

# Rural market imperfections and the role of institutions in collective action to improve markets for the poor

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## Abstract

*Many countries in sub-Saharan Africa have liberalized markets to improve efficiency and enhance market linkages for smallholder farmers. The expected positive response by the private sector in areas with limited market infrastructure has however been very limited. The functioning of markets is constrained by high transaction costs and coordination problems along the production-to-consumption value chain. New kinds of institutional arrangements are needed to reduce these costs and fill the vacuum left when governments withdrew from markets in the era of structural adjustments. One of these institutional innovations has been the strengthening of producer organizations and formation of collective marketing groups as instruments to remedy pervasive market failures in rural economies. The analysis presented here with a case study from eastern Kenya has shown that marketing groups pay 20–25% higher prices than other buyers to farmers while participation was also positively correlated with adoption of improved dryland legume varieties, crops not targeted by the formal extension system. However the effectiveness of marketing groups is undermined by external shocks and structural constraints that limit the volume of trade and access to capital and information, and require investments in complementary institutions and coordination mechanisms to exploit scale economies. Successful groups have shown high levels of collective action in the form of increased participatory decision making, member contributions and initial start-up capital. Failure to pay on delivery, resulting from lack of capital credit, is a major constraint that stifles competitiveness of marketing groups relative to other buyers. These findings call for interventions that improve governance and participation; mechanisms for improving access to operating capital; and effective strategies for risk management and enhancing the business skills of farmer marketing groups.*

*Keywords:* Market imperfections; Transaction costs; Institutions; Collective action; Producer marketing groups; Kenya.

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## 1. Introduction

Many sub-Saharan countries have liberalized their economies and developed poverty reduction strategies aimed at opening up new market-led opportunities for economic growth. The results have, however, been mixed (Winter-Nelson and Temu, 2002; Dorward and Kydd, 2004; Fafchamps, 2004). A large number of smallholder farmers continue to engage in subsistence agriculture and are therefore unable to benefit from liberalized markets. Structural problems of poor infrastructure (Kydd and Dorward, 2004; Dorward *et al.*, 2005) and lack of market

institutions (World Bank, 2002) continue to characterize the subsector with high transaction costs, coordination failure and pervasive market imperfections. Moreover, partial implementation of reforms and policy reversals have tended to mute the positive effects of liberalization (Jayne *et al.*, 2002). Although opportunities afforded by liberalization have not been fully exploited, the expectation that removing state marketing boards would open opportunities for the private sector to take over these functions has not been fully realized in many areas. However, avenues exist in market institutions that make use of collective action to complement government and private sector responses for enhanced coordination in rural commodity markets. This is because individual marketing of produce may not make economic sense due to small quantities, large spatial distances from input and output markets and subsequently the associated high transportation costs, all characteristics of small-scale production especially in the semi-arid areas. Underdeveloped market infrastructure in these areas makes

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them less-favoured for private investment and agro-enterprise development even when the agricultural potential is high.<sup>1</sup>

This paper aims to analyze the role that institutional and organizational innovations can play in improving the performance of rural markets in semi-arid areas lacking in terms of development infrastructure. With a case study of Producer Marketing Groups (PMGs) in semi-arid Eastern Kenya, the paper identifies potentials and limitations of rural institutions in providing market services for small-scale producers of staple and marketable crops. The effect of marketing groups on producer prices and the uptake of improved technologies are investigated along with institutional and organizational factors that condition the performance of marketing groups. The study finds that farmer groups have the potential to improve market opportunities and access to new technologies for small producers in less-favoured areas. If properly organized and governed, PMGs can overcome elite capture and corruption and help facilitate commercialization of smallholder production. The key policy issues are related to capital constraints and lack of supportive policies for the growth and development of farmer marketing groups.

The rest of the paper is organized as follows. Section 2 reviews market institutions and their emerging roles in remedying market imperfections in rural areas. Section 3 outlines the data and methods used in the case study. Section 4 presents the main results, followed by a summary of the key findings and policy implications in the concluding section.

## 2. Role of institutions in imperfect markets

### 2.1. Can institutions help overcome market failures?

According to North (1990), institutions constitute formal constraints (i.e., rules, laws, constitutions), informal constraints (i.e., norms of behaviour, conventions, and self-imposed codes of conduct) that structure human interactions, and their enforcement characteristics. Along the same line, World Bank (2002) defines institutions as rules, enforcement mechanisms and organizations that promote market transactions. These definitions show that institutions provide multiple functions to markets; they transmit information, mediate transactions, facilitate the transfer and enforcement of property rights and contracts, and manage the degree of competition. They can therefore be used to help remedy market failures in rural markets.

Market failures are due to asymmetric information, high transaction costs and imperfectly specified property rights.

They tend to be more pronounced in rural areas with under-developed road and communication networks and other market infrastructure, typical of many semi-arid regions in sub-Saharan Africa. Without supporting market institutions, rural markets in these areas tend to be thin and imperfect, leading to high marketing and transaction costs. These costs undermine the exchange process (Kranton, 1996; Gabre-Madhin, 2001) leading to atomized rural markets with few rural–urban linkages (Chowdhury *et al.*, 2005). Given such market arrangements, households respond by producing a limited range of goods and services for own consumption especially when household food security is not assured (de Janvry *et al.*, 1991). Further, important market players fail to undertake profitable investments (due to the absence of complementary investments) leading to coordination failures that hinder market performance (Dorward *et al.*, 2005; Poulton *et al.*, 2006). Associated shocks and vulnerabilities to production risk (i.e., weather, pests and sickness) and market risk also exacerbate market imperfections and transaction failures (Dorward and Kydd, 2004). Institutional innovations that reduce transaction costs and enhance market coordination — such as marketing groups that make use of collective action — can be instrumental in overcoming some of these problems.

### 2.2. Farmer organizations for improving markets

Farmer organizations have the potential to mitigate the effects of imperfect markets by enabling contractual links to input and output markets (Coulter *et al.*, 1999) and by promoting economic coordination in liberalized markets (Rondot and Collion, 1999) upon which market functions for smallholder farmers can be leveraged. Realization of this potential will however depend on their ability to convey market information; coordinate production and marketing functions; define and enforce property rights and contracts; and more critically mobilize smallholder farmers to participate in markets and enhance competitiveness of agro-enterprises.

Efforts aimed at promoting PMGs backed by innovative mechanisms for supporting market functions will need to consider development of a new generation of farmer cooperatives as business-oriented enterprises. The legacy of farmer cooperatives in Africa has not been exemplary in providing business opportunities and marketing services to small producers (Hussi *et al.*, 1993; Akwabi-Ameyaw, 1997). The lessons indicate that farmer organizations can succeed if farmers are allowed to manage them autonomously with minimal government interference, participate actively in decision-making, and if collective action reduces transaction costs and improves competitiveness. This implies that a new set of policies and institutional reforms would be desirable to facilitate their transformation as private sector enterprises with clear business plans, instead of their past role as non-profitable public sector

<sup>1</sup> Following Pender and Hazell (2000), we define less-favoured environments as areas with relatively low agricultural potential often overlooked or neglected in terms of infrastructural investments in the past as well as areas of good agricultural potential but that have limited access to infrastructure and markets.

service providers. Such institutional arrangements seem to raise hopes for rural areas affected by pervasive market imperfections to benefit from market integration and commercialization of production. Yet collective action is a critical factor in realizing this potential. Participation in collective action will depend on the magnitude of expected benefits and associated costs. Collective action is likely to occur if the gains in terms of reduced transaction costs, better input and/or product prices, empowerment and capacity enhancement outweigh the associated costs of complying with collective rules and norms. Effective collective action would also depend on good leadership, good governance and participatory decision making (Mude, 2006).

