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Chapter 1. Introduction

1.1 Small farms and agricultural commercialization

Since three-fourths of the world's poor live in rural areas and most depend on agriculture for their livelihoods, agriculture is still the key instrument for development and poverty reduction (World Bank 2007). How to make smallholder production more productive, profitable and sustainable is at the center of ambitious research efforts in this field. In three chapters this work investigates determinants, participation dynamics and impacts of farmer groups, using the case of small-scale banana producers in Kenya. The aim of such groups is to facilitate access to input and output markets by reducing the costs of market exchange, thereby promoting intensification and commercialization of small farms. Smallholder agriculture has recently received a lot of attention, because of its potential for rural poverty reduction. But is it desirable and feasible to drive agricultural growth through small farms?

The shock of the 2007-2008 food crisis has pushed agriculture and rural development back on top of the development agenda (Wiggins et al. 2010). Rising incomes and urbanization, along with changing consumer preferences, increasing use of biofuels and climate change will continue to exert pressure in agricultural markets in the future (von Braun 2006). Two sets of considerations have emerged. One concerns the question whether increases in food production are large enough to feed a still growing population, which includes poor farmers in rural areas who often tend to be net buyers of food (Barrett 2008). The other question is whether small farms themselves can contribute to agricultural growth and food production. While there is consensus about the imperative of scaling up agricultural investments, the role that small farms play is still under considerable debate (Wiggins et al. 2010).

With almost 3 billion rural people living on less than 2\$ a day, improving income opportunities in agriculture will certainly be an effective means to reduce the number of poor (World Bank 2007). Furthermore, spillovers to other sectors, such as



manufacturing and services, enable the development of a more diversified rural economy. However, multiple market imperfections keep rural incomes low (de Janvry et al. 1991). Smallholders have difficulties in accessing agronomic and market information, face distorted or absent input and output markets, credit constraints, low asset endowment, missing institutions and lack of infrastructure. Market failure is further exacerbated by imperfectly specified property rights and risk. While smallholders are poor, they are still assumed to be efficient: they use the resources available to them efficiently, but face endowment and institutional constraints that put limits to their economic activity (Schultz 1964). Hence, increases in agricultural productivity of smallholders can be achieved by improving their access to high-payoff inputs.

The green revolution in the late 1960s entailed the adoption of high-yielding varieties and complementary inputs. It was the result of public investments in market and road infrastructure, input subsidies, and research and development that took into account local conditions. Though being inefficient and costly, grain marketing boards guaranteed farmers a minimum price for grain (Hazell 2009). The green revolution has lifted millions of small farmers in Asia out of poverty by raising returns to land and increasing employment opportunities (Hazell and Haddad 2001). But whether the same success can be repeated in Africa is an ambiguous question. The circumstances have changed since the green revolution: technology is fast evolving, public investments and support of small farms is lumpy, competition within globalized markets is strong, and high-value supply chain managers have high demands on quality and traceability, whereby scale gives larger farmers a competitive advantage (Wiggins et al. 2010). The transformation of the African and international food retail sector has so far largely bypassed small farmers, although there are some cases where they successfully participate in high value and export markets (Markelova and Mwangi 2010; Rao and Qaim 2011).

The discussion of smallholder's role in agriculture centers much on the linkage between scale and efficiency. That economies of scale apply in agricultural production is often not supported by empirical findings, as studies in developing countries find higher



yields on smaller farms. This is largely attributed to differences in labor costs and intensive local knowledge (Poulton et al. 2010). Small farms tend to use family laborers who have an intrinsic motivation to put effort into agricultural tasks and who are more easily monitored than hired laborers on larger farms. However, once the farm engages in external transactions, economies of scale become highly relevant. The unit costs of procuring inputs, obtaining credit, getting agronomic and market information, acquiring third-party certification and meeting standards are relatively lower for larger farms, because most of the related expenses occur as fixed costs. Fixed transaction costs include the costs of (i) searching for a trading partner with whom to exchange goods or services, (ii) negotiating a price and bargaining, and (iii) screening, enforcement, and supervision. Variable costs depend on the volumes traded and are for example related to transferring the product to its destination (Key et al. 2000). With intensification and commercialization, external transactions become increasingly important. Hence, solutions that enable smallholders to compete with larger farmers have to tackle the scale problem of small farms regarding external transactions.

