforts usually start with production-related activities before collective marketing activities are added. Nonetheless, also in older groups the share of farmers not participating in

[3] Members involved in group leadership meet more often, sometimes on a weekly basis. A few of the farmers interviewed also included such meetings in their responses concerning the frequency of attendance, which is reflected in the maximum response value shown in the last column of Table 1.

group market days is significant. In addition, many of those selling through the group do not sell their entire marketable surplus collectively. On average, only 45% are sold through the groups; the rest is sold to traders at the farm gate or in very few cases at the nearest local market.

A relevant question is why individual marketing continues to be so important. The reason is probably related to the fact that collective marketing is not much more lucrative than individual marketing, at least for some of the farmers. Indeed, the interviews showed that the sales prices received through collective marketing are often only slightly higher than the prices received when selling individually at the farm gate. But there is a dilemma, because the more farmers decide not to participate in market days, the lower will be the benefits for those who continue to sell collectively, as the economies-of-scale effect diminishes. Another problem is that farmers who market individually deprive the groups of tax revenues. Hence, the decision of a group member to market collectively here has to be understood not only as benefiting from a group service but also as a contribution to supply a collective good. Or, in other words, selling individually has to be interpreted as free-riding on the contributions of others.

In terms of farm and household characteristics, which are shown in the lower part of Table 1, group members can be classified as smallholder farmers with an average farm size of around 3 acres. The average size of a banana plantation is 0.44 acres. There are slightly more men than women who participate in groups; nonetheless, sizeable female participation is a positive sign, because traditionally banana has been a women's crop in the Kenyan small farm sector. In terms of group characteristics, the average group consists of 53 members, with a minimum of 25 and a maximum of 103 members. Payment for banana sales made through the group is delayed, often by several days, in 43% of all cases.

4 Determinants of participation in group meetings

As explained in the previous section, we estimate a multinomial logit model to identify determinants of the intensity of participation in regular group meetings[4]. Group members are classified into three categories according to the number of times they participated in group meetings during the past year. Low degree participants are those who either attended never or up to two times during that year. Moderate degree participants attended between three and nine times, while high degree participants attended at least ten times during the last 12 months. Estimation results are presented in Table 2. The coefficients can be interpreted in a similar way as parameters of a normal logit model, comparing each category to the base category. Here, the base category is low degree participants; hence, the coefficients in column (1) report the log of the odds-ratio between moderate and low degree participation, while the coefficients in column (2) make the same comparison between high and low degree participation.

Farm size as such does not have a significant effect on the frequency of participation in group meetings. Banana area, however, has a positive and significant effect in both columns, that is, farmers with larger banana plantations are more likely to be moderate and high degree participants. However, the negative and significant coefficients of the square terms indicate that the effect is diminishing at larger plantation sizes. In column (1), the overall effect is reversed at a plantation size of 1.04 acres. This curvilinear relationship describes an often observed middle class effect, where the cost-benefit ratio of participation in group meetings is negative for very small and very large producers (e.g., Weinberger 2001). Very large producers suffer less from high transaction costs and may therefore have lower incentives to participate intensively in group

[4] A set of count data models are available to analyze the number of meetings directly without categorization. However, these either performed poorly in predictive power or depend on assumptions that were not fulfilled by our data.

activities. Very small producers, on the other hand, may have reduced incentives because their banana production is so low that the benefits do not outweigh the costs of spending time and effort in regular group meetings. The implication is that medium-sized banana growers are likely to benefit most from this form of cooperative organization.

The size of the TC banana area also has a positive effect in both columns of Table 2. As mentioned, we use TC area as a proxy for the level of benefits that members have received through the group, namely better access to new banana technology. The results show that past benefits increase the members' commitment to group activities, which is plausible. Likewise, banana yield levels have a positive effect on the frequency of participation in meetings. On the one hand, those with more production may expect greater benefits from intensive participation, while on the other hand, they may already have benefited more from improved access to inputs and information.[5] Interestingly, however, the square term of TC area indicates again a curvilinear relationship. Using the coefficient values in column (1), the probability of moderate participation in group meetings increases up to 0.46 acres of TC bananas, after which it declines. A possible explanation is that beyond this value the size effect may outweigh the effect of positive past experience with the group. In this connection it should also be mentioned that the proper management of TC plantations is more labor-intensive, so that extensive TC adopters may have a higher opportunity cost of time.