### 3. Case study and analytical methods

The study uses two sets of data that were obtained in 2003 and a follow-up survey in 2005. The data were collected by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Mbeere and Makueni districts of the semi-arid Eastern Province of Kenya, where market infrastructure is very limited and recurrent droughts reduce agricultural productivity and pose threats to rural livelihoods. These districts were targeted as potential areas where dryland legumes like pigeonpea and chickpea could be exploited to reduce poverty and vulnerability. The two districts are located in part of the larger semi-arid lands characterized by low density paved roads and limited access to major marketing centres. Farmers produce limited marketable surplus. Despite climatic variability and recurrent droughts, smallholder agriculture is almost entirely dependent on rains.

A random sample of 400 households (240 in Mbeere and 160 in Makueni) in the targeted villages were surveyed in 2003 before the PMGs were established as part of a research project that aimed to pilot alternative institutional innovations for improving market access for smallholders. Farmers were sensitized to form PMGs through voluntary participation.<sup>2</sup> Interested farmers voluntarily joined and established ten PMGs, mostly based on existing local social networks of different types. The groups had an agreed constitution and elected leadership, and were formally registered as welfare societies (self-help groups) as is required under Kenyan law. Some of the households that had initially expressed interest in joining the group subsequently decided not to join. From the initial sample of 400 households, the distribution of members and non-members

was decided later after the PMGs were established on the basis of committed and paid up members. The average size of the PMGs in terms of active members varied from 93 in Makueni to 117 in Mbeere, while the average joining fee and annual subscription fees were about Ksh 64 and 266 per member, respectively. Information on poverty indicators, agricultural production, market participation, and adoption of agricultural technologies was collected from the respondents during the survey.

During a follow-up survey conducted in 2005 in the same districts, data were collected at the PMG and at the farm household level. At the PMG level, all the ten PMGs were surveyed separately. About five to seven respondents selected from the PMG management and ordinary members served as key informants on the PMG marketing activities, governance, and internal dynamics. All the participants in these discussions were randomly selected from the leadership and ordinary members. Data obtained included objectives and aspirations of the groups, group characteristics, asset ownership, credit access, grading and quality control, bulking and marketing, governance, and major constraints to collective marketing. At the household level, data were collected from 400 households (210 from Mbeere and 190 from Makueni districts) in the ten PMG villages, comprising of 250 members and 150 non-members. This sub-sample consisted of 150 households re-sampled from 235 baseline households that had remained PMG members and 100 households re-sampled from 165 households that had remained non-PMG members. Information obtained included data on socioeconomic characteristics, assets, credit and savings, production, buying and selling, and participation in other groups or social networks and in PMG collective marketing.

The primary data were subjected to qualitative and quantitative analyses. The PMG data were used to determine constraints to collective marketing, identify indicators of collective action and to assess performance of marketing groups. Household data were used to determine the marketable surplus and to understand the structure and performance of rural markets for different crops. This was used to identify key marketing channels, market actors along the value chain and their market shares, and grain prices received by farmers in different markets. In order to determine whether the resource poor households are excluded from PMGs, we used a bivariate probit model to analyze the effect of household assets and wealth indicators on PMG membership. The bivariate specification was chosen mainly because many farmers belonged to other local groups/networks and participation in PMGs and other groups is likely to be jointly determined. If the error terms for participation in different groups are correlated, the PMG membership model would be better identified using the bivariate probit specification which takes into account such interdependent choices. This is an extension of Zellner's seemingly unrelated regression (SUR) model to binary choice variables (Greene, 1997). We also used a

<sup>2</sup> The form of assistance provided included mobilizing farmers to discuss production and marketing strategies for dryland legumes, training in quality seed production and marketing, and provision of information in organizing marketing groups. No direct subsidies or incentives were provided to farmers to join groups.

**Table 1. Descriptive statistics of selected variables**

Variable	Statistic	Members (N = 250)	Non-members (N = 150)	Total (N = 400)
Distance to collection centre (km)	Mean	1.60	1.80	1.68
	Std dev	1.12	1.25	1.18
Dist to nearest main market (km)	Mean	6.97	6.95	6.97
	Std dev	5.23	6.05	5.54
Family size	Mean	7.47	7.01	7.30
	Std dev	3.56	3.89	3.69
Sex of head	Mean	0.8	0.78	0.80
	Std dev	0.4	0.42	0.41
Male workforce (adult worker equivalent)	Mean	1.45	1.16	1.34
	Std dev	1.1	0.89	1.04
Female workforce (adult worker equivalent)	Mean	1.54	1.24	1.43
	Std dev	1.01	0.77	0.94
HH owns ICT (tv, radio or telephone)	Mean	0.8	0.84	0.82
	Std dev	0.4	0.37	0.39
HH owns ox-cart (yes = 1)	Mean	0.29	0.23	0.27
	Std dev	0.45	0.42	0.44
Ethnic group (Kamba = 1)	Mean	0.85	0.89	0.87
	Std dev	0.36	0.31	0.34
Household located in an average rainfall area (yes = 1)	Mean	0.2	0.2	0.20
	Std dev	0.4	0.4	0.40
Household located in a dry rainfall area (yes = 1)	Mean	0.32	0.33	0.33
	Std dev	0.47	0.47	0.50
Value of crops sold (Ksh)	Mean	4,526.8	6,085.13	5,111.18
	Std dev	8,716.32	15,664.6	11,815.93
Household food insecurity (yes = 1)	Mean	0.79	0.78	0.79
	Std dev	0.41	0.42	0.41
Membership in agricultural productive groups (APG) (yes = 1)	Mean	0.2	0.11	0.17
	Std dev	0.4	0.31	0.37
Adopted improved maize (yes = 1)	Mean	0.14	0.1	0.13
	Std dev	0.35	0.3	0.33
Adopted improved pigeonpea (yes = 1)	Mean	0.4	0.27	0.35
	Std dev	0.49	0.45	0.48
Adopted improved greengram (yes = 1)	Mean	0.28	0.24	0.27
	Std dev	0.45	0.43	0.44
Log of per capita livestock assets	Mean	3.35	3.31	3.34
	Std dev	0.54	0.54	0.54
Log of per capita physical assets	Mean	2.71	2.69	2.70
	Std dev	0.6	0.7	0.64
Log of per capita farm size (acres)	Mean	-0.06	-0.04	-0.05
	Std dev	0.39	0.40	0.39
Per capita oxen numbers	Mean	0.19	0.21	0.20
	Std dev	0.25	0.29	0.27
Per capita family education (yrs)	Mean	5.97	5.26	5.71
	Std dev	2	2.21	2.10
Main occupation (farming = 1)	Mean	0.76	0.69	0.73
	Std dev	0.43	0.47	0.45
Have no contact with NGOs (yes = 1)	Mean	0.16	0.23	0.19
	Std dev	0.37	0.42	0.39

price determination model to identify factors that influence grain prices in point transactions and to test whether PMGs pay higher prices to farmers than other buyers after controlling for grain quality, seasonality and distance. We also tested whether PMG membership facilitated the uptake of improved varieties. Since group membership is endogenous, we used the predicted values from the bivariate probit model to instrument group membership in estimating the probit model of variety adoption. The descriptive statistics for selected variables are given in Table 1.