High transaction costs give rise to institutions of governance that better manage transactions and thereby reduce their associated costs (Coase 1973). Through the mechanism of collective action, farmer associations create the required scale to offset the disadvantage of small farms. Acting collectively reduces unit transaction costs of market exchange¹, increases bargaining power to negotiate better terms of trade, simplifies long marketing chains by avoiding intermediary traders, and facilitates coordination on quality and quantity to cater requirements of high-value markets (Markelova and Mwangi 2010). But, forms of collective action are complex and diverse. Experiences with cooperative movements in the past have been mixed, if not disappointing. The failure of cooperatives to sustain themselves is attributed to its top-down institutional set-up, whereby cooperatives became quasi-governmental bodies that were sometimes misused for political ends, were prone to elite capture, and suffered from inadequate management skills (Shepherd 2007). Moreover, collective action institutions have to deal with opportunistic behavior and free-riding of their members,

¹ For instance, if a collective of individuals jointly purchases inputs and services, the fixed costs are divided by many instead of just one.



which leads to an undersupply of the collective good (Olson 1971). Eventually, the success of collective action depends on the type of market and product, group and member characteristics, the external environment, and the organizational set up, which determine the degree of benefits that can be extracted through cooperation (Markelova and Mwangi 2010). Interventions often promote the establishment of collective action institutions without investigating whether it provides enough scope for generating economic benefits (Shepherd 2007).

There is a large body of literature on collective action institutions in developing countries. Conceptual work investigated under which conditions cooperative organization would make most sense, and how it can best be established and maintained (Markelova and Mwangi 2010). Empirical studies focused on the marketing performance groups and success in obtaining certification (Kersting and Wollni 2011; Narrod et al. 2009; Bernard et al. 2008; Wollni and Zeller 2007), and scrutinized structural and institutional aspects (Hellin et al. 2009; Barham and Chitemi 2009). Other studies examined the determinants of participation in farmer associations and found that smallholders are more likely to choose cooperative marketing channels, although the poorest of the poor are often excluded (La Ferrara 2002; Bernard and Spielmann 2009; Shiferaw et al. 2009; Wollni and Zeller 2007). Much of this research has been limited to high-value and export markets. Bernard and Spielmann (2009) and Bernard et al. (2008) are the only studies that investigate cooperative grain marketing and find significant trade-offs between inclusiveness and marketing performance. Except for Shiferaw et al. (2009), past research focused mainly on the marketing side, but did not investigate impacts on technology adoption and access to inputs and information. Incentive problems and gender issues within such types of organizations have been left unaddressed so far. Hence, little is known about the various mechanisms by which farmer associations generate benefits for members.

This study contributes to the research direction by taking up a more comprehensive approach than previous studies. First of all, insights into the determinants of group membership are given. How inclusive are they of poor farmers? Finding answers to this question allows drawing implications on the group outreach, or inclusiveness. For



example, understanding whether marginal farmers are also motivated to join is important from a poverty perspective. Second, mechanisms that generate benefits for members are investigated. In addition to analyzing price premiums only, the analysis is expanded to include technology adoption, input and good agronomical practice use, and impacts on household welfare in terms of income and food security. The impacts of farmer collective action can be quite heterogeneous across types of farmers (e.g. small vs. large, men vs. women). The analysis therefore emphasizes the multi-functionality of such groups and provides justified arguments how collective action may benefit smallholders in particular. Third, we address incentive problems within collective action institutions. Free-riding and opportunistic behavior are pervasive in public goods provision and can result in the breakdown of collective action in the long run. We investigate commitment to collective action and free-riding among members, who face different costs and benefit of market and group participation. The analysis allows not only to conceptually expand the definition of membership, but also to formulate policy recommendations that can guide the design and implementation of successful and inclusive collective action. Finally, we investigate gender issues in collective action. Do men and women benefit equally? Although gender mainstreaming has found its way into most development initiatives, it is often absent in farmer associations. Because of gendered constraints regarding access to resources and traditional norms, the motivations and benefits that men and women extract from collective action can differ to a great extent. If collective action is to improve the situation of smallholders in an equitable way, more needs to be known about related gender dynamics. This allows some important policy conclusions that – although difficult to generalize – should also be considered by policy makers.

1.2 Research objective

The overall research objective of this study is to understand the particular mechanisms that affect participation and benefits for men and women in farmer associations. This will allow the formulation of policy recommendations to help guide the design and



implementation of successful and inclusive collective action. Within the scope of this overall objective, we formulate four research questions:

1. Are producer groups inclusive and do they benefit the poor and women?
2. What are the broader impacts of participation in producer groups on market access, technology adoption, and household welfare?
3. What determines farmers' intensity of participation in producer groups?
4. Do producer groups contribute to marginalize women's position within agriculture?

