Impact of Collective Action on the smallholder agricultural commercialization and incomes: Experiences from Kenya

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Abstract

Improving smallholder farmer market participation (agricultural commercialization) has seen the advent of a number of initiatives from collective action, extension service provision and even programs that utilize ICT tools in the provision of market information. Collective action through farmer groups is an important social asset for smallholders that continue to face challenges in accessing both input and output markets. The objective of this study was to assess the effect of participation in collective action initiatives on household agricultural commercialization (market access) and household agricultural income. The study utilizes propensity score matching technique to assess the effect of collective action initiatives on household agricultural commercialization and on household agricultural income. Results indicate that farmers participate in collective action initiatives for good reasons which include enhanced access to markets and improvement of their incomes. This study brings into perspective the effects of participation in collective action initiatives both on market participation and on smallholder incomes. It finds that participation in collective action initiatives significantly increase household output and input market participation by about 9 percent and 8 per cent respectively. It also improve household welfare by increasing incomes (by about Ksh. 3400 per growing season). We discuss implications for policy and practice.

Key Words: Impact, market access, collective action, commercialization, welfare, farmers, Kenya

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1. Introduction

Improved market participation (agricultural commercialization) by smallholders in developing countries has the potential reducing poverty. More recently, the desire to improve smallholder farmer market participation has seen the advent of a number of initiatives from collective action, extension service provision and even programs that utilize ICT tools in the provision of market information (Fischer and Qaim, 2011; Okello et al., 2012). Collective action through farmer groups is an important social asset for smallholders that continue to face challenges in accessing both input and output markets. Performance of smallholder agriculture markets in developing countries is driven by a number of factors which include access to and participation in the input and output markets (Barrett, 2008; Kirsten, 2010).

Most smallholder farmers are engaged in subsistence and semi-subsistence agriculture characterized by low level equilibrium (low input use, low productivity, low marketable surplus, and hence low returns) trap (Barrett & Swallow, 2006; Barrett, 2008). Poverty elimination can be made a reality through enhancing returns from agricultural production through improved access to markets. Improved market participation implies a higher level of agricultural commercialization with vast benefits to farmers including higher revenues, savings and hence investment in productivity enhancing inputs (technologies) (Okello, 2005). Apart from the direct income for smallholder producers, there are also the indirect employment impacts at both the household and community levels (Okello & Swinton, 2007).

Collective action initiatives are also seen transaction costs-reducing initiatives (Markelova et al. 2009), capacity building, and information exchange platform (Bingen et al. 2003). Collective action initiatives are also seen to improve smallholder market power (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 different related issues. These include: costs and

benefits of collective action (Poulton et al. 2010), exploitation of economies of scale (Shiferaw et al. 2009) and determinants of participation intensity producer and marketing participation and the degree of collective marketing (Fischer and Qaim, 2011).

Against this backdrop of information, there exist a gap on the effect of effect of participation in collective action initiatives on household agricultural commercialization and welfare of the participating farmers. Understanding the effects of participation will provide an impetus to promoting such initiatives among smallholder farmers. The objective of this study is to assess the effect of participation in collective action initiatives on household agricultural commercialization (market access) and household agricultural income. The rest of this paper is organized as follows: Section 2 presents the conceptual framework of the study. Section 3 presents the study results while Section 4 concludes.

2. Methodology

2.1 Conceptual framework

Transaction costs which include the costs of information, negotiation, monitoring, coordination and enforcement of contracts (Bardhan, 1989) are relevant in explaining market participation by small holder farmers. The higher transaction costs facing smallholder farmers stem from the higher costs of searching for and screening of exchange partners, negotiating the sale of output or purchase of inputs, monitoring and enforcing the terms of exchange and costs of renegotiating or adjusting to changes in market environment. Provision of market information in a costless manner improves market exchanges for the smallholder farmers. It therefore allows the farmers to increase net income by reducing the costs.