## 4. Results and discussion

### 4.1. Performance of rural grain markets

Analysis of the market structure in terms of transactions (number of sells and volume) by distance and market participants during 2005 show that rural wholesalers accounted for 45% of transactions and 49% of the volume traded while broker-assemblers accounted for 38% of the transactions and of the traded volume (Table 2).<sup>3</sup> This

**Table 2. Total transactions (number of sales) and volumes (tons) in 2004/05 (all crops)**

Buyer	Total		Share (%)		Farmgate		<3 km		3–5 km		>5 km	
	Sales	Volume	Sales	Volume	Sales	Volume	Sales	Volume	Sales	Volume	Sales	Volume
Consumer	33	6.5	5	3	21	4.7	6	0.7	3	0.5	3	0.7
PMG	27	3.7	4	2	4	0.8	10	0.7	12	2.2	1	0.1
Rural wholesaler	283	101.8	45	49	25	27.5	167	43.3	82	29.9	9	1.0
Broker-assembler	237	77.7	38	38	175	60.0	24	5.2	16	2.9	22	9.7
Urban wholesaler	13	6.4	2	3	1	0.0	3	0.2	3	0.2	6	6.1
Cotton ginner	12	4.7	2	2	–	–	2	0.4	9	4.1	1	0.2
School	19	4.9	3	2	–	–	2	0.7	10	2.1	7	2.0
Total	624	205.7	100	100	226	93.0	214	51.1	135	41.9	49	19.7
Share (%)	–	–	–	–	36	45	34	25	22	20	8	10

**Table 3. Pigeonpea marketed volumes, transactions and channel utilization by participant and distance to markets**

Buyer	Traded volume (tons)		Transactions at different points (number)								Mean price (Ksh/kg)	
			Farmgate		<3 km		3–5 km		>5 km			
	2003	2005	2003	2005	2003	2005	2003	2005	2003	2005	2003	2005
Consumer	2.0	0.36	20	0	2	1	1	2	0	0	22	25
PMG	–	0.35	–	1	–	3	–	3	–	0	–	27
Rural wholesaler	11.9	1.65	9	2	56	12	22	6	6	2	15.3	23
Broker-assembler	24.6	2.06	76	10	14	1	5	1	15	3	18.6	25
Urban grain trader	2.8	0.29	3	0	3	1	0	1	11	1	24.8	24
Total	41.3	4.68	108	13	75	18	28	13	32	6	18.1	25
Share (%)	–	–	44	26	31	36	12	26	13	12	–	–

shows that rural assemblers and wholesalers jointly control more than 80% of the grain transactions and traded volumes. These traders are well positioned to buy directly from dispersed farmers. As in other parts of Africa, transactions in these areas largely rely on personal visits by traders (or their agents) to inspect quality and negotiate prices. The high search and assembly costs that require extensive travel and presence of the trader at the time of exchange increase the transaction costs (Fafchamps and Gabre-Madhin, 2006) and reduce the share of the consumer price received by the farmer. The nascent PMGs only accounted for 4% of the sales and 2% of the volume while other buyers (rural consumers, cotton ginneries, schools, etc) accounted for about 10–12% of the sales and volume purchased from sample farmers.

Further, 45% of the traded volume and 36% of the transactions were conducted right at the farm-gate. About 34% of the transactions (accounting for 25% of the traded volume), were conducted within 3 km from the farm-gate. This means that about 70% of the transactions were traded within 3 km of the farm-gate. The number of transactions and volumes traded by market participant decline significantly with distance; less than 8% of the transactions

and 10% of the traded volume were traded in markets more than 5 km away from the farm. This can be attributed to increasing transportation and transaction costs for the small quantities marketed as distances increase, which is consistent with the findings by Fafchamps and Hill (2005). The prices also varied significantly over time — increasing gradually as local supplies decline and declining again as local produce reaches local markets after harvest. This illustrates potential business opportunities for PMGs through bulk marketing and spatial and temporal arbitrage.

In order to illustrate the effect of different buyers and growing conditions on prices received by farmers, traded volumes, and market shares, we use panel data collected on pigeonpea marketing (Table 3). While rural assemblers and wholesalers remain dominant market actors, the volumes traded significantly decline when erratic rainfall patterns reduce smallholder production. The drought that prevailed during the 2004/05 production season significantly depressed the marketed surplus and the number of transactions in 2005. The drought reduced transactions from 243 in 2003 (normal year) to just 50 during 2005 while volume declined from about 41 tons to 4.7 tons. Such drastic changes in market supply are indicative of the challenges that individual farmers and PMGs face in commercializing production. While drought-induced shocks that reduce individual marketable surplus create incentives for collective marketing, the need for achieving economies

<sup>3</sup> We use the brokers and assemblers jointly as most of the assemblers in rural areas also function as agents of other larger traders in the supply chain.

of scale requires larger volumes. The results also show that the average farm-gate prices paid by the PMGs (Ksh 27/kg) were generally higher than other buyers (Ksh 23–25/kg). The significance of this will be tested and presented later using a price regression model.

#### 4.2. Participation in collective marketing groups

One question that is often raised in relation to farmer organizations is whether resource poor and smallholder farmers could actually participate in these organizations and benefit from collective action. In order to explore this question, we tested whether the PMGs — voluntarily formed by farmers — were biased towards the wealthier households and excluded the resource poor and marginal farmers. This requires careful analysis of the determinants of PMG membership, and, in particular, tests of the effect of household assets and wealth indicators. Since households often belong to more than one group, we used a bivariate probit model to identify the determinants of PMG membership.<sup>4</sup> The bivariate specification was particularly used to test whether PMG membership is jointly determined with membership to closely related groups — agricultural production networks (APNs). Membership to APNs thus constituted the second equation in the bivariate specification. Model variables included village fixed effects (location, market access, infrastructure), household asset endowments, household characteristics, human capital, and access to information (Table 4). Household characteristics were captured by dependency ratios, age and gender, male and female household workforce, family education, and main occupation of the household head. Six variables were included to capture the effect of wealth and asset endowments: farm size, value of livestock, interaction between livestock and farm size, value of physical assets, ownership of means of transport, and oxen numbers (all in per capita terms). Access to information was captured through ownership of ICT (radio, mobile phones, and TV) and contact with NGO extension personnel. In the absence of effective public extension services, NGOs continue to play a vital role in the economic development process in the semi-arid areas. In this case, the Catholic Relief Services (CRS) was instrumental in farmer mobilization and sensitization for establishing PMGs while ICRISAT was the source of improved germplasm and crop cultivars. Location effects are captured through distance to local and main markets and average rainfall conditions for the PMG villages. For comparison, we also report the univariate probit model results (Table 4).

<sup>4</sup> About 11% of the non-PMG and 20% of the PMG member farmers belonged to agricultural production networks (APNs). These groups are involved in agricultural production and some marketing activities, including sharing of labour and information. The membership of sample farmers to other local groups included 54% to natural resource management, 75% to saving groups (Mary-Go-Round) and 50% to other social networks.