An interesting case study to investigate the mechanisms of collective action is provided by small-scale banana producers in central Kenya. Empirical work has shown that market participation decisions among East-African farmers are highly influenced by fixed transaction costs, which provides a motivation for market- and production-oriented collective action (Ouma et al. 2010).

1.3 The case of smallholder banana farmers in Kenya

In Kenya and other East African countries, banana and plantains are among the most important staple food crops and an important source of income for many people. In contrast to large-scale, export-oriented banana production in Latin America, the majority of banana growers in East Africa are small-scale farmers who produce for their own consumption and domestic markets. Traditionally, banana in Kenya is considered a security crop, because it provides continuous food supply and cash income even under low input regimes (Qaim 1999). It therefore falls mostly in the women's sphere of control. The significance of banana is gradually changing, however. Although banana yields are still quite low – mostly due to poor crop management, low input levels, and use of inferior planting material – the crop's commercial potential is increasingly being recognized.



With continuing urbanization, a growing middle class, and the expansion of supermarkets, the demand for high-quality banana is growing in Kenya. Hence, over the past few years smallholder producers have become more reliant on the cash income generated from banana sales. This has occurred especially in areas where farmers saw their incomes from coffee and other traditional cash crops decline (Wambugu and Kiome 2001). However, unlike coffee, for which marketing is usually done through cooperatives, bananas are mostly marketed individually. While procurement systems for some higher-value commodities gradually change towards tighter vertical integration (Reardon et al. 2009; Neven et al. 2009), Kenyan supermarkets still largely source bananas from traditional wholesalers.

A few banana producers in Kenya are able to sell at local markets or to small shops, but the majority sells their harvest to local traders at the farm gate. Because of remoteness, poor infrastructure, market information asymmetries, perishability, and bulkiness, smallholders have very limited marketing alternatives. This also contributes to low bargaining power vis-à-vis farm-gate traders, particularly for women. With a view to emerging non-traditional markets, high-value chains require a regular and reliable flow of supply of consistent quality, which small-scale producers can rarely satisfy. Collective action could reduce transaction costs and improve coordination in production and marketing.

Recognizing the problems of low banana yields and farmers' limited access to high-value markets on the one hand, and the increasing commercial potential of the crop on the other, efforts have been started by different development agencies to improve the situation through dissemination of better planting material and related measures. One of these initiatives was jointly launched by Africa Harvest and TechnoServe – two international NGOs. Since 2003, Africa Harvest and TechnoServe have been working together in encouraging banana farmers to establish self-sustaining groups, in order to facilitate access to clean planting material, technical extension, and output markets. This initiative builds on a whole value chain approach, as it encompasses activities from technology acquisition, via production, down to marketing (Acharya and Alton Mackey



2008). Since 2003, several thousand small-scale banana growers in the central highlands of Kenya became organized in such farmer groups.

One tangible benefit of these farmer groups is improved access to tissue culture (TC) planting material for banana. Traditionally, bananas in Kenya are propagated by suckers from old plantations, a procedure through which pests and diseases are spread. In contrast, TC bananas are propagated in the lab, so that the plantlets are pathogen-free. Africa Harvest facilitates contacts and linkages between farmer groups, TC labs in Nairobi and elsewhere, and local nurseries. Group members collectively order TC plantlets, thereby reducing transaction costs. Since each farmer usually only buys a few plantlets at a time, individual purchases would be associated with excessive per-unit search and transportation costs. Yet, buying TC plantlets instead of using suckers is more expensive. This could contribute to deteriorate women's position in banana cultivation, since women face gender constraints regarding access to productive resources, and groups do not collectively purchase other complementary inputs, such as chemical fertilizer or pesticides, and do not provide credit. In some cases, Africa Harvest has provided limited subsidies. Successful TC adoption also requires certain changes in traditional banana cultivation practices (Qaim 1999). Africa Harvest provides technical advice on proper plantation establishment and maintenance through special training sessions organized for farmer groups.

