

Assessment of Farmers' Responses to Market-Oriented Production Policy: A Case Study in Eastern Shewa Zone, Oromiya Region, Ethiopia

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Abstract

Investors, traders, decision-makers and all those who are based in the towns and have dealings with farmers need to be well informed about rural communities. But the depth of research and media coverage of this crucial sector remains generally inadequate. To that end, a farm level survey was conducted in order to better understand farmers' responses to market-oriented production policy and to identify marketing problems faced by small-scale farmers in four districts (Ada, Lume, Akaki and Gimbichu) of Oromiya Region in the central highlands of Ethiopia. In all the study districts, the results showed that 58% of the respondents are aware of the market-oriented production policy that the country followed. But 40% of the sampled households attached no importance to the market-oriented production policy due to various production constraints, such as, scarcity of land (88%), large family size (71%) and lack of improved technologies (34%). About 27.3% of the sampled farmers reported that the objective of their farm is to produce for own consumption and not for market. When asked as to whether they store grain as they used to do before or not, almost 77% of the sampled farmers responded negatively mainly due to urgent needs to repay fertilizer credits (94%), low production of farm products (57%), price attraction at harvest (33%) and fear of storage pests (18%). Overall, the vast majority of respondents reported that they sell farm products to settle fertilizer debt and to buy necessary items required for household consumption. The study employed the Tobit econometric model for analyzing factors influencing farmers' responses to market-oriented production policy. The model revealed that four socio-economic factors namely age, education, technology and access to marketing information had statistically significant effect on market-oriented production policy.

Key words: Farmers' responses, market-oriented, small-scale farmers and district

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1. Introduction

Marketing plays a very important role in terms of economic development and growth as it provides income, facilitates payment of credit, and enhances linkage with non-farm sectors (Makhura, 1997). In the absence of marketing, therefore, economic development can hardly be envisaged (Madikizela and Groenewald, 1998; IFAD, 1993).

Ethiopia has introduced a new approach known as the market-oriented production policy in 2003 to move its economy from a closed and regulated economy to an open and more market-oriented economy (EPRDF, 2002). As outlined in the government's macro-economic policy, increased sales were considered to be one of the most important vehicles for economic development and growth.

In response to the market reform, the majority of the smallholders are encouraged towards market-oriented production policy in order to increase marketable surplus through productivity change. However, due to resource limitations and scanty support services, farmers have not yet actualized the policy the government had designed. Empirical evidence has shown that marketable surpluses increase when farmers are provided with adequate production resources, production-enhancing technologies and other support services (Kirsten *et al*, 1993; Mathabatha, 1996). The question regarding inadequate production resources and accelerating the usage of production-enhancing factors is still a predicament many researchers had faced. According to Heisey *et al* (1998), farmers make use of new policy and technology only if they expect to get benefit. This evaluation assesses the benefits (cash saving and yield increment), and costs of accessing and utilizing the policy, technology and support services. These factors have been explored in numerous studies, which tend to put more emphasis on the institutional factors. For example, several studies confirmed that lack of market information, inaccessibility to appropriate extension support and unavailability of inputs on time constrain the implementation of the new policy and use of improved technologies (Bisanda and Mwangi, 1996; Nguluu *et al*, 1996; Mose *et al*, 1996). Other institutional factors including the size of membership to service cooperatives (Morokolo *et al*, 1999) as well as availability of credit and local input supplies plays significant roles (Hassen *et al*, 1998).

Thus, the main objective of this study is to assess the behavior of subsistence farm-households and their responses to the market-oriented production policy being practiced in Ethiopia for the last five to six years.

2. Research methodology

2.1 Survey design and sampling

The study is based on farm-level data of 425 sampled farm households in Ada, Gimbichu, Akaki and Lume districts of Oromia Region, which are the major bread wheat (*Triticum aestivum*), tef (*Eragrostis tef*), lentil (*Lens culinaris Medik*) and chickpea (*Cicer arietinum L.*) producing districts in the central highlands of Ethiopia. The survey was conducted between May and June 2007. The sample farmers were selected randomly from the smallholder farmers in the study districts. A two-stage selection technique was employed. The first stage involved the random selection of peasant associations (villages) and the second stage constituted random selection of sample farmers who were registered as members of a peasant association and who had official access to at least 0.5 hectare of arable land through the peasant association. A census carried out in March 1994 provided a sampling framework to randomly select the households that had official access to state land.