The bivariate model results show that the residuals of the two network membership equations are not independent ( $P > 0.034$ ). The ancillary parameter  $\rho$ , which measures the correlation of the residuals, shows that the two equations were strongly associated ( $P = 0.034$ ), indicating the superiority of the bivariate probit specification. Therefore, the discussion hereafter focuses on the bivariate model results. The variables with significant effects on membership include female workforce in the household ( $P = 0.018$ ), ownership of ICT ( $P = 0.067$ ), log of per capita farm size ( $P = 0.072$ ), the asset interaction term (log of per capita farm size\*log per capita livestock) ( $P = 0.042$ ), stock of household education ( $P = 0.014$ ), household occupation ( $P = 0.078$ ), access to information ( $P = 0.095$ ). The distance and location effects were not significant. Family workforce generally has a positive effect, but only female workforce had a significant effect on PMG membership, indicating that PMGs could potentially enhance participation and integration of the female workforce into markets. The other household characteristics were not significant.

The most important variables for the purpose of this paper are the household assets (wealth indicators). The results show that membership increases with per capita livestock wealth but decreases with per capita farmland, indicating an opposing marginal effect of these assets. This shows that households with larger farm sizes alone are less likely to participate in collective marketing, while households with more livestock have a higher probability of joining marketing groups. This opposing effect may result when higher livestock wealth is associated with smaller cropland, which reduces the marketed surplus and increases the gains from collective marketing. The results confirm that it is primarily those farmers with small landholdings who participate in collective marketing. These are households who produce small marketable surpluses and thus face higher per unit transaction costs in marketing their produce. However, households with more land and livestock assets together are also more likely to become members. Farm size and the asset interaction terms had a similar effect on the likelihood of participation in APNs. Participation in agricultural networks (mainly through reciprocity and labour exchanges) generally decreases with land, draught animal (oxen) assets, indicating that large farmers are less likely to engage in such exchanges. These findings are consistent with those of Mude (2006) although the latter focused on coffee marketing, a high value crop without alternative home use.

We also find that ownership of communication technologies (radio, TV or telephone) reduces the probability of participating in collective marketing, perhaps indicating some degree of substitution in accessing market information. However, households with limited contact with extension (proxied through frequency of contact with NGOs) are less likely to join PMGs, showing the benefits of sensitization and education, but interestingly participation in indigenous APNs seems to be higher for households who had less

**Table 4. Bivariate and univariate probit determinants of PMG membership**

Variable	Bivariate probit		Univariate probit
	PMG	APN	PMG membership
	Coefficient	Coefficient	Coefficient
Dist to village market (km)	-0.083 (0.061)	-0.090 (0.070)	-0.082 (0.061)
Dist to nearest main market (km)	0.006 (0.014)	-0.023 (0.018)	0.006 (0.013)
HH age (years)	-0.006 (0.006)	0.003 (0.007)	-0.006 (0.006)
HH gender (1 = male, 0 = female)	0.182 (0.178)	-0.111 (0.207)	0.179 (0.179)
Male workforce	0.024 (0.082)	-0.104 (0.091)	0.026 (0.083)
Female workforce	0.206** (0.087)	0.056 (0.103)	0.204** (0.087)
Dependency ratio	0.029 (0.044)	0.094** (0.047)	0.028 (0.044)
HH owns ox-cart (1 = yes, 0 = otherwise)	0.138 (0.178)	0.094 (0.198)	0.131 (0.177)
HH located in average rainy area (1 = yes, 0 = otherwise)	-0.120 (0.200)	0.041 (0.219)	-0.127 (0.200)
HH located in dry area (1 = yes, 0 = otherwise)	-0.155 (0.173)	0.396** (0.200)	-0.158 (0.173)
Log of per capita livestock asset (Ksh)	0.842 (0.533)	-0.507 (0.647)	0.837 (0.531)
Log of per capita physical asset (Ksh)	0.916 (0.703)	-0.346 (0.854)	0.911 (0.699)
Log of per capita farm size (acres)	-2.093* (1.162)	-2.408* (1.330)	-2.114* (1.169)
Log of per capita livestock* Log per capita farm size	0.766** (0.376)	0.866** (0.397)	0.772** (0.381)
Per capita oxen numbers	-0.389 (0.316)	-0.922* (0.506)	-0.388 (0.321)
Per capita family education stock	0.097** (0.040)	0.069 (0.045)	0.099** (0.040)
Main occupation (Farming = 1, 0 = otherwise)	0.301* (0.171)	0.217 (0.202)	0.299* (0.171)
HH owns ICT (1 = yes, 0 = otherwise)	-0.347* (0.190)	-0.102 (0.224)	-0.352* (0.192)
Average contact with NGOs (1 = yes, 0 = otherwise)	-0.179 (0.164)	0.243 (0.203)	-0.176 (0.164)
No contact with NGO (1 = yes, 0 = otherwise)	-0.351* (0.210)	0.490** (0.240)	-0.354* (0.210)
Constant	-2.744 (1.845)	-0.989 (2.236)	-2.726 (1.832)
Athrho	0.229** (0.108)		
Wald $\chi^2$ [df]	[46] 98.20: Prob > $\chi^2 = 0.000$		[23] 39.44: P > $\chi^2 = 0.0178$
Log pseudo-likelihood	-395.854		-243.069
Wald test of $\rho = 0$	$\chi^2 [1] = 4.501$ Prob > $\chi^2 = 0.034$		

Note: Robust standard errors are in parentheses; [df] are degrees of freedom.

\* denotes 10% level of significance, \*\* denotes 5% level of significance, \*\*\* denotes 1% level of significance.

contact with NGOs. We also find that education and farm-orientation increase the likelihood of PMG membership. Along with better education, NGO sensitization and information flow seem to be good instruments for facilitating participation in group marketing.

#### 4.3. The benefits of collective marketing

In this section we assess the potential effect of group membership on prices received by farmers and adoption of new varieties. It is hypothesized that participation in PMGs

**Table 5. Determinants of grain prices received by farmers**

Variable <sup>a</sup>	Descriptive stat (mean)	Estimated coefficient	Robust t-statistics
Amount sold (kg)	324.95	-0.001	-0.97
Amount sold squared (1,000 kg)	439	$3.34 \times 10^{-8}$	0.16
Distance to selling point (km)	4.6	0.023	1.97**
Beans dummy	0.06	15.163	14.99***
Pigeonpea dummy	0.08	11.275	12.06***
Chickpea dummy	0.03	13.512	9.31***
Greengram dummy	0.27	12.321	19.45***
Cowpea dummy	0.03	4.061	2.99***
Cotton dummy	0.04	7.760	4.77***
Vegetables dummy	0.04	7.421	5.51***
Quality (1 = if fair average quality)	0.92	0.222	0.26
District (1 = Makueni)	0.16	-2.194	-2.97***
Consumer buyer (= 1)	0.05	6.757	6.02***
PMG buyer (= 1)	0.04	5.950	5.04***
Rural wholesaler buyer (= 1)	0.45	-0.614	-1.20
Urban trader buyer (= 1)	0.02	0.988	0.52
Cotton ginnery buyer (= 1)	0.02	1.017	0.49
School	0.03	3.570	2.66***
Season1 (= 1 if harvest season)	0.71	-1.491	-1.96**
Season2 (= 1 if 2 to 3 months after harvest)	0.19	-1.173	-1.33
Gender (male = 1)	0.84	0.553	0.81
Education (yrs)	6.79	-0.032	-0.49
Own ICT (yes = 1)	0.82	0.056	0.09
Constant	-	13.914	9.79***
N		624	
F(23,600)		41.09	
R <sup>2</sup>		0.612	

Notes: <sup>a</sup> Reference variables include: crop price = maize; quality = above average; district = Mbeere district; buyer = broker-assembler; season = 4–5 months after harvest. Level of significance as defined in Table 4.

would increase prices received by member farmers and facilitate access to improved varieties and hence adoption of new technologies.