Farmers who use irrigation have a lower probability of being moderate degree participants. For high degree participation, the coefficient is also negative but not significant. Likewise, ownership of a motorized vehicle shows negative coefficients, albeit not significant. These negative

[5] One might expect reverse causality assuming that farmers who participate more often in group meetings learn more about new technology and plantation management, which could help them to increase yields. However, here we focus on attendance of regular internal group meetings, in which routine group business and strategic issues are discussed. These are separate from the technical training sessions, which are led by NGO extensionists.

coefficients are somewhat surprising, but they may potentially reflect a wealth effect. Wealthier farmers may expect to benefit less from intensive participation. Moreover, their opportunity cost of time may be higher than that of relatively poorer farmers. This is in line with findings of Ouma and Abdulai (2009) in Kenya. The distance effect is negative (but diminishing) for high degree participation, indicating that longer travel times are a disincentive for very regular participation in group meetings.

The number of crops that farmers grow has a positive influence on the probability of moderate degree participation. This may be explained by the fact that more diversified farmers face greater difficulties in obtaining information and inputs for one specific crop and thus may expect greater benefits from participation. Likewise, participation in other social groups increases the probability of moderate degree participation, which is not surprising. And finally, group size has a highly significant negative effect in both columns, implying that the intensity of member participation in group meetings is lower in larger groups. Social ties are often less tight in larger groups, so that individual identification with the group is poorer. Also, the perceived individual contribution to overall group success may be negatively correlated with the number of members, so that individuals are more inclined to free-ride on the active participation of others.

5 Determinants of participation in group marketing

We now focus on the determinants of participation intensity in collective marketing. For this analysis, we reduce the sample to members in those groups that regularly have market days at designated collection centers, so that we remain with 172 observations. But even in groups with regular market days, a non-trivial number of members is not marketing through the group. As

discussed above, we use a DH model to account for the two decisions whether and, if so, how much to market collectively.[6] The hurdle model is given by (Cragg 1971):

$$F(x|y) = \begin{cases} \Pr(d = 0|x) & \text{if } y = 0 \\ \Pr(d = 1|x) * E(y|d = 1, x) & \text{if } y > 0 \end{cases}$$

where y is the dependent variable, which in our case is the quantity and share of marketable surplus sold collectively, and x is the set of explanatory variables discussed above. We estimated a Heckman-selection specification that assumes dependent error terms of the participation and outcome equations, to test for possible selection bias (Yen and Jones 1997). But the coefficient of the Inverse Mills Ratio turned out not to be significant at the 10% level. Hence, we do not reject the hypothesis of independent errors terms and proceed with the standard DH model, where we first estimate a probit model of participation and second a truncated continuous regression model only over positive values.

5.1 Determinants of the decision to participate in collective marketing

The left-hand part of Table 3 (part 1) reports the estimated probit coefficients and average marginal effects (AME) of the decision whether or not to market collectively. As expected, the size of the banana plantation has a positive but again curvilinear effect. For members with a banana area larger than 1.2 acres the probability of selling collectively starts to decrease again. Hence, very small and very large producers are less likely to sell through the group. which is additional evidence of a middle class effect of group participation. For very small producers it

[6] Alternatively, a Tobit model could have been used to estimate such corner-solution responses. Yet, a likelihood-ratio test indicated that the DH model is preferred over the Tobit in our particular case ($p < 0.01$).

may not be worthwhile to transport their bananas to the collection centers, while very large producers may have more profitable alternatives to sell.

Whereas the level of TC adoption has no significant effect on the decision to market collectively, banana yields influence the decision positively. This may again be due to some form of reciprocity: farmers who have benefited from technical training may be more inclined to contribute to group market days. Likewise, the production of cash crops, such as tea and coffee, influences the decision to market collectively in a positive way. Female members are more likely to use collective marketing. In the survey region, transporting bananas to a market place or a group collection center is typically a women's chore. Women may be also more vulnerable to opportunistic behavior by farm gate traders and thus may perceive greater benefits through collective bargaining. However, group members who feel more exploited by traders are less likely to sell through the group. This is surprising, because collective marketing is expected to improve the bargaining position vis-à-vis traders. But perhaps the perceived exploitation is also an indicator of general distrust, which may translate into skepticism towards other group members and trading partners.