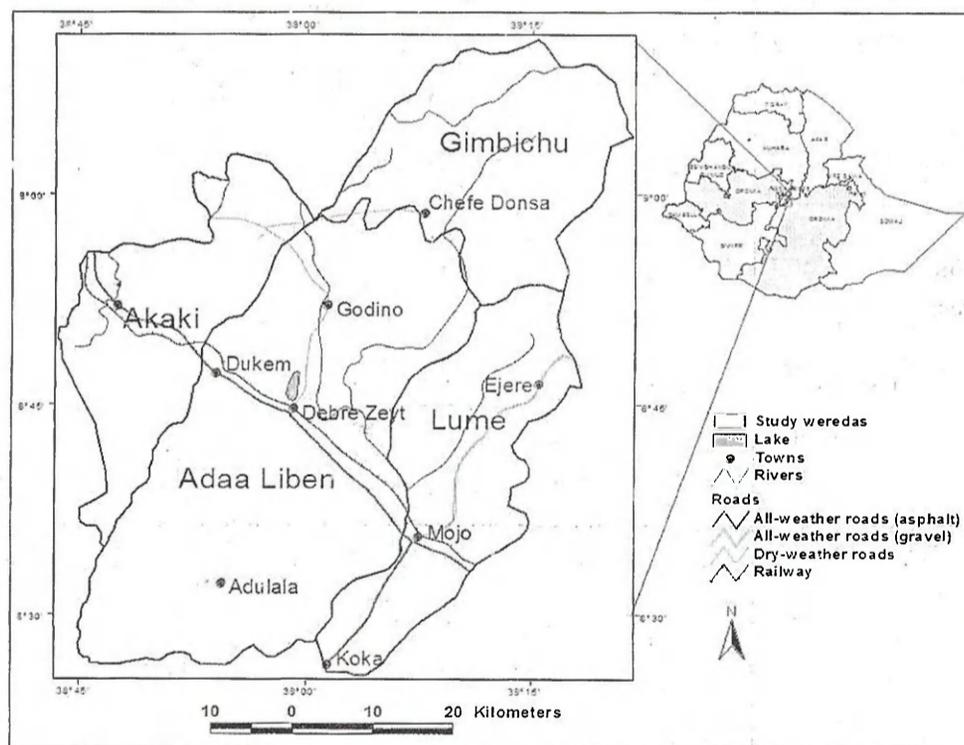


Figure 1. Map of the study sites comprising the four districts

2.2 Primary and secondary data collection

The primary data on which the study was largely based were collected from sampled farmers in the study districts. A formal survey method was employed using a structured questionnaire. Before starting the actual data collection, the questionnaires were pre-tested and on the basis of the results obtained, the necessary modifications were made to the questionnaires.

Relevant data were also collected from secondary sources. The secondary sources of information include published and unpublished documents about agricultural production in the study districts. This information was collected from regional, zonal and district level bureaus of agricultural planning and knowledgeable individuals.

2.3 Data analysis

Following data collection, the data were coded and entered into the SPSS Version 11.5 computer software package for analysis (SPSS Manual, 2006). In this study both descriptive and econometric model were applied.

Data were initially analyzed using descriptive statistics such as percentages, means, frequencies and standard deviations. Frequencies and means were computed for different variables.

Finally, the Tobit model has been employed to assess factors influencing farmers' response to market oriented agricultural production policy.

2.4 Model specification

In this study, the Tobit model has been employed to assess the effect of major socio-economic variables on the commercialization of smallholder farmers measured by the proportion of total grain production destined for market sales.

The stochastic model underlying Tobit could be defined by the following relationship:

$$Y_i = \beta' X_i + \varepsilon_i \quad \text{if} \quad X_i \beta + \varepsilon_i > 0$$

$$Y_i = 0 \quad \text{if} \quad X_i \beta + \varepsilon_i \leq 0$$

Where Y_i is a limited dependent variable that measures the probability and intensity of commercialization; X_i is a vector of independent variables; β is a vector of parameters to be estimated; and ε_i is an independently distributed error term assumed to be normal with zero mean and constant variance σ^2 .

The Tobit model assumes that there is a stochastic index equal to $(X_i\beta + \varepsilon_i)$ whose value is observed only when it is positive, and hence qualifies as an unobserved, latent variable. The Tobit model measures both the probability of being above the limit value and the intensity of the dependent variable above the limit value (Tobin, 1958).

The major advantage of the Tobit model is that its coefficients can be further disaggregated to determine the effect of a change in an explanatory variable on both changes in the probability of being above the limit value, usually zero, and changes in the value of the dependent variable if it is already above the limit (McDonald & Moffitt, 1980). Important economic and policy implications could be derived from these disaggregated parameters.