Transaction costs stems from Coase (1937), theorem that explains that exchange between two trading partners does not operate in a frictionless environment and thus incurs some costs of doing business so-called transaction costs. Transaction cost theory is part of the New Institutional Economics (NIE) which seeks to explain the significance of market and non-market institutions in economic exchange (Williamson, 2000; Menard, 2005). This theory recognizes that markets are driven by transaction costs created by information asymmetry, bounded

rationality. Transaction cost theory has been widely used in studying agricultural markets in developing countries (Jaffee, 2004; Fafchamps and Hill, 2005; Okello and Swinton, 2007). In the analysis of agricultural marketing in Kenya, this theory can be helpful when estimating the impact of collective action initiatives on the institutional structure of markets. Farmers participating in collective action initiatives are hypothesized to increase income from their farming activities and in turn this is expected to provide greater incentives to smallholder farmers to participate in the market.

2.2 Analytical framework

Propensity score matching technique has been utilized to evaluate of the impact of collective action on agricultural commercialization (both at the output and input side) as well as on the welfare of the smallholder farmers. Output On the output side, commercialization is a measured as a ratio of the value of agricultural sales to the value of agricultural production. On the input side, commercialization is measured as a ratio of the value of inputs acquired from market to the value of agricultural production on the input side. Income from farming activities is used as a proxy for welfare of the farm households.

Implementation of the propensity score matching technique consists of three steps: estimating the propensity score, choosing the matching algorithm and measuring the impact. The propensity score begins with the estimation of the probit (or logit) model of participation in collective action initiatives. This stage sets to identify potential determinants of participation in collective action initiatives including personal characteristics, social-economic variables and capital endowment. If X denotes the multidimensional vector of these characteristics and D = {0,1} is the indicator of participation in collective action initiatives, referred to as 'treatment,' the propensity score p(X) is the probability of receiving the treatment given X. This can be represented as:

$$p(X) = Pr\{D=1|X\} = E\{D|X\} \quad (1)$$

Suppose Y_{1i} and Y_{0i} denote the realization of random variables Y_1 and Y_0 (which capture the outcome for an individual i, if he does and does not receive the treatment respectively), then the impact of participation in collective action initiatives is:

$$D_i = Y_{1i} - Y_{0i} \quad (2)$$

For those who receive the treatment, we observe only the participation in collective action initiatives outcome (Y_{1i}) and for those who do not participate, a non-participant outcome only (Y_{0i}), and leading to a fundamental problem in determining causality. That is, if D_i is a dummy variable indicating the incidence of participation in collective action initiatives, for each individual the only observed outcome is:

$$Yi = D_i\ Y_{1i} + (1-D_i)\ Y_{0i} \qquad (3)$$

The parameter of interest is the Average Treatment Effect on the Treated (ATT). This is the outcome gain from treatment for those who actually are selected into the treatment (Heckman, 2001).

Mathematically,

$$ATT = E\ \{E\ \{Y_{1i}|D_i=1,\ p(X_i)\} - E\{E\{\ Y_{0i}|D_i=0,\ p(X_i)\}|D_i=1\} \qquad (4)$$

Before calculating the ATT, the balancing property is tested on p(X) and the matching methods are used. The test of the balancing property ensures that the distribution of the relevant characteristics is balanced the groups of participants and non-participants collective action. This leads to impose the 'common support,' by considering only the individuals whose propensity score belongs to the intersection of the supports of the propensity score of treated (participants) and controls (non-participants) in the impact estimation. This paper uses different matching methods (Radius, Kernel and Nearest Neighbor). With Radius Matching each treated unit is matched only with the control units whose propensity score falls in a predefined neighborhood of the propensity score of the treated unit. With the Kernel Matching all treated are matched with a weighted average of all controls with weights that are inversely proportional to the distance between the propensity scores of treated and controls. The Nearest Neighbor consists of taking each treated unit and searching for the control unit with the closest propensity score. Once each treated unit is matched with a control unit, the difference between the outcome of the treated units and the outcome of the matched control units is computed. The ATT of interest is then obtained by averaging these differences (Becher and Ichino, 2002). When estimating the impact on the net income from trading activities, these three matching methods have been combined

with the differences-in-differences approach to control both time-varying selection bias and time-invariant selection bias (Smith and Todd, 2005).