Group characteristics play an important role, too. The effect of group size is positive, implying that members in larger groups are more likely to decide for group marketing. This may be related to higher expected benefits through exploiting economies of scale. On the other hand, delayed payments present a significant disincentive for collective marketing, which should not surprise.

5.2 Determinants of the quantity and share of collective sales

The middle and right-hand parts of Table 3 show estimated coefficients of the truncated regressions with respect to the total quantity of collective sales (part 2) and the share of marketable surplus sold through the group (part 3). In addition, two types of marginal effects are displayed: (i) the conditional average marginal effect (CAME), which is the effect on the expected value conditional on the decision for collective marketing being positive; and (ii) the unconditional average marginal effect (UAME). The CAME and UAME are calculated according to Burke (2009). For the quantity regression in part (2), the variables banana area and yield are transformed into natural logs to avoid misspecification, since quantity sold depends on banana area and yield in a multiplicative way. As one would expect, both variables are positive and significant predictors of quantity sold.

Somewhat surprisingly, while the effect of TC adoption is insignificant in part (3), it is negative and significant in part (2) of Table 3. A likely reason is that farmers who have adopted TC planting material established new banana plantations, for which it takes about one year until the first fruits can be harvested. Those who have adopted relatively recently may simply not yet have substantial quantities to harvest and sell. By contrast, the square term of TC area has a positive and highly significant effect on the quantity sold collectively, which fits into this argumentation: since the TC planting material is relatively expensive, farmers usually adopt the technology gradually, implying that those with larger TC areas have already started to adopt earlier and have therefore already more marketable surplus to harvest. Hence, those who benefited from group services in the past seem to be more willing to contribute to collective marketing activities.

On the other hand, the results in part (3) show that farmers with higher banana yields, which we use as another indicator of group benefits experienced, market a lower share of their marketable

surplus through the group. This is interesting, because yield had a positive effect on the general decision to market collectively in part (1). Yet, the CAME indicates that the effect is relatively small: each additional ton of average per-acre yield decreases the collectively marketed share by 0.5 percentage points, given that the general decision to participate in group market days is positive. The reason is probably that more productive farmers may have more lucrative individual marketing alternatives, so that the incentive to free-ride increases, especially when a certain contribution to collective goals has already been made.

The level of crop diversification has a negative and significant effect in both parts (2) and (3) of Table 3. The CAME values indicate that each additional crop grown by a group member reduces the quantity of bananas sold through the group by 0.18 tons and the share by 3 percentage points. This is in spite of the fact that we control for the size of the banana holding and banana yield. Farmers with more different farm enterprises have less time to spend on the marketing of each individual crop. As mentioned, transporting the bananas to the collection centers and regularly participating in market days is relatively time-intensive. For highly diversified farmers it would be advantageous if collective marketing activities would involve more than one single crop.

Education has a positive effect on the quantity and share of collective marketing. While we found that better educated members are equally likely to sell through the group, once they have made the decision to do so they actually sell significantly more. This may indicate a form of self-selection: better educated farmers who decide not to sell through the group will do so very deliberately, but those who decide to sell collectively will probably do so because they expect true benefits, so that it makes sense for them to also sell higher quantities and shares.

Group members who also participate in other social groups sell significantly higher quantities through the group (part 2), which may be related to their greater general trust in the mechanisms

of collective action. In contrast, members who feel more exploited by traders sell a lower share through the group (part 3), suggesting a higher level of general distrust. Household size has a positive effect on the collectively marketed share, which can be explained by the time-intensity of collective marketing. Households with more members usually have a higher availability of family labor, and thus lower opportunity costs of intensive participation.

In terms of group characteristics, group size exhibits a negative relationship to collective sales quantities per member and shares. While larger groups offer higher potential benefits of collective marketing and thus provide an incentive to participate in general (part 1), they also offer more opportunities to free-ride, when the actual benefits of collective marketing are not substantial. In larger groups, social ties are less tight, and peer monitoring becomes more difficult. In addition, payment modalities have a considerable effect on the share of collectively sold bananas: when there is delayed payment, the share is reduced by almost 14 percentage points as the CAME in part (3) indicates.