Following Tobin (1958), the expected value of Y_i in the model is

$$E(Y) = \Phi(Z)\beta'X + \sigma\phi(z),$$

where $Z = \frac{X\beta}{\sigma}$, $\phi(Z)$ is the unit normal density, $\Phi(Z)$ is the cumulative normal distribution function and σ the standard error of the error term.

Further, McDonald and Moffitt (1980) show that:

$$E(Y) = \Phi(Z)E(Y^*),$$

where $E(Y^*)$ is the expected value of Y_i for observations above the limit.

Based on such basic relationship, McDonald and Moffitt (1980) show that the marginal effect of an independent variable on the expected value of the dependent variable is:

$$\frac{\partial E(Y)}{\partial X_i} = \Phi(Z)\beta_i$$

The change in the probability of being above the limit as independent variable X_i changes is:

$$\frac{\partial \Phi(Z)}{\partial X_i} = \phi(Z) \beta_i / \sigma$$

The marginal effect of an explanatory variable on the expected value of Y_i of those above the limit³:

$$\frac{\partial E(Y^*)}{\partial X_i} = \beta_i \left[1 - Z \frac{\phi(Z)}{\Phi(Z)} - \frac{\phi(Z)^2}{\Phi(Z)^2} \right]$$

2.5 Variables specification

To investigate factors influencing farmers' response to market-oriented agricultural policy, a Tobit model has been specified having a dependent variable measured by the proportion of total grain production destined for marketing. It has been hypothesized that the commercialization variable is influenced by major socio-economic, technical and marketing variables, i.e. age, education, family size, total cultivated land, technology use, access to market and marketing information, and sources of non-farm income (Table 1)⁴. The descriptive statistics showed that farmers sold, on average, 32% of their total grain production. It was also found that about 9.7% of the sample farmers did not have any surplus to be sold in the market while the remaining were participated in grain marketing with different proportions. The definition and hypothesized relationships of the independent variables with commercialization are indicated in Table 1.

³ If the estimated parameters β and σ are found, then each of the terms in the above equation can be evaluated at some values of βX , usually at the mean of the X 's, \bar{X} .

⁴ In this section the sample size has been reduced to 407 due the fact that 18 observations have been eliminated for they had outliers in the model variables.

Table 1. Variable definitions and hypothesized signs

VARIABLES	DESCRIPTION	H ₀ signs with COMINDEX	Mean	Std Dev
<i>Dependent variable:</i>				
COMINDEX	Proportion of total grain production sold in the market (<i>total grain sold in the market ÷ total grain production</i>)	#	0.32	0.2018
<i>Explanatory variables:</i>				
AGE	Age of household head (years)	-	47.19	12.9530
EDUCA	Education of household head {score: 1 = illiterate, 2 = read and write, 3 = Elementary Education (1-6), 4 = Secondary Education (7-12), 5 = Higher Education (> 12)}	+	2.18	1.0449
FAMILYSIZ	Total family size (no.)	-	7.85	2.8292
TOTCULAD	Total cultivated land (<i>kert</i>)	+	11.39	6.0207
TECHADOPTION	proportion of total cultivated land covered with improved crop varieties	+	0.18	0.2263
MKTDIST	Walking distance from the nearest town market (score: 1 = 15-30 minutes, 2 = 31-45 minutes, 3 = 46-60 minutes, and 4 = > 60 minutes)	-	3.05	1.1166
MKTINFO	Access to market information (Dummy, 1 = yes, 0 = otherwise)	+	0.58	0.4946
NONFARINC	Non-farm annual income (Birr)	+	196.76	698.3402

3. Analytical findings and discussion

3.1 Descriptive statistics of sample households

3.1.1 Farmers' responses to market-oriented production policy

From marketing point of view, agricultural production is the quantity of products that will be offered for sale in a given period of time, under a given set of conditions (Breitenbach and Fenyes, 2000). Thus, the factors affecting the market supply of products selected include (1) the price of the products; (2) the price of alternative products; (3) the price of inputs; (4) the objectives of the farms; (5) the number of farmers supplying the market; and (6) the size and distribution of farms supplying the markets.

Based on the above factors, some sampled farmers have been able to respond to the rising demand of consumers for crop and livestock products. However, the increase in price still continues indicating that supply does not keep at equal pace with demand. Domestic demand for agricultural products will continue to rise due to population growth and increase in food consumption.

