Commercialization of Smallholders: Is Market Participation Enough?

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Abstract

The literature on commercial transformation of smallholders makes little distinction between market orientation (production decision based on market signals) and market participation (sale of output). However, policy implications to enhance commercial transformation of subsistence agriculture drawn from the analysis of the determinants of household market participation alone could be inadequate, if in fact, the determinants of market orientation and market participation are not the same or not consistent with each other. This paper analyzes the determinants of market orientation and market participation in Ethiopia separately and examines if market orientation translates into market participation. Empirical results show that the determinants of market orientation and market participation in crop output markets are not the same, but market orientation translates strongly into market participation. Results imply that while interventions to enhance market orientation could also help in promoting market participation, interventions to promote market participation may not be adequate to promote market orientation.

Key Words: commercialization, smallholders, market orientation, market participation.

JEL Classification: C21, C24, Q12, Q13

1. Introduction

Commercial transformation of subsistence agriculture is an indispensable pathway towards economic growth and development for many agriculture dependent developing countries (von Braun, 1994; Pingali and Rosegrant, 1995; Timmer, 1997; World Bank, 2008). Sustainable household food security and welfare also requires commercial transformation of subsistence agriculture (Pingali, 1997). Commercial agricultural production is likely to result in welfare gains through the realization of comparative advantages, economies of scale, and from dynamic technological, organizational and institutional change effects that arise from the flow of ideas due to exchange-based interactions (Romer, 1993; 1994). Commercialization enhances the links between the input and output sides of agricultural markets.

Commercialization entails market orientation (agricultural production destined for market based on market signals) and market participation (produce offered for sale and use of purchased inputs). However, the literature on commercialization of smallholders makes little distinction between market orientation and market participation of smallholders. In fact, most of the literature considers market orientation and market participation as synonymous and thus most of the analysis of the determinants of smallholder commercialization is based on the analysis of the determinants of output market participation (von Braun et al., 1994; Jaleta, et al., 2009; Otieno et al., 2009). However, policy implications to enhance commercial transformation of subsistence agriculture drawn from the analysis of the determinants of household market participation alone could be inadequate, if in fact, the determinants of market orientation and market participation are not the same and not consistent in their direction of effect. The literature on commercialization of smallholders also focuses on the output side of commercialization, giving little attention to the input side.

The primary objectives of the paper, therefore, are (1) to analyze the determinants of market orientation and market participation separately, and investigate whether the determinants of the two are the same with consistent directions of effects, and whether higher market orientation is translated into higher output market participation, and (2) to analyze the determinants of the intensity of use of purchased inputs for annual crop production, as a measure of household commercialization from the input side.

In addition to informing Ethiopian policy making to facilitate the transformation of subsistence agriculture into commercial orientation, this paper is hoped to contribute to the smallholder commercialization literature by analyzing the determinants of market orientation and market participation separately, and determining if market orientation translates in higher market participation.

The paper is organized as follows. The next section gives the context of the study in brief. Section three presents the conceptual framework. Section four deals with empirical models, methods and hypotheses. Section five presents results, while section six concludes the paper and draws implications.

2. Context

Ethiopia has adopted commercialization of smallholder agriculture as a strategy for its economic transformation. The agricultural services of extension, credit and input supply are expanding significantly to support commercial transformation, although the dominant player in these services still remains to be the public sector. A recent study by Gebremedhin et al. (2009) showed that the expansion of the agricultural services had significant impact on the intensity of input use, agricultural productivity and market participation of Ethiopian smallholders.

Results in this paper are based on household and plot level data collected from annual-crop based farming systems of three districts (Bure, Goma and Mieso), thought to represent the major annual crop production systems in the country in terms of agricultural and market infrastructure characteristics[1]. Bure district receives adequate rainfall (about 1600 mm per year) and has relatively well developed road networks and market places. Goma district receives abundant rainfall (about 1860 mm per year and lasting for about 8 months in a year), with less developed road networks and market places. Meiso is characterized as drought prone with rainfall (about 800 mm per year) as the most important constraint of crop production, but with well developed road networks and

[1] Bure is located in North Western Ethiopia in the Amhara region, at about 300 km north of the capital, Addis Ababa; Goma is located in South Western Ethiopia, in the Oromia region, at about 400 km south of the capital; and Mieso is located in Eastern Ethiopia in the Oromia region, at about 300 km east of the capital.

market places. Annual crops cover about 93% of cultivated land in the study areas. Hence, commercialization is analyzed in terms of annual crop production.

3. Conceptual framework

Our overall conceptual framework is given in Figure 1. The determinants of market orientation and market participation may not be the same because a household may produce marketable commodities but use them for home consumption if the household specific endogenous prices lie between the mark-up selling and buying prices. This situation is more common when there are high transaction costs and the price band is wider (Key et al., 2000). A household could also have high market participation because of surplus production due to various reasons, including favorable weather conditions, although it may not be market oriented.