6 Conclusion and policy implications

Collective action through farmer groups is an important strategy for smallholders to remain competitive in rapidly changing environments. The major objective of this article was to expand the commonly used concept of farmer group participation, mostly measured as a binary choice variable, by distinguishing between different intensities of participation. Since commitment to the collective goal and contributions of individual members are crucial for the success and viability of farmer groups, understanding what drives different participation intensities is an important precondition to enhance group performance. We have used production- and marketing-oriented

groups of smallholder banana farmers in Kenya as an empirical example; these groups were recently established with support from international NGOs.

Concrete activities considered were regular group meetings, where members gather to discuss future strategies and manage routine business, and collective marketing, where bananas are transported to collection centers and sold at special market days to exploit economies of scale. Participation in both types of activities is voluntary for group members, so that different intensities of participation can be observed. Participation in group meetings clearly has to be seen as a contribution of individual members to the shared goal, which does not come with an immediate personal benefit. The benefit is the existence of a well functioning group, which is a public good for all group members. Participation in collective marketing, on the other hand, could be expected to come with a clear personal benefit in terms of higher sales prices. In this particular case, however, price advantages proved to be relatively small on average, and collective marketing comes at the cost of having to transport bananas to the collection centers. Moreover, a small tax has to be paid on sales made through the group; a revenue that the group uses to finance some of its other activities. Hence, participation in collective marketing, at least to some extent, also has to be understood as a contribution of members to supply a collective good.

Multinomial logit and double-hurdle regression models were estimated to analyze the intensity of participation in these activities. While results on determinants differ somewhat between group meetings and collective marketing, there are also a number of interesting parallels. In terms of member characteristics, we found a middle class effect with respect to banana area. That is, those with very small and very large banana plantations are less likely to participate intensively in group activities. While very large producers suffer less from high transaction costs and may therefore have lower incentives to participate, very small producers may find that the benefits of

intensive participation may not outweigh the fixed costs associated with this. The implication is that medium-sized growers are likely to expect greater benefits from farmer groups.

Moreover, we found that members who have benefited in the past from group services, especially in terms of better access to information and innovation, have a higher tendency to intensively participate in group activities. This suggests that there is a certain understanding of reciprocity underlying individual decisions. However, for those with particularly high levels of crop productivity and technology adoption, this effect diminishes, probably because the temptation of more lucrative alternatives outside the group starts to emerge.

The number of household members was shown to have a positive effect on intensive participation, as group involvement is time-intensive and larger households have more family labor available. And finally, households that are more specialized on banana participate more intensively in collective marketing than farmers who are highly diversified.

In terms of group characteristics, the frequency of participation in meetings is lower in larger than in smaller groups. Moreover, even though larger groups attract more members to sell through the group, because higher economies of scale can be realized, the average quantity sold collectively per member is lower than in smaller groups. Large groups imply less close social ties between members, which increases incentives to free-ride on the efforts of others. This tradeoff between economies of scale and social cohesion may provide an important explanation for previous studies that found no conclusive relationship between group size and marketing success (e.g., Barham and Chitemi 2009). Delayed payment for collectively marketed produce also decreases the willingness of intensive participation and increases incentives to free-ride. The majority of group members are resource-poor smallholders, who are often liquidity constrained, so that immediate cash is preferred, even when the price received may be somewhat lower.

These findings underline that it is important to go beyond considering participation in collective action as a binary variable. The intensity of participation is not only influenced by opportunistic behavior but also by member constraints, which contribute to lower than optimal supply of collective goods and services. The results also have several policy implications. First, groups should not be too big, in order to ensure sufficient social ties and thus reduce incentives to free-ride. Smaller groups imply lower economies of scale to be realized, but this can be offset when fewer members participate more intensively and market greater shares of their harvest through the group. This also facilitates planning, including for traders, and may enable negotiation of better prices. Higher prices in collective marketing will provide additional incentives for members to participate in market days and other group activities. As discussed, a general tendency to reciprocate can be observed among group members.