In all the study districts, about 58% of the respondents were aware of the market-oriented production policy that the government has been pursuing but they produce for sale to settle fertilizer credit and to buy household consumer goods (oil, kerosene, salt, sugar, coffee, cloth, etc.). Asked whether or not farmers produce enough for sale and for own consumption, almost 60% of sampled farmers reported that they produce large enough to be used for sale and for home consumption (Table 1). The remaining 40% of the households attached no importance to the market-oriented production policy due to various production constraints, among which were shortage of arable land (88%), large family size (71%) and lack of improved technologies (34%). Indeed, about 27.3% of the sampled farmers reported that the objective of their farm is to produce for own consumption and not for sale.

Table 1. Farmers' awareness of market-oriented production policy and their capacity to produce for market, 2007/08 cropping year

Description	Response	N	Proportion of sampled farmers (%)
Farmers' awareness of the market-oriented production policy	Yes	245	57.6
	No	180	42.4
Farmers' capacity to produce for market	Yes	253	59.5
	No	172	40.5
Reasons for not producing enough for sale*			
Limitation of cultivated land owned by household		151	87.6
Large family size per household		122	70.9
Lack of improved technologies		59	34.3
Selling is not the main objective of the farm		47	23.3

Source: Survey data, 2007

* *Farmers gave multiple responses*

3.1.2 Factors influencing farmers' decision to market-oriented production policy

This research targets at identifying motivating factors that influence farmers' decision to market-oriented production policy. In this context, farmers were asked to rank the major factors influencing their decision to market-oriented production policy. Accordingly, the study revealed that almost 94% of the sampled farmers reported that farm size was the most important production factor influencing farmers' decision to market-oriented production policy (Table 2). About 73% of the farmers indicated that market access was the second most important factor influencing farmers to sell more farm products. In addition, about 66% of the surveyed farmers confirmed that higher producer prices relative to the input prices motivated them to increase marketable surplus. Improved technology was the fourth factor influencing marketable surplus. Availability of improved technology was another motivating factor for only 52% of interviewed farmers.

Large farms are not only pursuing commercial-oriented production, but they also have achieved high level of physical and economic efficiency than small farms (Abate *et al*, 2005). Small farms consider farming as a lifestyle activity rather than

an income generating business. Thus, the cost of inducing changes in the practices of small farms may be extremely difficult (Skaggs and Samani, 2005).

Resource-poor farmers are not motivated by commercial objectives. For many of these farmers, involvement of crop and livestock production are mainly for own household consumption purposes, with meager sale of farm produces to settle fertilizer and seed debts. Moreover, most farmers in the study districts have no savings to enable them buy the required inputs for production or they may lack the resources (land, oxen, tools, etc.) necessary to produce it by themselves.

Table 2. Factors influencing farmers' decision to sell more farm products to consumers in the 2007/08 cropping year

Factors*	Ada		Akaki		Lume		Gimbich		Total	
	N	%	N	%	N	%	N	%	N	%
Farm size	103	97.2	93	93.0	101	91.8	101	92.7	398	93.6
Market access	67	63.2	71	71.0	88	80.0	82	75.2	308	72.5
Improved technologies	62	58.5	49	49.0	50	45.5	60	55.0	221	52.0
Farm products price	74	69.8	68	68.0	66	60.0	71	65.1	279	65.6
Market information	11	10.4	12	12.0	16	14.5	13	11.9	52	12.2
Farm inputs price	8	7.5	12	12.0	10	9.1	9	8.3	39	9.2

* *Farmers gave multiple responses*

3.1.3 Farmers' choice of crops for production

All categories of farms (small and large) grew wheat and tef. Farmers reported that their choice of crops depends on their productivity and profitability. Successful innovation is, thus, an alternative and a strong supplement to an increase in the output; whereas profitability can be raised either by improving productivity at same output price or by improving the terms of trade without innovation (Krishna, 1990). Some farmers in the study districts cited that lentil, chickpea and grasspea were grown as cash source and as rotation crops to restore soil fertility.

This survey made an attempt to determine farmers' choice of crops based on multiple objectives. Farmers in Ada and Lume gave highest priority to tef whereas farmers in Akaki and Gimbichu gave highest priority to chickpea and lentil, respectively (Table

3). Farmers' criteria for crop selection were higher yield per unit area to meet family food requirements and higher profitability. Almost 86% of the sampled farmers in the four districts reported that wheat is the most important crop for satisfying both the cash and food needs of the family, followed by tef (76%). This fact is also apparent from the large proportion of the cropped land area allocated to wheat and tef.