TechnoServe concentrates on the marketing side and provides assistance to group members with respect to business practices, such as bookkeeping and negotiation skills. When members are able to deliver the necessary quantity and quality, groups are encouraged to sell collectively. Through the organization of group marketing days, middlemen are excluded and farmers are directly linked to wholesalers from urban centers. On the marketing days, group members are invited to deliver their bananas to designated collection centers, where bunches are weighed, graded, and picked up by wholesale traders. While farmers have to pay a certain fee for group membership, they keep individual accounts; that is, sales revenues are distributed according to actual delivery. A small tax of one Kenyan Shilling (KSh.) per kilogram is deducted from individual sales, which is used to build up group savings to be re-invested in service



provision. But members are not formally required to market collectively; they are also allowed to sell bananas individually, which many of them do. 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. Shiferaw et al. (2009) identified low volumes as one of the major limiting factors for the success of smallholder marketing groups in Kenya.

Several groups have not yet started collective marketing, because they are relatively young and first focused on upgrading production technologies. Africa Harvest and TechnoServe also have plans to directly link banana farmer groups to high-value markets, including supermarkets, processing companies, or exporters, but these plans have not yet materialized.

1.4 Household survey

To answer the research questions formulated in section 1.2, a unique data set is used that was collected in 2009 in the central highlands of Kenya in Central and Eastern provinces (Figure 1). Before going to the field for data collection, questionnaires were carefully designed and pre-tested. Enumerators were intensively trained to approach farmers and ask questions in a sensitive yet consistent way and were given an interview manual that guided them through the questionnaire.

Then structured, household-level interviews were conducted with banana growers in the districts of Muranga, Nyeri, Embu, and Meru. These districts are all 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 as well as non-members for comparison. In order to select members and non-members we used stratified random sampling. We first obtained a complete list of 240 banana farmer groups; out of these, 17 groups were randomly

selected, which were located in different sub-locations. Within each group, around 12 member households were randomly selected, resulting in a total of 201 group member observations. In the same 17 sub-locations, we also randomly sampled 137 non-members. As these non-member households are located in areas where farmer groups operate, they are exposed to the initiative and might potentially be affected by spillover effects. In order to have a more robust control group, we further identified 10 sub-locations in the same districts but without any group activities. In these control regions, we randomly selected another 106 banana growers.

Figure 1: Survey region in Central and Eastern Province, Kenya





Thus, the total sample consists of 444 banana-growing households, including group members, non-members in regions where groups operate, and farmers (non-members) in control regions where no groups operate. As agroecological and socioeconomic conditions vary across different banana-growing areas of Kenya (Qaim 1999), our sample is not representative for the country as a whole. But because we used stratified random sampling it is representative for members and non-members of banana farmer groups in the central highlands of Kenya.

1.5 Study outline

The research is structured into three related chapters that find answers to the research questions formulated in section 1.2. In the first chapter, the determinants and impacts of smallholder organization are assessed. Using the sub-sample of members and non-members in treatment regions, probit regression is used to identify factors that influence the decision to become a member of a producer group. Propensity score matching, which creates an artificial experiment based on the assumptions that all factors determining group membership can be observed, is used to reduce possible selection bias in the impact analysis. Outcome variables of interest are prices, household income, technology adoption, and other variables related to agricultural intensification and commercialization. Treatment effects are shown separately for members selling through the group and those selling individually. Results are also disaggregated by group duration and member's land holdings. Robustness of the treatment effects is tested by using different matching algorithms and different specifications of the probit model that generate propensity scores to be used for matching treatment and control observations. The concluding section discusses the conditions under which collective action is useful, and through what mechanisms the potential benefits emerge.

Within farmer groups, the commitment of individual members can vary, because the expected net benefits are not the same for all individuals and opportunities to free-ride exist. Sequential probit regression for categorical data and double-hurdle regression to model corner solutions explain participation in group meetings and collective marketing. Farmer characteristics such as size and degree of diversification are expected



to influence the cost-benefit ratio. Structural and institutional factors such as group size and the timing of group payments are also included as explanatory variables. Further policy implications are discussed in the concluding section.

With increasing returns to agricultural activity, women's access to land often declines, which can negatively affect household welfare. Hence, the third chapter analyses changes in gender relations due to farmer group participation and the effects on household food security and nutrition. Banana, being a major food crop in East Africa, traditionally falls into the women's sphere of control. Descriptive statistics are used to analyze whether men become increasingly involved in banana production and revenue decisions when market and technology access improve. Controlling for possible selection bias using instrumental variables and propensity score weighting, regression analysis is employed to test whether calorie consumption and dietary quality deteriorate when men seize control over revenues from banana production. Also, the determinants of women's control over banana output are assessed. Some wider implications on efficiency and equity are discussed, for example under what conditions collective action in food crop production can contribute to women's empowerment.