Our conceptual framework is based on the literature on firm and farm market orientation (Hinderink and Sterkenburg, 1987; Kohli and Jaworski, 1990; Immink and Aarcon, 1993; Jaworski and Kohli, 1993; Fritz, 1996; Selnes et al., 1996; Jaworski and Kohli 1996), and household market participation (Goetz, 1992; Pingali and Rosegrant, 1995; Pingali, 1997; Lapar et al., 2003; Bellemare and Barrett, 2006; Rios et al., 2008; Omiti, 2009).

In developing our conceptual framework, first we make the distinction between market orientation and market participation. The concept of market orientation has been used more widely in the manufacturing sector (eg. the food industry) to refer to the extent to which a producer uses knowledge about the market (esp. customers and prices), as a basis to make decisions on the three basic economic questions of what to produce, how to produce and how to market (Kohli and Jaworski, 1990; Jaworski and Kohli, 1993; 1996). Several studies have also demonstrated that the degree of market orientation is a major determinant of competitive advantage (Fritz, 1996; Selnes et al., 1996). Market orientation in agriculture is basically a production decision issue.

Based on the extant literature on agricultural commercialization, we define market orientation in agriculture as the degree of allocation of resources (land, labor and capital) to the production of agricultural produce that are meant for exchange or sale (Hinderink and Sterkenburg, 1987; Immink and Aarcon, 1993). Hence, in this study, we measure

market orientation as the extent to which a household's crop portfolio includes crops that are relatively more marketed[2] evaluated at farming system level. On the other hand, market participation in crop production is measured by the proportion of crop produce sold.

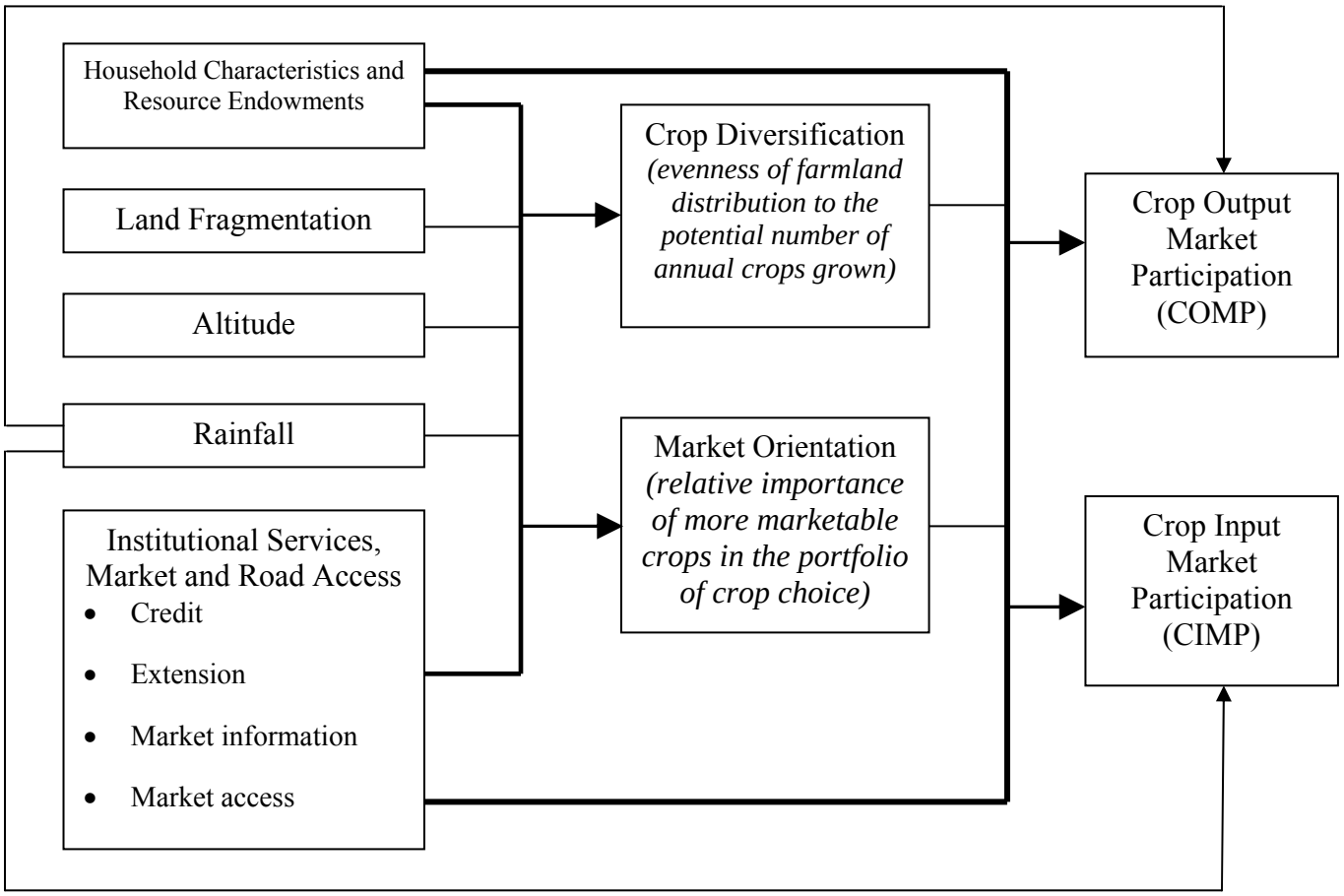

Figure 1. Conceptual framework of household level crop diversification, market orientation, and crop input and output market participation.