#### 4.3.1. Producer price benefits

A key objective of collective marketing is to reduce transaction costs and improve farm-gate prices for producers. In some cases, reducing the volatility of local markets and reducing the price risks could be an important benefit to small producers. Testing the latter hypothesis however requires panel seasonal price data for different buyers. Since the PMGs were not active in 2003, we could not assess this effect, but use cross-sectional grain sales data to test whether PMGs indeed pay a significantly higher price than other buyers. In order to test this hypothesis we estimated a regression model to identify the determinants of actual prices received by farmers. The main model variables included distance to the selling market, type of buyer, type of grain traded, season, grain quality and household characteristics of the farmer.

The estimated model was significant ( $P < 0.001$ ) and explained about 61% of the variation ( $R^2 = 0.612$ ). The results show that grain prices are significantly determined by the distance to the point of transaction, the type of crop

sold, location (district), buyer type (particularly consumers, PMGs and schools) and the season the grain is sold. Grain prices were positively correlated with distance (Table 5). Specifically, prices seem to increase by about Ksh 0.2/kg for every 10 km traveled from the farm-gate ( $P < 0.1$ ). While producer prices increase as distance increases, the price change for the range of distances covered in this study (less than 10 km) does not seem to be attractive for farmers to travel long distances for grain marketing. The small price gain is likely to be muted by the associated transportation costs unless the quantity sold is large enough to exploit economies of scale. This seems to explain why most farmers prefer to sell the grain at the farm-gate (Tables 1 and 2). After controlling for the crop type, season, quality and type of buyer, amount sold does not seem to have a significant effect on prices received by farmers.

Prices vary significantly across crops ( $P < 0.01$ ). In relation to maize (reference crop) the price variation ranges from Ksh 4/kg for cowpea to about Ksh 15/kg for beans. Pigeonpea and greengram — two predominant cash crops in the study districts — sell at Ksh 12 over and above the maize price while chickpea fetches about Ksh 14/kg more than maize. An interesting result is that grain quality does not seem to matter in price determination; the price



**Table 6. The effect of collective marketing on pigeonpea prices in eastern Kenya**

Buyer	Season	Point of sale	Price (Ksh/kg)	PMG price advantage (%)
PMG	Immediately after harvest	Farmgate	29.81	24.00
Broker-assembler			24.04	
PMG	4–5 months after harvest	5 km	29.93	23.88
Broker-assembler			24.16	
PMG	4–5 months after harvest	Farmgate	31.16	22.72
Broker-assembler			25.39	
PMG	4–5 months after harvest	5 km	31.29	22.62
Broker-assembler			25.52	

**Table 7. Income effects associated with selling through marketing groups**

Value of grain sold (Ksh)	Income gain from using marketing groups <sup>b</sup>				Lost income by members for not using marketing groups <sup>b</sup>			
	Small	Medium	Large	All households	Small	Medium	Large	All households
Using PMG price	2,303	5,387	7,418	5,155	14,381	19,284	22,452	18,705
Using broker price	1,872	4,413	5,988	4,188	10,518	14,407	16,743	13,889
Difference	431	974	1,429	967	3,862	4,877	5,708	4,816
Cost of collective action <sup>a</sup>	279	290	296	289	314	330	339	328
Net gain or lost income	152	684	1,133	678	3,548	4,547	5,369	4,488

Notes: <sup>a</sup> The cost of collective action includes the annualized costs of joining fee, annual subscription fee and the opportunity cost of delayed payments calculated using the annual interest rate of 4.3% on savings for commercial banks in Kenya.

<sup>b</sup> The farm size classes represent the lower, medium and upper one-third household groups for farmers selling grain using the PMG and non-PMG channels.

differential between high quality and fair average quality (FAQ) grain is insignificant. This is a reflection of the classic case of asymmetric information (Akerlof, 1970) where buyers take the quality of a good to be uncertain and consider trading only in average quality, which may crowd out suppliers of superior quality. More than 90% of the grain transactions were declared as FAQ. More work is currently underway to understand this effect.

When we look at the different marketing channels, consumers, PMGs and schools respectively paid about Ksh 7, Ksh 6, and about Ksh 4 over and above the prices paid by broker-assemblers ( $P < 0.01$ ). This shows that PMGs can be attractive market outlets for small producers. The school feeding programs (captured by the school variable) also seem to provide an alternative market outlet to smallholders at significantly higher prices ( $P < 0.01$ ).

About 70% of the grain is sold immediately after harvest, but farmers selling at this time (Season1) would lose about Ksh 1.5/kg compared to those who can afford to delay selling for 4–5 months (reference season) after harvest ( $P < 0.051$ ). Farmers can even benefit from higher prices by delaying sales for 2–3 months after harvest (Season2) as prices for this period are not significantly lower than prices 4–5 months after harvest. This however shows that PMGs could exploit seasonal price differentials through temporal arbitrage involving bulking and storage. This supports the current PMG practice of storing grain for some months in anticipation of better prices.

A simulation analysis using these econometric results shows that prices paid by the PMGs to the member farmers — after having covered operational costs — are about 22 to 24% higher than the prices paid by middlemen, the major competitors in rural areas (Table 6). However, this gain comes at a cost of delayed payments to grain sellers (on average for 5 weeks). In contrast, other competing buyers paid on delivery or shortly thereafter. This explains why cash-constrained farmers opt to sell through other channels, even at a risk of lower prices. As we discuss later, capital constraints and lack of access to credit are major constraints to PMGs performance.

Is the observed price differential sufficient to provide economic incentives for smallholders to join marketing groups? What is the additional income that farmers gain from group membership after having paid the associated fees and indirect costs? A simple cost benefit analyses of grain marketing using two prices — that offered by broker-assemblers and PMGs at the farm-gate — can show these gains. Using the 24% farm-gate price differentials (Table 6) for selling immediately after harvest, Table 7 presents (first half) the estimated gains to members by using the PMG channel as compared to selling to broker-assemblers. The associated average costs of membership (annualized joining fee and annual contributions) and the opportunity cost of capital for delayed payments are included as costs of collective action. The average income gain is about Ksh 678 per household, but varies across household groups

**Table 8. Effect of PMG membership on technology adoption**

Variables	Pigeonpea			Greengram		
	Coeff	Robust Std error	T-stat	Coeff	Robust Std error	T-stat
Predicted membership	5.494	1.46	3.76***	2.690	1.03	2.61***
Age of head	0.012	0.01	1.83*	0.002	0.01	0.36
Head is male	-0.255	0.21	-1.24	0.305	0.25	1.23
Male workforce	-0.098	0.09	-1.13	-0.039	0.10	-0.38
Female workforce	-0.405	0.14	-2.91***	-0.105	0.12	-0.86
Dependency ratio	-0.037	0.05	-0.71	-0.162	0.07	-2.42**
Owns radio, phone or TV	0.303	0.27	1.11	0.553	0.25	2.23**
Owns ox-drawn cart	-0.247	0.19	-1.31	0.281	0.21	1.35
Lives in medium rainfall area	0.673	0.21	3.24***			
Lives in dry area	0.807	0.17	4.64***	-0.167	0.18	-0.93
Log of per capita land	1.316	1.63	0.81	1.287	1.43	0.90
Log of per capita livestock	-0.485	0.20	-2.42**	-0.163	0.20	-0.83
Log of per capita physical assets	0.277	0.16	1.68	-0.119	0.17	-0.70
Log per capita land X log per capita livestock	-0.482	0.49	-0.99	-0.351	0.44	-0.81
Per capita oxen numbers	0.356	0.49	0.73	1.224	0.40	3.06***
Per capita education	-0.081	0.06	-1.39	-0.131	0.06	-2.29**
Farming main occupation (yes = 1)	-0.647	0.23	-2.83***	-0.104	0.24	-0.44
Medium contact with NGO	1.295	0.27	4.79***	0.122	0.33	0.37
No contact with NGO	1.027	0.35	2.91***			
Has extension contact	-0.048	0.15	-0.33	-0.514	0.16	-3.20***
Predicted error	-1.226	1.47	-0.83	0.423	1.58	0.27
Constant	-2.687	0.90	-3.00***	-1.001	1.04	-0.96