2.3 Study area, sampling procedure and data

This study was part of a wider project implemented by Electronic Agricultural Research Network in Africa (eARN-Africa). The aim of the project was to evaluate the effectiveness of ICTs in helping smallholder farmers commercialize and was implemented in three different districts each in a separate province. These include Kirinyaga (Central province), Bungoma (western province) and Migori (Nyanza province). These districts were characterized by poor access to markets by small farmers and reliance on agriculture. The study districts were selected to represent diverse agro-ecological zones, socio-economic environment, cultural diversity and varying production systems. For example, Kirinyaga district is considered a high potential area with export oriented export crops (French beans, baby-corn and Asian vegetables). Bungoma district on the other hand grew mainly maize with sugarcane while Migori is considered low potential area with main crops grown being maize and tobacco. Thus the choice of the districts presents differing levels of commercialization. Kirinyaga district is mainly inhabited by people of Kikuyu ethnic group while Bungoma and Migori districts are mainly inhabited by Luhya and Luo ethnic groups respectively.

Sampling procedure was done in three stages. First, the three districts (project districts) were purposely selected. Second, in each of the district, a location was randomly identified. A list of all farm households was then drawn with the help of local administration (village elders and area agricultural extension officers). Third, the respondents were then randomly sampled from the lists. A total of 379 farmers were interviewed in this study. The data collected included household characteristics, socio-economic indicators, household assets, information sources, ownership and use of mobile phones, sources and uses of income, among others. The household survey was conducted during March and April of 2010.

3. Results

3.1 Determinants of participation in collective action initiatives

Several factors discriminate participants in collective action initiatives from non-participants (Table 1). Among the farmer specific characteristics, age, gender and household size affected the likelihood of participation in collective action initiatives. Female farmers were more likely to participation in collective action initiatives than their male counterparts. Similarly, more experienced farmers had higher likelihood of participation in collective action initiatives. Larger household too had a higher likelihood of participating in collective action initiatives. Among the farm-specific variables, distance to the extension agent and number of crop enterprises facilitate participation in collective action initiatives while distance to the bank tend to impede the likelihood of participation in collective action initiatives.

Table 1: The propensity score for participation in collective action initiatives

	Logit Estimates			**Marginal Effects**		
Variable	Coef.	SE[b]	p-value	Coef.	SE[b]	p-value
Household specific variables						
Ln age	1.644**	0.648	0.011	0.359**	0.151	0.018
Gender (female)	0.685***	0.259	0.008	0.146**	0.059	0.014
Occupation	-0.032	0.403	0.936	-0.020	0.093	0.826
HH size	0.121*	0.070	0.087	0.032**	0.017	0.049
Farm-specific variables						
Output market dist.	0.013	0.024	0.588	0.002	0.006	0.706
Extension agent dist.	0.065**	0.026	0.013	0.015**	0.006	0.013
Bank dist.	-0.067**	0.030	0.023	-0.015**	0.007	0.023
Number of crops	0.352***	0.098	0.000	0.085***	0.023	0.000
Capital endowment variables						
Education	0.018	0.038	0.640	0.001	0.009	0.867
Farming experience	-0.021	0.017	0.205	-0.005	0.004	0.239
Land size	0.015	0.019	0.426	0.005	0.005	0.270
Ln non-farm income	-0.285**	0.137	0.037	-0.065**	0.032	0.041
Ln total income	0.378**	0.169	0.025	0.091**	0.039	0.022
Ln assets	0.039	0.091	0.667	0.009	0.021	0.667
Input per capita	0.000	0.000	0.552	0.000	0.000	0.571
Regional dummy variables#						
Kirinyaga	0.462	0.325	0.155	0.108	0.072	0.131
Bungoma	0.709**	0.320	0.026	0.228***	0.070	0.001
Constant	-8.829***	2.438	0.000			
Number of obs. = 379	Pseudo R2 = 0.4719		Prob > chi^2 = 0.0000			
LR $chi^2(17)$ = 136.75	Log likelihood = -882.57					

Source: Author's compilation. *b*: Standard errors (SE) are robust.

Notes: *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

The dependent variable is a dummy (*1= participation in Collective action group, 0 =otherwise*)

Capital endowment variables that affect the likelihood of participation in collective action initiatives include possession of physical assets. In particular, households with non-farm income had less likelihood of participation in collective action initiatives while total household income increased the likelihood of participation in collective action initiatives. Among the regional variables, farmers from Bungoma region were more likely to participation in collective action initiatives than those in Migori.

The graph of the "common support" (Figure 1) shows that the histograms of estimated propensity scores densities for participants and non-participants in collective action initiatives overlap. Treated on support indicates the individuals in the participants' group who find a suitable. From the graphs, all the treated and the untreated individuals were within the region of common support indicating that all treated individuals have corresponding untreated individuals. This reassures that statistically treated and untreated individuals are comparable.