Most of the literature on smallholder commercialization deals only with the output side of commercialization. However, sustainable commercialization of smallholders also requires integration into the input markets (Pingali and Rosegrant, 1995). To contribute to redressing the gap in the commercialization literature on the

[2] In this study, we do not make the distinction between cash crops and staple crops, since market orientation is measured in terms of the relative importance of more market oriented crops in the household crop portfolio.

determinants of crop input market participation of households, we analyze determinants of the proportion of the value of purchased crop inputs used to total value of inputs.

In order to determine the ceteris paribus effects of the variables of our focus, we control for household characteristics, resource endowments, access to institutional factors (extension, credit, input supply, market information) access to markets and roads, and village level factors (rainfall, altitude) wherever appropriate.

4. Empirical Model, Methods and Hypotheses

4.1 Empirical Model

Our specification of empirical model is divided into three parts, (1) the determinants of market orientation of households in crop choices, (2) the determinants of household participation in crop output as seller, and (3) input markets as buyer.

1. Market orientation

Household level market orientation index (*MOI*) is modeled as a function of household characteristics (age, sex, and literacy of household head), household resource endowment (labor supply, land, land quality, draft power, equines and other livestock), access to market and roads (distance to nearest market and nearest all-weather road), access to institutional services (extension, credit and market information), village level factors (rainfall and altitude), and land fragmentation (Eq. 1).

$$MOI_i = f(HH, HR, MKTac, EXT, CRD, MIS, RF, ALT, SI, u_{MOI_i}) \quad (1)$$

Where u_{MOI_i} is an error term assumed to be independently and identically distributed with zero mean and constant variance.

2. Crop output market participation (COMP)

Crop output market participation (*COMP*) is modeled as a function of household characteristics, resource endowment, access to market and roads, access to institutional services, rainfall and household income from off-farm and non-farm sources (OINC). We

use results of this model to examine if the determinants of market orientation and crop output market participation are the same and with consistent direction of effect (Eq. 2). In a second model, we also include household level crop diversification (*MEI*) and market orientation (*MOI*) as explanatory variables to test the relationship between market participation and diversification, and to test if market orientation is translated into higher market participation (Eq. 3). However, both diversification and market orientation decisions can be endogenous variables in this specification, if the realized level of market participation was envisioned during production decision. To account for this possible specification problem, we have used land fragmentation and altitude as instrumental variables for the two explanatory variables.

$$COMP_i = f(HH, HR, MKTac, EXT, CRD, MIS, RF, OINC, u_{COMP_i}) \quad (2)$$

$$COMP_i = f(HH, HR, MKTac, EXT, CRD, MIS, RF, OINC, MEI, MOI, u_{COMP_i}) \quad (3)$$

3. Crop input market participation (CIMP)

Crop input market participation (*CIMP),* is modeled as a function of household characteristics, resource endowment, access to markets and roads, access to institutional services, rainfall, household level crop diversification (*MEI*) and market orientation (*MOI*) (Eq. 4). We excluded the off- and non-farm income variable, as most input use decisions are made early in the production season, but off-farm and non-farm income is realized mostly late in the season.

$$CIMP_i = f(HH, HR, MKTac, EXT, CRD, MIS, RF, MEI, MOI, u_{CIMP_i}) \quad (4)$$

4.2 Methods

4.2.1 Data sources

Results are based on a survey of 168 households and all plots operated by the households, and 53 communities (peasant associations (PAs)) in the three districts in 2007/08. Farming systems were stratified into PAs and households in each PA were selected randomly based on proportional to size sampling. Village level data on rainfall, altitude, distance to nearest market and all-weather road were collected at community level. Indices of land quality, land fragmentation, annual crop diversification, market orientation, and crop output and crop input market participation in annual crops were computed using the household, plot and community level data. Below, we briefly present the computation of these indices.

Weighted land quality index:

Household level land quality index (LQI) is derived from the plot level soil fertility scale weighted by the plot size (Eq. 5).

$$LQI_i = \sum_{j=1}^{J} \frac{f_{ij} * L_{ij}}{L_i^T} \quad , \qquad 1 \le LQI \le 3 \qquad (5)$$

where f_j is soil fertility scale (1 to 3, where 1 is poor, 2 is medium and 3 is good) for plot j, L_j is area of plot j and L_i^T is the total crop area operated by the i^{th} household.