Note: \* denotes 10% level of significance, \*\* denotes 5% level of significance, \*\*\* denotes 1% level of significance.

depending on the amount marketed. While the income gain per unit sold is constant, farmers with larger marketed surplus obtain higher benefits. In our case this varied from Ksh 152 for the bottom one-third to Ksh 1133 for the upper one-third of the farm size classes.<sup>5</sup>

These income gains are modest for two reasons: (a) the average amount marketed was severely reduced because of the drought that prevailed during the 2004/05 production season, and (b) some member farmers chose to sell through non-PMG channels mainly because these buyers paid promptly to cash-constrained farmers compared to the PMGs that need about 35 days.

Assuming that the main alternative at the farm-gate is using the broker-assembler channel, we use the amount marketed by the members outside the PMG-channel to estimate the income loss that they sustain by not exploiting collective marketing. This is shown in the second half of Table 7. The average income loss to members by selling through the broker-assembler channel (instead of using the PMG) is about Ksh 4,488 per year. This is quite significant and amounts to about 7.4% of the poverty line income and it increases further with the amount diverted away from the PMG channel. This shows the potential of group marketing for poverty reduction and the need to make this channel

attractive to farmers by addressing the underlying factors that force them to use other outlets.

#### 4.3.2. Improved access to and adoption of new technologies

As indicated earlier, one of the key policy relevant questions is whether PMGs could also facilitate the access of smallholder farmers to improved seeds and agricultural inputs. The PMGs in eastern Kenya have been involved in local production and marketing of improved seeds of dryland crops. Selected farmer members trained in quality seed production methods produce identified new varieties with the support of some NGOs. The groups then distribute the improved seeds to members at affordable prices, while in some cases non-members could also buy seeds from the PMG outlets at relatively higher prices. While the active role of PMGs may catalyze and accelerate technology adoption, it is likely that the new varieties would gradually spread through farmer-to-farmer exchange of information and new seeds. Informal technology exchange is particularly important for open-pollinated varieties and for legumes where out-crossing is very limited and genetic purity is less likely to be affected for three to five years.

In order to test the initial adoption effect, we used a probit specification where membership is instrumented using the bivariate model results. Separate regressions were run for maize, pigeonpea and greengram for which a significant share of farmers indicated planting new varieties (Table 8). Group membership does not have any observable effect on adoption of improved maize varieties

<sup>5</sup> Higher rates of time preference and hence higher opportunity cost of capital will lower the gains from using the groups. For example, the income gains to lower and upper farm size groups decrease to Ksh 132 and 1070, respectively, if a higher annual rate of interest (15%) is used to value the cost of delayed payments (for five weeks).

**Table 9. Selected indicators of performance of marketing groups**

PMG	Per capita assets built over time (Ksh/member)	Per capita sales volume (kg/member)		Per capita total sales volume (kg/member) 2003–2004	Mean rank for performance indicators	Mean rank for collective action indicators
		2003*	2004			
Kathonzweni	6,393	212	30	242	1.3	4.3
Kalamba	3,130	46	8	54	3.3	3.0
Makima	301	–	123	123	3.5	3.2
Kilia	177	34	23	57	5.3	6.8
Kamwiyendeyi	333	192	0	192	5.3	6.3
Wango	63	–	8	8	6.5	4.8
Emali	268	92	0	92	6.7	6.0
Thavu	395	3	0	3	6.7	5.2
KYM	335	10	0	10	6.7	6.5
Nthingini	34	–	7	7	7.5	5.7

Notes: \* Missing data indicate that PMGs were established later in 2003 and did not sell during that year.

(hence results not shown). This may indicate that both members and non-members have equal levels of access to maize seed — a focus of public and other extension efforts in many parts of Kenya. On the other hand, membership does seem to have a significant positive effect on the uptake of dryland legume crops (pigeonpea and greengram) ( $P < 0.001$ ). These are important cash and food crops for many smallholders in the drier areas; hence adoption of improved varieties for both crops is significantly higher in the drier zones where these crops are more important. Farmers with higher dependent family members seem to have lower likelihoods for legume adoption, perhaps because food security concerns push these households to focus on staple cereals. Contact with formal extension systems does not have any effect for adoption of pigeonpea varieties but seemed to discourage the uptake of greengram. This may be a reflection of the predominance of formal extension systems on major staples rather than dryland legumes. On the other hand, contact with NGOs does seem to promote adoption of legume varieties, especially pigeonpeas.

#### 4.4. Effectiveness of collective marketing groups

One major difficulty in collective action studies is to identify metrics for measuring the level of collective action and lack of evidence on how such group action contributes to final performance outcomes. Generally there are no standardized measures or indicators that can be used to assess the level, viability and effectiveness (performance) of collective action (e.g., Place *et al.*, 2002). However, depending on the situation, certain indicators may be identified as proxies for the differential level of collective action and the degree of effectiveness of such action in attaining stated group objectives. We used the PMG survey data to identify some indicators for the levels of cooperation and its effectiveness (performance) in attaining certain marketing outcomes. Accordingly, six indicators of collective action were identified: the number of elections

since formation, share of members respecting bylaws, attendance of meetings, annual member contributions to the group, cash capital and agreed annual subscription fees (not shown due to space limitations). In order to facilitate comparison across groups, the indicators were standardized in per capita or in percentage values. In relation to the effectiveness of collective marketing the PMGs were compared on the basis of two outcome indicators: total assets built over time and total volume of grains traded (both standardized per member). The PMGs were then ranked according to their performance on each of the selected indicators. An aggregate mean rank for all the indicators of both the level and effectiveness of collective action is then used to evaluate the overall performance of PMGs. While the assumption of equal weights for the selected indicators is unlikely to hold for all groups, it was quite sufficient to show the relative ordering of PMGs on a scale of collective action indicators.

The aggregate rankings across the three effectiveness indicators (i.e., combining assets built over time and crop sales per capita) show that Kathonzweni (1.3), Kalamba (3.3) and Makima (3.5) performed much better than others (Table 9). The mean rankings for the six indicators of the degree of collective action indicate that these same groups performed best, namely Kalamba (3.0), Makima (3.2), and Kathonzweni (4.3). A non-parametric test — Spearman's rank correlation — was used to check for consistency on how the PMGs were ranked on the basis of selected indicators for level of collective action and its effectiveness. The average ranks were strongly correlated ( $r = 0.985$ ) which shows that groups that did well in terms of the different aspects of collective action were also the groups that performed better in terms of achieving their collective marketing objectives. This confirms that higher effectiveness in group marketing functions is closely correlated with higher levels of collective action, a result consistent with field observations on the level of group action and its effectiveness.