Table 3. Farmers' choice of crops in the four surveyed districts in the 2007/2008 cropping year

Crops*	Ada		Akaki		Lume		Gimbichu		Total	
	N	%	N	%	N	%	N	%	N	%
Wheat	91	83.5	88	90.7	89	85.6	92	83.6	360	85.7
Tef	108	99.08	79	81.4	95	91.3	37	33.6	320	76.2
Lentil	0	0	7	7.2	9	8.7	107	97.3	123	29.3
Chickpea	35	32.1	91	93.8	37	35.6	61	55.5	224	53.5
Field pea	7	6.4	1	1.0	20	19.2	0	0	28	6.7
Grass pea	1	0.9	4	4.1	5	4.8	0	0	10	2.4
Faba bean	3	2.8	1	1.0	4	3.8	0	0	8	1.9

*Farmers grow multiple crops

3.1.4 Increase in marketable surpluses

Agriculture in Ethiopia comprises a diverse group of subsistence, emerging commercial farmers within interrelated and often intermingled sub-sectors (crop and livestock, rain-fed and irrigated, pastoral and agro-pastoral). The implementation of the market-oriented production policy thus depends on the objectives of those farmers constituting the major actors in the various production systems and sub-sectors. To this end, the key point of inquiry is, how many of the farmers would be willing to enhance the marketable surpluses to meet the demand of the population? To assess the likely impact of the market-oriented production policy on the marketable surpluses, therefore, farmers were asked if they had increased farm supplies since the inception of the policy. The empirical findings confirmed that 150 of the sampled farmers (35%) increased their produce of marketable surpluses to meet the demand, aspiring for extra income. The remaining 275 farmers (65%) did not attempt to increase the marketable surpluses due to various reasons (Table 4), among which the most important reasons were increase in demand for home consumption (90%), possession of limited cultivated land (41%), obtaining the desirable income from selling smaller quantity of farm products (30%), and lack of improved technology (25%).

Table 4. Farmers' reasons for not increasing the marketable surpluses in four districts during 2007/08 cropping year

Description	Response	N	%
Farmers' ability to increase marketable surplus	Yes	150	35.3
	No	275	64.5
Total		425	100
Reasons* for not increasing marketable surpluses**			
Increase in home consumption		248	90.2
Having limited cultivated land		113	41.1
Obtaining desirable income from small sale		83	30.2
Lack of improved technologies		69	25.1
Selling is not the main objective of the farm		47	23.3

* Farmers gave multiple responses

** Marketable surplus refers to the quantity left to the market after the producer meets his requirements for family consumption, farm needs, and payments in kind to casual and permanent labourers.

3.1.5 Farmers' capacity to store grain

The bulk of grain produced by the small-scale farmers should not be sold to consumers because food security of these farmers depends on their success of producing and storing the staple food needed for their families with a minimum loss of quantity and quality. They must be able to keep the stored product until the next successful harvest, and this might take more than a year especially at times of crop failure (Blum and Abate, 2003). Sampled farmers were asked if they store grain until the next successful harvest as they used to store before. To this end, the responses confirmed that about 77% of the sampled farmers did not store grains until the next successful harvest. Some of the reasons farmers cited were the urgent need to settle fertilizer credit (92%), inadequate amount of harvest (75%), attractiveness of price at harvesting season (31%) and fear of storage pests (23%).

Table 5. Farmers' capacity to store grain and reasons for not storing grain until the next successful harvest in four districts during the 2007/08 cropping year

Description	Response	N	%
Farmers' capacity to store grain until the next successful harvest	Yes	96	22.6
	No	329	77.4
Total		425	100
Reasons* for not storing grain until next harvest			
Urged to settle fertilizer credit		302	91.8
I have no enough grain to store		245	74.5
Prices are attractive at the time of harvest		101	30.7
Fear of storage pests		76	23.1

* Farmers gave multiple responses

3.1.6 Farmers' involvement in marketing development

The key constraints that block the involvement of smallholders in marketing development have been an important focus of attention for this study. To this end, the following constraints were identified as the major stumbling blocks for the involvement of farmers in market-oriented production policy:

1) *Access to road and transport facilities:* About 57% of the sampled farmers confirmed that roads and transport services have made it difficult for them to sell their products in nearby towns. Moreover, local markets are less often used for buying and selling farm products. The key issues are the existence of very small and insecure markets as a result of low income. Moreover, some households stated that community norms and beliefs constrained sales of farm products at lower or similar prices within the rural areas.

2) *Access to improved technology:* Access to and the use of appropriate technology is a critical issue for the development of smallholder farms. Issues of technological transfer become important for improved crop productivity and development. In this study, about 50% of the surveyed farmers had access to improved technology during the 2007/08 cropping year.