Land fragmentation:

Land fragmentation can be measured either in single dimension or integrated indicators. Among the integrated indicators, Simpson index (SI) and Januszewski index (K) are the most common (Blarel et al., 1992; Wu et al., 2005). We use the Simpson index to measure the degree of land fragmentation of households as defined below (Eq. 6).

$$SI_i = 1 - \frac{\sum_{j=1}^{J} a_{ij}^2}{A_i^2}, \qquad 0 \le \mathrm{SI} \le 1 \qquad (6)$$

Where a_{ij} is area of the j[th] plot and A_i is the total area of annual crop land operated by a household. We chose the Simpson index because the Januszewski index does not take farm size into account[3]. Zero value of *SI* indicates complete land consolidation (one parcel only), while the value closer to one indicates numerous parcels of equal size.

Market orientation index (MOI):

We define that a smallholder is market oriented if its production plan follows market signals and produce commodities that are more marketable. Under a semi-commercial system, where both market and home consumption are playing a central role in production decision, all crops produced by a household may not be marketable in the same proportion. Thus, households could differ in their market orientation depending on their resource allocation (land, labor and capital) to the more marketable commodities. Based on the proportion of total amount sold to total production at farming system level, a crop specific marketability index (α_k) is computed for each crop produced at farming system level as follows (Eq. 7):

$$\alpha_k = \frac{\sum_{i=1}^{N} S_{ki}}{\sum_{i=1}^{N} Q_{ki}} \quad ; \quad Q_{ki} \geq S_{ki} \quad \text{and} \quad 0 \leq \alpha_k \leq 1 \tag{7}$$

Where α_k is the proportion of crop *k* sold (S_{ki}) to the total amount produced (Q_{ki}) aggregated over the total sample households in a farming system. α_k takes a value between 0 and 1, inclusive. Crops mainly produced for markets usually have α_k values closer to 1.

[3] Januszewski index $K = \frac{\sqrt{\sum_{a=1}^{n} a_i}}{\sum_{a=1}^{n} \sqrt{a_i}}$, where *n* is the number of plots, and a_i is the area of each plot.

Once the crop specific marketability index is computed, household's market orientation index in land allocation (MOI_i) is computed from the land allocation pattern of the household weighted by the marketability index of each crop (α_k) derived from Eq. 7 as follows (Eq. 8).

$$MOI_i = \frac{\sum_{k=1}^{K} \alpha_k L_{ik}}{L_i^T} \quad ; \quad L_i^T > 0 \quad \text{and} \quad 0 < MOI_i \leq 1 \tag{8}$$

Where MOI_i is market orientation index of household i, L_{ik} is amount of land allocated to crop k, and L_i^T is the total crop land operated by household i. The higher proportion of land a household allocates to the more marketable crops, the more the household is market oriented.

Crop output market participation:

Following von Braun et al (1994), we computed household crop output market participation in annual crops as the proportion of the value of crop sales to total value of crop production, which we refer to in this paper as crop-output market participation (*COMP*) index, computed as follows (Eq. 9):

$$COMP_i = \frac{\sum_{k=1}^{K} \overline{P}_k S_{ik}}{\sum_{k=1}^{K} \overline{P}_k Q_{ik}} \tag{9}$$

where S_{ik} is quantity of output k sold by household i evaluated at an average community level price ($\overline{P}_k$), Q_{ik} is total quantity of output k produced by household i.

Crop input market participation:

Household commercialization from the input side is commonly computed as the proportion of the value of purchased inputs to total value of crop production. However, different crops may have different input requirements, which may have implications for the need to purchase external inputs. Hence, we compute household participation in input markets as the proportion of the value of purchased crop inputs to total crop input used, which we refer to in this paper as crop-input market participation (*CIMP*) index (Eq. 10).

$$CIMP_i = \frac{\sum_{r=1}^{R} \overline{w}_r X_{ir}^{p}}{\sum_{r=1}^{R} \overline{w}_r X_{ir}^{T}} \tag{10}$$

where X_{ir}^{p} is the amount of input r purchased by the household at the average input price $\overline{w_r}$, and X_{ir}^{T} is the total amount of input r used in the production of annual crops.

4.2.2 Econometric approach

The dependent variables analyzed in this paper are market orientation, crop output market participation, and crop input market participation of households in annual crop production. The econometric model used depends on the nature of the dependent variable. For the determinants of household market orientation we use ordinary least squares (OLS) model, since it is a continuous variable (summary of descriptive statistics of variable used in the regression models are given in Table 1). For the household participation in crop output market as seller, and the household participation in crop input markets as buyer, we use Tobit models, since these variable are lower censored at zero. All coefficients and standard errors are adjusted for sampling weights, clustering, and stratification using the SVY command (STATACorp, 2008).

Crop diversification and market orientation are potentially endogenous variables in the models for crop output and input market participation. We use land fragmentation and altitude as instruments to check for endogeneity, since we do not expect land fragmentation and altitude to affect market participation once we control for crop diversification and market orientation. We failed to reject exogeneity.