**Table 10. Rankings of PMG collective marketing constraints (1 = most important)<sup>a</sup>**

Constraint	Mbeere (n = 5)	Makueni (n = 5)	Total (n = 10)
Lack of credit	1.4 (1)	1.2 (1)	1.3 (1)
Price variability	4.6 (5)	2.6 (2)	3.6 (3)
Low volumes	4.8 (3)	3.2 (3)	4.0 (3)
Lack of buyers	5.4 (4)	4.0 (4)	4.7 (4)
Low business skills	4.8 (6)	6.0 (6)	5.4 (6)
Low quality	7.2 (7)	6.2 (6)	6.7 (7)
Storage pests	7.6 (8)	7.6 (7)	7.6 (7.5)
Internal conflicts	8.0 (8)	8.2 (8)	8.1 (8)
Poor leadership	7.8 (9)	9.6 (10)	8.7 (9)
Lack of storage	11.3 (12)	8.2 (7)	9.4 (10)
Theft in storage	10.8 (11)	11.2 (12)	11.0 (11)

Notes: <sup>a</sup> Figures in parentheses are medians.

#### 4.5. Policy and structural impediments to collective marketing

If the farmer marketing groups offer new opportunities to make markets work for small producers, what are the external limiting factors for their growth and expansion? The study attempted to identify the key perceived constraints to PMG performance. The median rank for the three most important constraints to collective marketing was given as: lack of credit (1), price variability (3) and low volumes (3) (Table 10). Other less important operational constraints include lack of buyers (4) and low business skills (6). In order to exploit the full potential of PMGs, future policies need to address these constraints.

The prominence of lack of credit as a major constraint is consistent with the pervasive financial market imperfections in rural areas (e.g., Poulton *et al.*, 1998; Kelly *et al.*, 2003) and the wide recognition that this service can play an important role in marketing and enterprise development (Kirkpatrick and Maimbo, 2002; Bingen *et al.*, 2003). Credit constraints may be addressed through rural micro-credit facilities, contract or out-grower schemes and inventory credit arrangements. While Grameen bank type micro-finance schemes may be useful, such loans tend to be small and hence less suitable for grain marketing operations that require significant capital to attain economies of scale. This suggests that while access to significant capital is needed, selective subsidies may also be required to 'kick-start' agricultural markets as they play an important role in relieving critical seasonal and cash constraints, and reducing market and input supply uncertainties (Dorward *et al.*, 2004).

Processors, exporters and supermarkets that need consistent and timely supply of high quality products may also provide financial resources and key inputs to farmers, through contractual or out-grower schemes. The production loans can then be settled against the value of the grain supplied. The viability of such an arrangement would how-

ever depend on three factors: i) the extent to which farmers are able to supply quality produce in the desired quantity and time, ii) the ability of the groups to coordinate production and marketing activities, and iii) the legal and institutional framework for contract formation and enforcement. The latter is critical as many contract farming arrangements suffer from non-binding contracts and lack of arbitration and enforcement mechanisms. An inventory credit or warehouse credit system is another option for providing credit services. However, the success of warehouse arrangements will depend on the legal status of the groups, the willingness of the banks to lend against inventories, and availability of suitable storage facilities in rural areas.

These results suggest that given the low level of market development and lack of service providers in many semi-arid rural areas, the PMGs are unlikely to prosper in a "business as usual" policy environment. There is a need for supportive policies that spur their growth and gradual transition to cooperatives and business enterprises. This would include an enabling legal framework, improved access to market information, support to enhance business skills, and access to essential finance and credit facilities. The current status of farmer marketing groups in Kenya as self-help groups (SHGs) means that they lack legal status as business enterprises. This restricts their ability to access essential credit and finance from financial institutions. While the Kenya Cooperative Societies amendment bill (Republic of Kenya, 2004) would appear to provide for a stronger regulatory framework within which cooperative societies can operate (Manyara, 2003; Argwings-Kodhek, 2004), it fails to provide sufficient mechanism for nascent farmer organizations, now registered as welfare groups, to develop fully and transit into cooperative societies. The current legal framework may also inhibit further development and competitiveness of embryonic groups and fails to provide sufficient mechanisms to facilitate and support their transition into farmer-owned business enterprises.<sup>6</sup>

## 5. Conclusions

This study has shown that market liberalization and reform policies of the recent past in sub-Saharan Africa were necessary but not sufficient conditions to increase access and market participation of smallholder farmers in areas where market institutions and infrastructure are underdeveloped. The expected positive response by the private sector in many areas with limited market infrastructure has

<sup>6</sup> Among other things, the framework requires that societies annually elect new office bearers and maintain financial statements that meet international standards. Failure to meet these requirements may lead to dissolution.

generally been very poor, leaving a large number of smallholder farmers under subsistence production and, therefore, unable to benefit from liberalized markets. Structural problems of poor infrastructure and lack of market institutions needed to fill the vacuum left when governments withdrew from markets in the process of liberalization contribute to high transaction costs, coordination failure and pervasive market imperfections. This realization has necessitated the search for new kinds of institutional arrangements to enhance the uptake of market-oriented and productivity-enhancing technologies and foster market participation and commercialization of smallholder production. One of these institutional innovations has been the strengthening of producer organizations and formation of collective marketing groups like PMGs as instruments to remedy pervasive market failures in rural economies.

The analysis presented here has shown that while collective action — embodied in PMGs — is feasible and useful, external shocks and structural constraints in the system require farmer organization and coordination mechanisms at a higher scale to exploit scale economies.

The PMGs were able to pay higher prices to members and hence improve opportunities for resource-poor farmers to benefit from markets. The PMGs also seemed to facilitate access to improved seed and adoption of new varieties for dryland crops. This is important since these crops are largely neglected by public extension systems and access to quality seed of improved varieties is an important determinant of agricultural commercialization. While marketing channels in the study areas are characterized by long and complex marketing chains and high transaction costs, which considerably lower the farmers' share of the consumer price, PMGs improved market opportunities for small producers by bulking, storage, grading, sorting, and selling the produce directly to buyers at the upper end of the value chain. The links to secondary and tertiary markets were enhanced through better coordination of production and marketing activities. There was no evidence that the PMGs benefited only the wealthier and resource-rich farmers. On the contrary, the incentive for joining collective marketing groups seems to be higher for those with less farmland.

Producer marketing groups have the potential to simplify and shorten the marketing chain by directly connecting small producers to secondary and tertiary markets; better coordinate production and marketing activities and facilitate farmer access to production inputs at fair prices. The effectiveness of this collective action was reflected in the larger volumes of grain transacted and capital assets held by the group. The effectiveness of collective action in terms of these performance indicators was found to be a function of the level of collective action in the form of increased participatory decision making, member contributions to the PMG, and initial start-up capital. Hence, better performing groups in terms of collective marketing,

showed evidence of high levels of collective action. The higher the levels of collective action, the more successful the PMGs were in terms of monetized per capita assets built over time and also the per capita grain volumes traded.

However, recurrent droughts in semi-arid areas and low productivity of soils reduce marketable surplus and increase vulnerability and attenuate the benefits of collective action and institutional innovations. The effectiveness of groups was also hampered by their lack of cash capital to pay for produce deliveries by farmers, which reduces their competitiveness with other buyers. The continued existence of PMGs under such circumstances depends on the ability to organize farmers at a higher level of coordination, and their ability to tackle technological and financial problems that now limit crop yields, volume of trade and access to marketing services.