3) *Access to finance:* The question of access to finance was a major constraint for 70% of the sampled farmers in the four districts. Studies often confirmed that financial problems might be symptoms for instability of markets or unfavorable government policy environment (FAO, 1987). In order to improve access to finance, there is a need for improving rural financial market performance as a

whole and also for measures to improve the mobilization of rural saving to augment the competitiveness and innovative financial structure (Dawson & Jeans, 1997).

4) *Access to training*: A common problem of smallholder production is that of managerial weakness. Lack of management or business skills worsens all the other problems of rural producers since entrepreneurs lack the capacity to analyze and forecast situations and devise ways to minimize the adverse impacts of constraints on their business. The study revealed that about 9% of the sampled farmers had access to training on marketing during the 2007/08 cropping year. In this context, key policy terms relate to education and training of smallholder entrepreneurs in terms of enhancing their ability to learn to compete, especially more so, in the context of free-market policy and globalization (King & McGrath, 1998).

5) *Access to institutional supports*: The final set of constraints identified concerning smallholder producers relates to issues of institutional frameworks and inadequate market services in the study districts. For the smallest part of smallholder producers, assistance can usually be effectively delivered on an individual basis. Group buying of inputs and group selling of farm products are not well organized and motivated in the study districts. Lack or poor organization of smallholder producers in a manner which enables them to make effective use of available support services is known to be a widespread problem in developing countries (FAO, 1987). To this end, our study confirmed that only 25% of the surveyed farmers had access to institutional supports, such as, input deliveries and farm product marketing.

Thus, in seeking to solve the problems and constraints of smallholder producers in Ethiopia, policy makers can learn a lot from the key issues surrounding rural counterparts across the developing world. In the final analysis, it is evident that policy for promoting small-scale farmers' livelihood will demand a complex package of interventions that address various issues of markets and marketing, production input availability, institutional framework, access to finance, technology, education and training (Table 6).

Table 6. Basic constraints of farmers to marketing development in the four district of the central highlands of Ethiopia during the 2007/08 cropping season

Descriptions	Responses	N	%
Farmers' access to institutional supports (delivery of inputs, marketing of farm products, etc.)	Yes	105	24.7
	No	320	75.3
Farmers' access to improved technologies	Yes	212	49.9
	No	213	50.1
Farmers' access to road and transport facilities	Yes	181	42.6
	No	244	57.4
Farmers' access to training on marketing	Yes	36	8.5
	No	389	91.5
Farmers' access to finance	Yes	129	30.4
	No	296	69.6
Total		425	100

3.1.7 Change in farm sizes

To alleviate land shortage, 52.7% of the sampled farmers in the study districts rented-in land for crop production. The mean area of rented-in land was 1.12 ha for sampled farmers in the four districts, and involves a contractual arrangement for 2-3 years and a rent payment of Birr 350-600 per *Kert* (one fourth of a ha), depending on the soil fertility. This shows that an informal land market appears to exist. To this end, farmers were asked how their farm sizes had changed during the last six years. Without considering rent-in land, about 4.7% and 20% of the sampled farmers reported that their farm sizes had increased (gained some land) and decreased (lost some land), respectively, while about 75% of the respondents indicated no change during 2001-2006 (Table 7).

Table 7. Change in cultivated land of the sampled farmers without considering rented-in land during 2002-2007

Types of change	Lume		Akaki		Gimbichu		Ada		total	
	N	%	N	%	N	%	N	%	N	%
Increased	7	6.6	6	6.0	6	5.5	1	0.9	20	4.7
Decreased	21	19.8	17	17.0	24	21.8	23	21.1	85	20.0
No change	78	73.6	77	77.0	80	72.7	85	78.0	320	75.3
Total	106	100	100	100	110	100	109	100	425	100

3.1.8 Household income of sampled farmers

Analysis of farm income is one of the important structural changes in agricultural production patterns (Meyer, 1998). Although farmers are often reluctant to disclose their household income generated from farm product sales, the survey made an attempt to estimate average income of the sampled farms in the four selected districts (Table 8). Sales of farm products vary among households because of differences in family size and food consumption. The most common observation drawn from the survey is that wheat and tef have high importance in the consumption and marketing patterns of the study districts. Lentil, chickpea and livestock products are the main sources of protein and cash income for Akaki and Gimbichu district households.