Market participation of households may differ by the level of crop diversification. It could be that as a household starts moving into production destined for markets, it might bring in additional crops into existing cropping mix, thus increasing diversification, and as the level of integration into market increases, a household may move into specialization in few crops (Pingali and Rosegrant, 1995). Hence, we derived three dummy variables from the continuous crop diversification index to test this hypothesis. Farmers were grouped into three based on their tercile of crop diversification index.

4.3 Hypotheses

In setting our hypotheses, our main interests are in analyzing the determinants of market orientation and market participation separately, in analyzing the determinants of crop input market participation, in testing the effect of crop diversification on crop output and input market participation, and in testing whether market orientation translates into higher crop output and input market participation. However, to capture the ceteris paribus effects, we need to control for other relevant explanatory variables. Hence, we also present our hypotheses about the effect of key variables that might influence, market orientation and market participation.

Household characteristics

If the self-sufficiency preference or attitude towards risk of households would change as the household grows older, we would expect a U-shape or an inverted U-shape relationship between age of the household, and market orientation and household market participation in crop output and input markets. Male headed households, due to their potential crop production efficiency advantages over female headed households, are expected to be more market oriented, and have higher participation in output and input markets.

Literate households are expected to have better skills, and better access to information and ability to process information, and thus may be positively associated with market orientation and market participation. Household size increases domestic

consumption requirements and renders households more risk averse. Hence, controlling for labor supply, larger households are expected to have lower market orientation and market participation.

Household resource endowment

When agricultural factor markets are imperfect, ownership of the factors matters for efficiency and productivity (Sadulet and de Janvry, 1995). For example, when land markets are imperfect, households with larger farm holdings may be more likely to be more market oriented and have higher market participation (von Braun and Immik, 1994). Hence, household endowments of labor, land, bullocks and farm equipment are expected to be positively associated with market orientation and market participation. Ownership of equines is also expected to have the same effect through its role in reducing marketing (transportation) costs. We expect ownership of livestock other than oxen and equine, to be negatively associated with market orientation and market participation, since they offer alternative cash income sources.

Access to markets and roads

The role of marketing costs in completely hindering or limiting the level of smallholder market participation has been examined by several authors (de Janvry et al., 1991; Sadoulet and de Janvry, 1995; Key et al., 2000; Gabre-Madhin, 2001; Barret, 2007; Pender and Alemu, 2007; Alene et al., 2008). Access to markets and roads is expected to reduce marketing costs, thus encourage market orientation and market participation.

Institutional Services

Agricultural services (extension, credit, market information) are expected to enhance farmer skills and knowledge, link farmers with modern technology, and ease liquidity and input supply constraints (Lerman, 2004), thus are expected to induce market orientation and market participation.

Rainfall and altitude

Rainfall may increase farm productivity, thus encouraging market orientation and market participation. Altitude determines the type of crops grown. High altitude areas are expected to have wider crop choice than low altitude areas, because of the more varied and more favourable climatic conditions. However, the effect of altitude on market orientation is indeterminate.

Market orientation

We defined market orientation in terms of the relative importance of more marketable crops in the crop mix of the household. Underlying market orientation is the profit motive of households (Pingali and Rosegrant, 1995; Pingali, 2001). The realization of profit depends on market revenues. The realization of profit also requires increased production efficiency using modern inputs and technologies. Hence, we expect that market orientation will be positively associated with household participation in crop output and input markets.

5. Results

5.1 Descriptive information

Descriptive statistics of variables used in the regression analysis are given in Table 1. The average market orientation index is about 0.30, indicating moderate market orientation of smallholders in the study area, while the average crop output and crop input market participation are 25% and 20%, respectively, also indicating moderate market participation.

The average value of annual crop produced per household is Birr[4] 3874, of which Birr 1468 worth of produce is sold. The average input value used for annual crop production is also Birr 2604, of which about Birr 520 is purchased input. These results indicate that the average return to land per household is about Birr 977. Households in

[4] At the time of the survey 1 US $ = Birr 9.5

the study area get about Birr 530 of income from non-farm and off-farm employment and remittances.