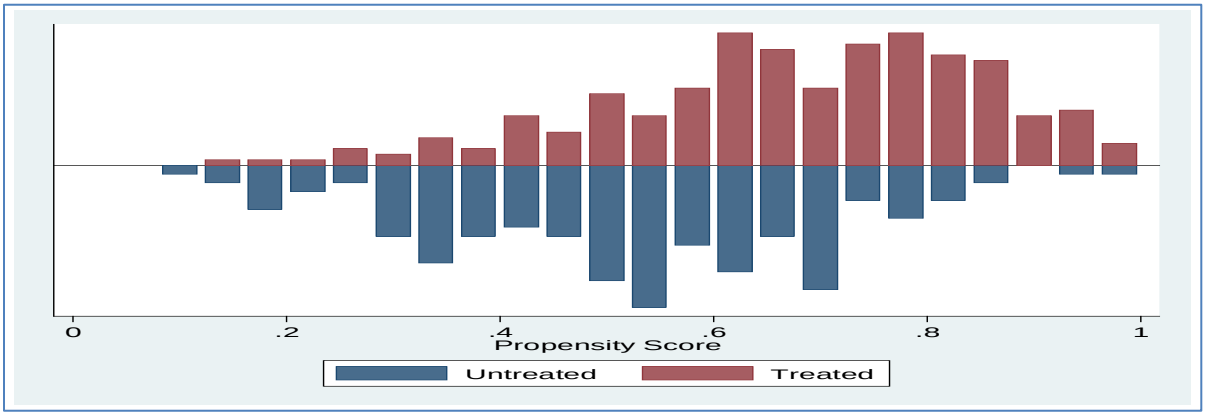

Figure 1: Propensity score distribution and common support for propensity score estimation.

Assessing the impact of participation in collective action initiatives was made of three results: output market commercialization, input market commercialization and agricultural income. Results from all matching approaches indicated that participation in collective action initiatives had a positive and significant effect on all three outcomes: output market commercialization, input market commercialization and agricultural income (Table 3). The results from all matching approaches (Nearest Neighbour matching (NNM), Kernel-based matching and Radius matching (RM)) indicated that participation in collective action initiatives increased the level of output

market commercialization by about 9 per cent. It also increased participation in input market commercialization by 8 per cent, and agricultural income by about Ksh. 3286 – Ksh.3566.

Table 2: Average treatment effects of participation in collective action initiatives

Matching Algorithm	Outcome variable	Treated (n=234)	Control (n=145)	ATT	S.E	t-value
Nearest Neighbor Matching	Output market commercialization	0.68	0.59	0.090***	0.026	3.18
	Input market commercialization	0.19	0.11	0.083***	0.027	3.04
	Crop income	20941.95	17375.74	3566.21**		2.14
Kernel Based Matching	Output market commercialization	0.68	0.57	0.916***	0.035	4.12
	Input market commercialization	0.19	0.11	0.079**	0.025	2.34
	Crop income	21041.35	17677.48	3363.87**		2.06
Radius Matching	Output market commercialization	0.65	0.56	0.085***	0.011	3.36
	Input market commercialization	0.19	0.13	0.071**	0.021	1.89
	Crop income	20661.94	17375.74	3286.21**		0.014

Notes: *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

4. Conclusions and implications

Collective action through farmer groups is an important social asset for smallholders that continue to face challenges in accessing both input and output markets. The objective of this study was to assess the effect of participation in collective action initiatives on household agricultural commercialization (market access) and household agricultural income. From the assessments carried out, it appears that farmers participate in collective action initiatives for good reasons which include enhanced access to markets and improvement of their incomes. Participation in collective action initiatives goes beyond social purposes with family and friends to obtaining information from fellow farmers, traders / buyers and sellers. This study brings into perspective the impact of participation in collective action groups. The study found that participation in collective action initiatives significantly increase household output and input market participation by about 9 percent and 8 per cent respectively. It also improve household welfare by increasing incomes (by about Ksh. 3400 per growing season). The implications of this study is that for smallholders to remain competitive and relevant, better access to markets through

such avenues like collective action initiatives must be facilitated. Challenges facing farmers in participating in these groups should be addressed. Further, group viability and performance should be enhanced to tap the potential therein.

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