The types of crops produced do not vary among the four districts. Crop production is the major income source for all households in the four study districts (74%). In other words, about 95% of the sampled farmers generated income from crop sales. It can, therefore, be concluded that crop production is the most essential and important activity for the overall functioning of the farming system. In comparison to other activities, about 42% of the income was generated from livestock sales. In other words, about 62% of the sampled households earn income from livestock sales. The households engaged in off- and non-farm activities were 3.92% and 12.67%, respectively. Although the terms, non-farm and off-farm have literally often been used interchangeably, they are not precisely the same things. To illustrate the distinction between the terms, according to Lin *et al.*, (1986), many small farmers have chosen farming as an occupation because of the values they attach to farm work, including the opportunity to work for oneself. Most small farm operators seek jobs (off-farm) away from their farms for at least a short time in order to earn supplementary family income. Some small farm operators carry out farm as full-time jobs, but do also run non-farming activity (livestock fattening, petty trading, artisan, pottery work, weaving, etc.) at night and on weekends in their residents to earn additional income.

Table 8. Mean income of the sample farms in four districts of the central highlands of Ethiopia during the 2007/2008 cropping season (Birr)

Source of income	Ada		Akaki		Lume		Gimbichu	
	N	Mean income	N	Mean income	N	Mean income	N	Mean income
Crop sales	109	4935	91	5658	79	4680	110	6899
Livestock sales	56	2448	69	3642	62	3105	64	3175
Off-farm income	6	2633	6	1553	2	960	2	1900
Non-farm income	5	3460	12	2241	25	2166	8	1925

3.1.9 Marketing problems in the surveyed districts

In response to the question of ranking of the major marketing problems in the study districts, almost 74% of the sampled farmers reported that traders' conspiracy was the most important marketing constraint during the 2007/2008 cropping year (Table 8). This caused price fluctuation (56%) and interference of brokers (50%). The survey confirmed that for about 62% of the farmers, instant and excess supply of farm products was the second most important marketing constraint. A price cut by traders due to lack of market information (48%) was the third ranking constraint identified by the respondent farmers. To a very limited extent, lack of market centers and transport problem were indicated as limiting factors by 21% and 13% of the interviewed farmers, respectively.

Table 9. Types of marketing problems identified by farmers in the four districts during the 2007/2008 cropping season

Problems*	Ada		Akaki		Lume		Gimbichu		Total	
	N	%	N	%	N	%	N	%	N	%
Traders' conspiracy	88	80.7	74	74.0	85	80.2	67	60.9	314	73.9
Instant & excess supply	74	67.9	60	60.0	53	50.0	75	68.2	262	61.6
Price fluctuation	49	45.0	58	58.0	68	64.2	63	57.3	238	56.0
interference of brokers	53	48.6	72	72.0	48	45.3	41	37.3	214	50.4
Lacks of market inform.	20	18.3	20	20	64	58.2	44	40.0	205	48.2
Lack of market place	12	11.0	48	48.0	20	18.9	11	10.0	91	21.4
Transport problem	6	5.5	8	8.0	20	18.9	29	26.4	63	14.8

* Farmers cited multiple problems

3.2 Results of the Tobit model

The estimated Tobit model for factors influencing farmers' responses to market-oriented agricultural production policy and the marginal effects of the explanatory variables on the probability and extent of commercialization are given in Table 10. The model results showed that age (**AGE**) had a negative and significant ($p < 0.01$) effect on the commercialization of farm production. This result is consistent with the expectation that elder farmers have limited access to resources, information and technology which ultimately result in low productivity and production. Hence, their capacity is very limited to generate surplus for marketing. The Tobit decomposition model results revealed that the probability of market participation (commercialization) would decline, for instance, by 2% for those farmers whose age is 10 years older than the average farmer. Furthermore, the proportion of total grain production for marketing decreases, on average, by 2.7% for the entire sample and by 2.2% for those farmers who had already some commercialization activities.

Education status (**EDUCA**) was found to have a positive and significant ($p < 0.01$) effect on the level of commercialization of farm production. Normally, education is expected to enhance farmers' ability to have access to information and technology, which increases farm productivity and production that enables to have market surplus. The model results showed that a shift from simple read and write to the status of elementary education increased the probability that farmers would engage in market oriented production by 2% while the proportion of total grain production to be sold would increase by 3%, on average, for the entire sample and by 2.4% for those farmers who already had some commercialization experience.