Table 1: Descriptive statistics for variables used in econometrics

Variables	N	Mean	Std. Dev.	Min	Max
Crop diversification (modified entropy index)	160	0.45	0.150	0.10	0.78
Crop diversification (low) *(yes=1, no=0)*	160	0.33	0.456	0	1
Crop diversification (medium) *(yes=1, no=0)*	160	0.33	0.473	0	1
Crop diversification (high) *(yes=1, no=0)*	160	0.32	0.471	0	1
Market orientation index	168	0.30	0.094	0.05	0.60
Crop input market participation index	165	20.38	19.231	0	87.81
Crop output market participation index	167	25.29	19.875	0	86.60
Land fragmentation index (Simpson index)	168	0.58	0.207	0	0.85
Age of household head *(year)*	168	43.32	11.884	20	78.00
Age of household head squared *(year)*	168	2016.63	1082.65	400	6084
Sex of household head *((male=1, female=0)*	168	0.89	0.310	0	1
Education of household head *(literate=1, illiterate=0)*	168	0.49	0.501	0	1
Family size *(no.)*	168	6.44	2.434	2	14
Available family labour *(persons)*	168	3.38	1.405	1	7
Farmland size owned *(ha)*	168	1.33	0.717	0.07	4.0
Weighted land quality	168	2.33	0.593	1	3
Oxen owned *(no.)*	168	1.89	1.412	0	6
Equine owned *(no.)*	168	0.57	1.076	0	11
Other livestock owned *(TLU)*	168	2.33	2.285	0	16.4
Distance from settlement center to nearest market place *(km)*	168	5.04	3.30	0	18
Distance from settlement center to all-weather road *(km)*	168	6.75	7.073	0	2
Involvement in extension program *(2005/06) (yes=1, no=0)*	168	0.49	0.501	0	1
Access to credit *(2005/06) (yes=1, no=0)*	168	0.61	0.490	0	1
Market information service available in PA *(yes=1, no=0)*	168	0.28	0.450	0	1
Rainfall *(mm)*	168	1518.49	388.332	757	1956
Altitude *(m above sea level)*	168	1945.67	369.147	1207	2414
Off and non-farm income *(Birr)*	168	530.05	1045.780	0	7160
Value of farm equipment *(Birr)*	168	217.48	166.681	0	1150

About 11% of households in the sample are female headed. The average household size is about 6.44, with family labour supply of 3.4 persons per household, figures which are close to the national average. A household on average operates about

1.33 ha, a result also quite close to the national average. However, the land quality index of 2.32 appears to be higher than would be expected for a national average in Ethiopia. Almost 50% of household heads are literate. The average population density in the study area is about 347 persons/ km^2.

5.2 Results of econometric analysis

Market Orientation

Market orientation of households is influenced by literacy of household head, household size, labor supply of household, land quality, ownership of equine, access to all-weather road, involvement in extension, rainfall and altitude, all of them with expected signs (Table 2). Of the significant variables, literacy of head, labor supply, land quality, ownership of equines, and involvement in extension service have stronger numerical effects on market orientation.

Literacy of head is associated with higher market orientation. Literate households may have better access to information and better able to process it than illiterate households, thus more able to see the benefits from market orientation. Household size detracts from household market orientation due to its effect on increasing household domestic consumption needs. Household labor supply is associated positively with market orientation. Factor markets in rural Ethiopia are far from perfect and so ownership of resources matters for efficiency (thus profitability) of agricultural production, all else equal.

Higher land quality increases market orientation due to its effect on land productivity. Ownership of equines and proximity to all-weather road encourage market orientation due to their effect of reducing marketing costs, thus improving profitability. The Ethiopian agricultural extension service appears effective in inducing market orientation. While higher rainfall is associated with higher market orientation (perhaps due to its effect on profitability), higher altitude appears to detract from it.

Table 2: Estimation results for market orientation index (OLS) and Crop output market participation (Tobit)

	Market orientation index		Crop output market participation index	
Explanatory Variables	Coef.	Std. Err.	Coef.	Std. Err.
Age of household head *(year)*	0.0051	0.0037	1.6192	1.0833
Age of household head squared *(year)*	-0.00001	0.0000	-0.0155	0.0114
Sex of household head *(male=1, female=0)*	-0.0147	0.0308	-9.2171	8.0473
Education of household head *(literate=1, illiterate=0)*	0.0258*	0.0153	9.3567**	4.1882
Family size *(no.)*	-0.0102**	0.0045	-0.9599	1.1952
Available family labour *(persons)*	0.0180***	0.0069	-0.6394	1.9262
Farmland size owned *(ha)*	-0.0049	0.0119	-1.9779	3.3466
Weighted land quality	0.0330***	0.0118	4.8288	2.9847
Oxen owned *(no.)*	-0.0020	0.0069	4.5227**	1.9302
Equine owned *(no.)*	0.0181***	0.0055	0.9551	1.1554
Other livestock owned *(TLU)*	-0.0038	0.0039	-1.8735*	1.0971
Distance from settlement center to nearest market place *(km)*	0.0015	0.0023	-1.6946**	0.6728
Distance from settlement center to nearest all weather road *(km)*	-0.0029**	0.0012	-0.1882	0.3264
Involvement in extension program *(2005/06) (yes=1, no=0)*	0.0258*	0.0153	4.9258	4.6121
Access to credit *(2005/06) (yes=1, no=0)*	-0.0034	0.0209	5.9701	5.6142
Market information service available in PA *(yes=1, no=0)*	-0.0165	0.0193	-3.3192	4.9118
Rainfall *(mm)*	0.0002***	0.0000	-0.0020	0.0073
Altitude *(m above sea level)*	-0.0002***	0.0000	---	---
Value of farm equipment *(Birr)*	-0.0000	0.0000	0.0153	0.0138
Off and non-farm income *(Birr)*	---	---	0.0012	0.0018
Land fragmentation index (Simpson index)	0.0574	0.0360	---	---
Constant	0.2336**	0.1052	-13.0825	28.1300
Number of strata	4		4	
Number of observations	168		159	
F(20, 145)	7.20		2.65	
Prob > F	0.0000		0.0006	
R-squared	0.4756		---	

Note: ***, **, and * are significant at 1%, 5%, and 10% significant levels, respectively.