The challenge therefore is to sensitize members on the democratic principles of participatory group governance through elections, to provide initial start-up capital to kick-start their operations, and to encourage members to increase their registration fees for membership to raise the necessary minimum capital. This calls for interventions that improve governance and democratization of farmer organizations; increase the start-up capital base; and enhance access to market infrastructure (storage, transport, communication, etc) and agribusiness development services (market information, credit, business skills). There is a strong argument for public investment to support the emergence and establishment of institutional and organizational structures that facilitate access to and participation of smallholders in agricultural value chains.

One strategy to enhance access to marketing services is to explore the use of crop inventory as collateral for financial credit and to subsequently encourage formal financial institutions to extend warehouse or inventory credit services to organized farmer groups. Another option would be to pay farmers a portion of the grain value upfront at the time of delivery and defer full payments until the grain is sold at higher prices. This would allow farmers to meet immediate cash needs and also benefit from better prices by exploiting the power of collective marketing. Strong public sector support is critical in creating a conducive policy environment for the emergence of farmer marketing groups and participation of the private sector. These strategies should be pursued together with alternative options for smoothing supply through investments in drought-mitigating and water-harvesting techniques that would enable farmers in drought-prone areas to manage production risk more effectively.

## References

- Akerlof, G.A., 1970. The market for "lemons": Quality and uncertainty and the market mechanism. *Quarterly Journal of Economics*, 843: 488–500.

- Akwabi-Ameyaw, K., 1997. Producer cooperatives resettlement projects in Zimbabwe: Lessons from a failed agricultural development strategy. *World Development*, 25(3): 437–456.
- Argwings-Kodhek G., 2004. Feast and famine: Financial services for rural Kenya. *Tegemeo Rural Finance Paper*, Tegemeo Institute of Agricultural Policy and Development, Egerton University. <http://www.aec.msu.edu/fs2/kenya/wp12-rural.pdf>.
- Bingen, J., Serrano, A., and Howard, J., 2003. Linking farmers to markets: Different approaches to human capital development. *Food Policy*, 28: 405–419.
- Chowdhury, S., Negessa, A., and Torero, M., 2005. Market institutions: Enhancing the value of rural–urban links. *FCND Discussion Paper 195/MTID Discussion Paper 89*. Washington, DC: International Food Policy Research Institute.
- Coulter, J., Mills, J., Tallontire, A., and Stringfellow, R., 1999. Marrying farmer co-operation and contract farming for agricultural service provision in liberalizing economies in Sub-Saharan Africa. *ODI Natural Resources Perspectives, No. 48*. London: Overseas Development Institute.
- de Janvry, A., Fafchamps, M., and Sadoulet, E., 1991. Peasant household behaviour with missing markets: Some paradoxes explained. *Economic Journal*, 101: 1400–1417.
- Dorward, A. and Kydd, J., 2004. The Malawi 2002 food crisis: The rural development challenge. *Journal of Modern African Studies*, 42(3): 343–361.
- Dorward, A., Fan, S., Kydd, J., Lofgren, H., Morrison, J., Poulton, C., Rao, N., Smith, L., Tschale, H., Thorat, S., Urey, I., and Wobst, P., 2004. Institutions and policies for pro-poor agricultural growth. *Development Policy Review*, 22(6): 611–622.
- Dorward, A., Kydd, J., Morrison, J., and Poulton, C., 2005. Institutions, markets and economic development: Linking development policy to theory and praxis. *Development and Change*, 36(1): 1–25.
- Fafchamps, M., 2004. *Market Institutions in sub-Saharan Africa*. Cambridge, MA: MIT Press.
- Fafchamps, M. and Hill, R.V., 2005. Selling at the farmgate or traveling to the market. *American Journal of Agricultural Economics*, 87(3): 717–734.
- Fafchamps, M. and Gabre-Madhin, E., 2006. Agricultural markets and Benin and Malawi. *African Journal of Agricultural Economics*, 1: 67–94.
- Gabre-Madhin, E.Z., 2001. Market institutions, transaction costs, and social capital in the Ethiopian grain market. *IFPRI Research Report 124*. International Food Policy Research Institute, Washington, DC.
- Greene, H. W., 1997. *Econometric Analysis, 3rd edition*. Princeton, NJ: Prentice-Hall Inc.
- Hussi, P., Murphy, J., Lindberg, O., and Breneeman, L., 1993. The development of cooperatives and other rural organizations. *Technical Paper No 199*. Washington, DC: The World Bank.
- Jayne, T.S., Govereh, J., Mwavumo, A., Nyoro, J.K., and Chapoto, A., 2002. False promise or false premise? The experience of food and input market reform in Eastern and Southern Africa. *World Development*, 30(11): 1967–1985.
- Kelly, V., Adesina, A., and Gordon, A., 2003. Expanding access to agricultural inputs in Africa: A review of recent market development experience. *Food Policy*, 28(4): 379–404.
- Kirkpatrick, C., and Maimbo, S.M., 2002. The implications of the evolving microfinance agenda for regulatory and supervisory policy. *Development Policy Review*, 20(3): 293–304.
- Kranton, R.E., 1996. Reciprocal exchange: A self-sustaining system. *American Economic Review*, 86(4): 830–851.
- Kydd, J. and Dorward, A., 2004. Implications of market and coordination failures for rural development in least developed countries. *Journal of International Development*, 16: 951–970.
- Manyara, M.K., 2003. *The Development of Cooperative Law and Policy in Kenya*. Nairobi, Oscan Print.
- Mude, A., 2006. Weaknesses in institutional organization: Explaining the dismal performance of Kenya's coffee cooperatives. Paper presented at the 26th Conference of the International Association of Agricultural Economists, 12–18 August 2006, Brisbane, Australia.
- North, D.C., 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge, Cambridge University Press.
- Pender, J. and Hazell, P., 2000. Promoting sustainable development in less-favoured lands: Overview. In: Pender, J., and Hazell, P., (eds.) *Promoting Sustainable Development in Less-favoured Lands*. International Food Policy Research Institute, Washington, DC.
- Place, F., Kariuki, G., Wangila, J., Kristjanson, P., Makauki, A., and Ndubi, J., 2002. Assessing the factors underlying differences in group performance: Methodological issues and empirical findings from the highlands of central Kenya. *CAPRI Working Paper No. 25*. Washington DC. International Food Policy Research Institute.
- Poulton, C., Kydd, J., and Dorward, A., 2006. Overcoming market constraints on pro-poor agricultural growth in sub-Saharan Africa. *Development Policy Review*, 24(3): 243–277.
- Poulton, C., Dorward, A., and Kydd, J., 1998. The revival of smallholder cash crop in Africa: Public and private roles in the provision of finance. *Journal of International Development*, 10(1): 85–103.
- Republic of Kenya, 2004. Kenya gazette supplement No. 17, Bill no. 5. Nairobi: Government Printer.
- Rondot, P. and Collion, M., 1999. Agricultural producer organizations: Their contribution to rural capacity building and poverty reduction. Summary of a workshop, Washington, DC., June 28–30. Rural Development Department, World Bank.
- Winter-Nelson, A. and Temu, A., 2002. Institutional adjustment and transaction costs: Product and input markets in the Tanzania coffee system. *World Development*, 30(4): 561–574.
- World Bank, 2002. *World Development Report 2002: Building institutions for markets*. New York: Oxford University Press.