The intensity of technology adoption (**TECHADOPTION**) measured by the proportion of total cultivated land covered with improved varieties is positively and significantly ($p < 0.1$) associated with the commercialization of smallholder farmers. In general, the use of improved agricultural technologies increases farm production by enhancing the productivity of resources and creates the capacity to produce marketing surplus. The model showed that if the total cultivated land was covered with improved varieties, the probability that farmers would decide to market their grain production increased by 5.4%. In addition, the proportion of total grain production destined for marketing would increase, on average, by 7.9% for the whole sample farmers while by 6.5% among those farmers who decided to market oriented farm production.

Access to market information (MKTINFO) had a positive and significant effect ($p < 0.05$) on the commercialization of smallholder farmers. The Tobit decomposition results revealed that having access to market information would increase the probability of farmers to decide on market oriented production system by 3.4% while the proportion of total grain production targeted for marketing would increase, on average, by 5% for the entire sample and by 4% for those who had decided to sell their grain production. It is widely accepted that access to marketing information is critical to make informed farm management decisions.

Table 10. Estimated Tobit model parameters for factors influencing commercialization of smallholder farmers

Variables	Coefficients	t-ratio	Probability change $\partial\Phi(z)/\partial X$	Total change $\partial E(Y)/\partial X$	Intensity change $\partial E(Y^*)/\partial X$
INTERCEPT	0.34531	4.94***			
AGE	-0.00290	-3.16***	-0.0018	-0.0027	-0.0022
EDUCA	0.03185	2.84***	0.0203	0.0296	0.0244
FAMILYsiz	0.00468	1.17	0.0030	0.0044	0.0036
TOTCULAD	-0.00089	-0.49	-0.0006	-0.0008	-0.0007
TECHADOPTION	0.08430	1.82*	0.0538	0.0785	0.0647
MKTDIST	-0.01444	-1.54	-0.0092	-0.0134	-0.0111
MKTINFO	0.05376	2.47**	0.0343	0.0500	0.0413
NONFARINC	0.00001	0.82	0.0000	0.0000	0.0000
Σ	0.20869				
Z	1.48176				
$\Phi(z)$	0.9308				
$\phi(z)$	0.1331				
Censored observations	36				
Uncensored observations	371				
LR chi2 (8)	35.19***				

Note: * = significant at $p < 0.1$; ** = significant at $p < 0.05$; *** = significant at $p < 0.01$

4. Summary and conclusions

In the Tobit model analysis, four socio-economic variables, namely, age, education, technology, and access to marketing information had a significant impact on the commercialization of smallholder farmers measured by the proportion of total grain

production destined for marketing. Thus, to enhance the current commercialization effort, attention should be given to improving access to education, technology and marketing information. In addition, targeting young farmers in the commercialization process would have a great impact.

The descriptive results revealed that farmers responded differently to the market-oriented production policy depending on numerous factors. The major factors that constrained farmers to increase marketable supplies were shortage of arable land (87.8%), increase in family size (70.9%) and lack of improved technologies (34.3%); and indeed, 27.3% of the sampled farmers even reported that the objective of their farm is to produce for home consumption not for sale.

The study results confirmed that farmers in the study districts have benefited substantially from the use of improved seeds, but they still complain that the improved varieties released to date are limited in number (e.g. lentil variety known as "Alemaya") and in supply. Therefore, the breeding and seed production system must be further strengthened to increase the number of varieties and to supply sufficient quantity of improved variety seeds to farmers at reasonable prices.

The adoption rate of improved technology has increased markedly over the last six years due to decreasing land to man ratio. However, the surveyed farmers reported various problems (e.g. shortage of feed for livestock, insect pests, etc.) that limit the expansion of improved technologies. In lentil and chickpea growing districts, about 90% of sampled farmers reported that feed shortage was the most important constraint to livestock production during the 2007/08 cropping year.

With regard to income, almost 95% and 62% of sampled households generated income from crop and livestock sales, respectively. About 4% and 13% of sampled households reported off-farm and non-farm activities, respectively. In most cases, smaller farms with less than 1 ha of land holding per household subsidize farm activities with off-farm income.

To alleviate land shortage, about 52.7% of sampled farmers rented-in land for crop production during the survey period. This shows that an informal land-market appears to exist. To this end, farmers were asked how their farm sizes had changed during the last six years. Thus, without considering rent-in land, about 5% and 20% of the sampled farmers reported that their farm sizes had increased (gained some land) and decreased (lost some land), respectively, while about 75% of the respondents indicated no change during 2002-2007.

The most important marketing problems cited in the study districts were traders' conspiracy (73.9%), instant and excess supply of farm products (61.6%), price fluctuation (56.0%), interferences of brokers (50.4%) and lack of market information (48.2%). This is a clear indication that marketing services were virtually nonexistent in the study districts.

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