Comparisons between the determinants of market orientation, and household market participation in crop output markets show that the determining factors can indeed vary between market orientation and market participation (Table 2). However, results confirmed that there is no inconsistency in the direction of effect of the significant variables.

We find that most of the significant factors that explain market orientation failed to have significant effect on output market participation. Household characteristics tend to be more important in explaining market orientation than market participation.

Among the household characteristics, literacy of household head and household size explain market orientation, of which only literacy of head turns out also important factor for output market participation.

Household resource ownership factors are also more important in explaining market orientation than for market participation. While labor supply, land quality, and ownership of equines are important for market orientation, only ownership of oxen is important for output market participation.

Market and road access factors turn out important both for market orientation and market participation. While distance to nearest market is important for output market participation, distance to all-weather road is important for market orientation. The extension service, while effective in inducing market orientation, has no effect on output market participation. While the village level factors of rainfall and altitude are important for market orientation, none of them has significant effect on output market participation.

Crop output market participation

Household crop output market participation is determined by literacy of household head, ownership of oxen, nearness to market place and household market orientation (Table 3). All significant variables have expected signs. Of the significant variables, market orientation has the highest explanatory power.

Households with literate heads have higher crop output market participation, as expected. Literacy of head increases the proportion of output sold by about 6% on average for the population of study, and by about 7% for those who already participate in output market as sellers, and increases the probability of market participation in output market as seller by about 7%. Ownership of oxen also increases output market participation, perhaps due to its effect on production. Oxen is the sole traction power used in the study area. An increase in ownership of an ox increases the proportion of output sold by about 3% for the population of study, and by about 4% for those who are already in the output market as sellers. Ownership of an ox also increases probability of participation in output market as seller by about 4%.

Table 3: Tobit estimation results for crop output market participation index (COMPI)

	Crop output market participation index				
			Marginal effects		
Explanatory variables	Coef.	Std. Err.	a	b	c
Age of household head *(year)*	1.2281	0.9344	1.1258	0.9096	0.0114
Age of household head squared *(year)*	-0.0105	0.0099	-0.0096	-0.0078	-0.0001
Sex of household head *(yes=1, no=0)*	-8.5542	6.2717	-8.0528	-6.7824	-0.0600
Education of household head *(literate=1, illiterate=0)*	7.4511**	3.3172	6.8125	5.5056	0.0701
Family size *(no.)*	0.3836	1.1139	0.3516	0.2841	0.0036
Available family labour *(persons)*	-2.7038	1.7437	-2.4784	-2.0026	-0.0251
Farmland size owned *(ha)*	-3.5087	2.6842	-3.2162	-2.5987	-0.0326
Weighted land quality	0.6999	2.7308	0.6416	0.5184	0.0065
Oxen owned *(no.)*	4.0658***	1.5261	3.7269	3.0114	0.0378
Equine owned *(no.)*	-1.1312	0.9057	-1.0369	-0.8378	-0.0105
Other livestock owned *(TLU)*	-1.0523	0.8821	-0.9646	-0.7794	-0.0098
Distance from settlement center to nearest market place *(km)*	-1.4890***	0.4730	-1.3648	-1.1028	-0.0138
Distance from settlement center to nearest all-weather road *(km)*	0.0979	0.3041	0.0898	0.0725	0.0009
Involvement in extension program *(2005/06) (yes=1, no=0)*	1.9202	4.5069	1.7623	1.4264	0.0177
Access to credit *(2005/06) (yes=1, no=0)*	7.4207	4.7332	6.7648	5.4479	0.0715
Market information service available in PA *(yes=1, no=0)*	0.2037	4.0187	0.1868	0.1510	0.0019
Rainfall *(mm)*	-0.0074	0.0068	-0.0068	-0.0055	-0.0001
Off and non-farm income *(Birr)*	-0.0001	0.0016	-0.0001	-0.0001	0.0000
Value of farm equipment *(Birr*	0.0126	0.0094	0.0115	0.0093	0.0001
Crop diversification (low) *(yes=1, no=0)*	0.3374	4.0849	0.3094	0.2501	0.0031
Crop diversification (medium) *(yes=1, no=0)*	1.1777	3.8747	1.0818	0.8765	0.0106
Market orientation index	121.2153***	17.8286	111.1101	89.7796	1.1267
Constant	-26.9809	24.3650			
Number of strata	4				
Number of observation	159				
F(22, 134)	6.76				
Prob > F	0.0000				

Note: [a] Marginal effect on the truncated expected value, dE[COMPI*| COMPI >0]/dx (for market participants only)
[b] Marginal effect on the censored expected value, dE[COMPI | COMPI >0]/dx (for whole sample of study)
[c] Probability of being censored, Pr(COMPI >0)
***, **, and * are significant at 1%, 5%, and 10% significance levels, respectively.