Second, it seems to be important for farmer groups to go beyond a single crop focus and add additional agricultural commodities to their activities. Smallholder farmers in Africa are often highly diversified, in order to reduce risk. Hence, they only generate a relatively small proportion of their total income from one particular crop, and may not find that the efforts of participating in a group that promotes this crop only would outweigh the benefits. Product diversification of groups can help reduce the unit fixed costs of group participation and thus increase the incentives to do so more intensively. Similarly, it can help further reduce transaction costs, manage group risks, and enhance access to new markets. In this respect, success stories of cooperatives that focus on single specialty crops, such as coffee or other export crops, are not representative (Wollni and Zeller 2007, Roy and Thorat 2008). In such specialty crops, there is a higher degree of asset specificity, and the harvest cannot easily be used at home or sold outside the group. This is different for bananas and other food crops that are widely traded in local markets. Since

improving market access is currently ranking high on the international policy agenda, new farmer groups are often formed through the support of NGOs and other development initiatives. Such initiatives often tend to have a narrow commodity focus, but the findings here suggest that this should be reconsidered and broadened.

Third, constraints for more intensive participation, such as delayed payment schedules, should be avoided. Sometimes, this may be possible through more efficient group procedures. In other cases, external support may be required to bridge short-term financing gaps through advance payment mechanisms or microcredit programs tailored to the particular needs. More empirical research is needed to verify and extend these findings in different situations.

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Table 1: Summary statistics of group and member characteristics

Variable	Description	Mean	S.D.	Min	Max
Dependent variables					
D_meetings	Household participated in group meetings (yes=1, no=0)	0.90	0.30	0	1
Meetings	No. of group meetings participated in the last 12 months	7.60	7.14	0	52
D_marketing	Household participates in group marketing (yes=1, no=0)	0.59	0.49	0	1
Share	Share of marketable surplus sold through the group	0.45	0.44	0	1
Quantity	Quantity sold through the group per member in tons	2.70	6.19	0	51
Independent variables					
Land holdings	Total land owned by household in acres	3.22	2.99	0.125	20
Motorized	Household owns car, pick-up, or motorbike (yes=1, no=0)	0.19	0.40	0	1
Irrigation	Household uses irrigation (yes=1, no=0)	0.39	0.49	0	1
Banana area	Banana plot size in acres	0.44	0.46	0.03	3.71
TC area	Size of banana plot planted with TC banana in acres	0.20	0.31	0	2.5
Yield	Banana output in tons/acre	11.30	9.52	0	42.42
Cash crop	Household produces cash crops (e.g., coffee, tea, cotton)	0.61	0.49	0	1
No. of crops	No. of different crops the farm household grows	7.49	3.67	2	19
Female	Group member is female	0.45	0.50	0	1
Education	Education of member in years of schooling	9.06	4.45	0	18
Age	Age of member in years	53.84	14.24	21	88
Non-farm activity	Member pursues non-farm economic activity (yes=1, no=0)	0.21	0.41	0	1
Household size	No. of household members	4.70	2.09	1	15
Social participation	Household participates in other groups (yes=1, no=0)	0.85	0.36	0	1
Exploit	Perceived degree of exploitation by traders (not at all=1 to severely=4)	2.91	1.14	1	4
Distance	Distance to group meeting place or collection center in km	1.83	1.60	0.01	10
Group size	No. of members in the group	53.13	21.46	25	103
Delayed payment	Payment for group sales is delayed (yes=1, no=0)[a]	0.43	0.50	0	1
	No. of observations	201			

Table 2: Determinants of participation in group meetings (multinomial logit model)

	(1) Moderate vs. low participation			(2) High vs. low participation		
	Coefficient		S.E.[a]	Coefficient		S.E.[a]
Land holdings	-0.111		0.148	-0.111		0.124
Motorized	-0.798		0.882	-0.356		0.820
Irrigation	-1.564	**	0.774	-0.567		0.684
Banana area	5.441	***	2.058	3.902	*	2.181
Banana area squared	-2.577	***	0.946	-1.795	*	0.962
TC area	11.030	***	4.036	6.075	*	3.406
TC area squared	-11.859	***	4.125	-6.269	**	2.748
Yield	0.088	**	0.042	0.071	*	0.041
Cash crop	-0.703		0.624	0.495		0.613
No. of crops	0.204	**	0.097	0.150		0.104
Female	-0.709		0.795	-0.658		0.581
Education	-0.064		0.087	-0.009		0.066
Age	-0.006		0.029	-0.010		0.023
Household size	1.011		0.779	0.439		0.699
Non-farm activity	0.075		0.110	-0.010		0.113
Social participation	2.490	**	1.000	1.013		0.774
Exploit	-0.094		0.334	-0.232		0.250
Distance	0.170		0.550	-0.918	**	0.361
Distance squared	-0.063		0.079	0.091	**	0.036
Group size	-2.328	***	0.177	-2.310	***	0.204
Constant	99.039	***	7.668	101.554	***	9.750
Group dummies	included			included		
Observations	201					
LR chi2(34)	119.47					
Prob>chi2	0.000					
(Pseudo) R2	0.276					

*, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

[a] Cluster robust standard errors

Table 3: Determinants of individual banana sales through the group

	(1) Decision to sell collectively					(2) Quantity of collective sales							(3) Share of marketable surplus sold collectively							
	Coefficient		S.E.[a]	AME[b]		Coefficient		S.E.[a]	CAME[c]		UAPE[d]		Coefficient		S.E.[a]	CAME[c]		UAPE[d]		
Land holdings	0.004		0.057	0.001		0.205		0.222	0.055		0.049		0.008		0.011	0.008		0.006		
Motorized	0.295		0.295	0.068		-0.744		1.223	-0.198		0.008		-0.052		0.070	-0.050		0.011		
Irrigation	0.457		0.558	0.105		-0.265		2.448	-0.071		0.213		0.087		0.050	0.084		0.131		
Banana orchard size	2.054	**	0.938	0.471	**						1.227		0.140		0.179	0.135		0.418		
Banana orchard size2	-0.863	**	0.377	-0.198	**						-0.516		-0.064		0.098	-0.061		-0.179		
Ln(banana orchard size)						14.184	***	2.291	3.782	***	3.210	***								
TC area	0.703		1.264	0.161		-6.019	**	2.469	-1.605		-0.942		-0.167		0.165	-0.162		-0.002		
TC area2	0.557		0.747	0.128		5.474	***	1.200	1.460		1.572		0.130		0.195	0.126		0.176		
Yield	0.040	**	0.019	0.009	**						0.024		-0.005	**	0.003	-0.005		0.003		
Ln(yield)						13.733	***	3.345	3.662	***	3.108	***								
Cashcrop	0.561	**	0.286	0.129	**	-0.507		1.677	-0.135		0.220		0.026		0.077	0.025		0.106		
No. of crops	-0.029		0.035	-0.007		-0.676	**	0.287	-0.180	*	-0.170	*	-0.031	***	0.008	-0.030	***	-0.026	**	
Female	0.491	*	0.257	0.113	**	0.739		0.972	0.197		0.461		-0.090		0.088	-0.087		0.017		
Education	-0.054		0.040	-0.012		0.443	***	0.135	0.118		0.068		0.012	**	0.006	0.011		0.000		
Age	0.017	*	0.011	0.004	*	-0.051		0.071	-0.014		-0.001		0.002		0.002	0.002		0.004		
Non-farm activity	0.612		0.398	0.140		0.322		2.747	0.086		0.438		0.007		0.076	0.006		0.101		
Household size	-0.038		0.100	-0.009		0.280		0.388	0.075		0.041		0.033	***	0.007	0.032	**	0.016		
Social participation	0.349		0.381	0.080		6.424	**	2.943	1.713		1.662	*	0.132		0.111	0.127		0.144		
Exploited	-0.351	***	0.088	-0.081	***	1.158		0.962	0.309		0.052		-0.049	**	0.022	-0.047	*	-0.088	***	
Distance	-0.315		0.213	-0.072		-1.699		2.530	-0.453		-0.573		-0.015		0.045	-0.015		-0.060		
Distance2	0.024		0.033	0.006		0.167		0.356	0.044		0.052		0.000		0.008	0.000		0.004		
Group size	0.029	***	0.007	-0.014	***	-0.100	***	0.037	-0.027		-0.006		-0.005	***	0.001	-0.004		0.001		
Payment	-4.537	***	0.658	-0.809	***	0.722		2.037	0.192		-2.548		-0.153	***	0.059	-0.148		-0.822		
Constant	1.970		1.371			-21.761	*	11.202					1.184		0.208					
Sigma						3.737	***	0.460					0.226	***	0.020					
Group dummies	yes					yes							yes							
Observations	201					172							172							

*, **, and *** denote significance at the 10%, 5%, and 1% level respectively

[a] Cluster robust standard errors, [b] average marginal effect (AME)

[c] AME conditional on y>0 with bootstrapped standard errors (reps. 300), [d] unconditional AME with bootstrapped standard errors (reps. 300)