Ownership of other livestock detracts from crop output market participation, since these livestock offer alternative sources of cash income. Nearness to market enhances market participation. One km reduction in distance to nearest market increases the proportion of output sold by about 1% for the population of study, by about 1.4% for those who are already in the market, and increases the probability of market participation by about 1.4%.

Our results also sow that market orientation of households translates strongly to output market participation. An increase of 0.1 in market orientation index increases the proportion of output sold by about 9% for the population of study, by about 11% for those already in the output market as sellers, and the probability of market participation by about 11%. These results suggest that interventions in promoting market orientation could enhance household market participation, as well.

Crop input market participation

Household participation in annual crop inputs market as buyer is influenced by family labor supply, ownership of equines, nearness to market place, access to all-weather road, rainfall, and household diversification in annual crop production (Table 4). All significant variables have the expected signs. Market orientation of households failed to have significant impact on crop input market participation, despite its strong effect on crop output market participation. Of the significant variables, labor supply, ownership of equine, and specialization in annual crop production have stronger numerical effects.

Household labor supply is positively associated with household participation in crop input markets as buyer, since labor is likely to be a complementary input to external inputs under the Ethiopian condition. On average for the population of study, an increase in one unit of household labor supply increases the proportion of purchased crop input use by about 1.8%, by about 2.5% for those who are already in the input market, and increases the probability of crop input market participation by about 6.7%.

Ownership of equines is also positively associated with crop input market participation due its effect of reducing marketing costs and increasing farm profitability. A unit increase in ownership of equines increases the proportion of purchased input use by about 1.2% for the population of study, by about 1.7% for those who are already in the input market, and increases the probability of participation in the market by about 4.5%.

Table 4: Tobit estimation results for crop input market participation (CIMP)

	Crop input market participation index				
		Std.	Marginal effects		
Explanatory variables	Coef.	Err.	a	b	c
Age of household head *(year)*	1.0174	0.7206	0.7953	0.5743	0.0214
Age of household head squared *(year)*	-0.0131	0.0080	-0.0103	-0.0074	-0.0003
Sex of household head *(yes=1, no=0)*	1.3869	5.6737	1.0679	0.7673	0.0300
Education of household head *(literate=1, illiterate=0)*	0.5385	3.0481	0.4208	0.3038	0.0113
Family size *(no.)*	-1.3294	1.0225	-1.0392	-0.7503	-0.0279
Available family labour *(persons)*	3.2142**	1.5577	2.5125	1.8142	0.0674
Farmland size owned *(ha)*	-0.0667	2.4410	-0.0521	-0.0376	-0.0014
Weighted land quality	2.2400	2.8056	1.7510	1.2643	0.0470
Oxen owned *(no.)*	0.5527	1.6179	0.4320	0.3120	0.0116
Equine owned *(no.)*	2.1230**	0.9405	1.6595	1.1983	0.0445
Other livestock owned *(TLU)*	-0.5490	0.8422	-0.4292	-0.3099	-0.0115
Distance from settlement center to nearest market place *(km)*	-0.8753*	0.4609	-0.6842	-0.4941	-0.0184
Distance from settlement center to nearest all-weather road *(km)*	-1.1715***	0.2815	-0.9158	-0.6613	-0.0246
Rainfall *(mm)*	0.0369***	0.0060	0.0288	0.0208	0.0008
Market information service available in PA*(yes=1, no=0)*	-3.1595	3.8593	-2.4330	-1.7496	-0.0681
Involvement in extension program *(2005/06) (yes=1, no=0)*	3.1919	3.7676	2.5081	1.8164	0.0661
Access to credit *(2005/06) (yes=1, no=0)*	4.6580	4.1369	3.6145	2.6089	0.0987
Value of farm equipment *(Birr)*	-0.0046	0.0088	-0.0036	-0.0026	-0.0001
Crop diversification (low) *(yes=1, no=0)*	6.9095*	3.8394	5.5136	4.0333	0.1372
Crop diversification (medium) *(yes=1, no=0)*	-0.5342	2.9925	-0.4164	-0.3004	-0.0113
Market orientation index	-20.2363	15.8871	-15.8187	-11.4221	-0.4246
Constant	-51.6739***	18.7487			
Number of strata	4				
Number of observation	157				
F(21, 133)	7.09				
Prob > F	0.0000				

Note: [a] Marginal effect on the truncated expected value, dE[CIMPI*| CIMPI >0]/dx
[b] Marginal effect on the censored expected value, dE[CIMPI | CIMPI >0]/dx
[c] Probability of being censored, Pr(CIMPI >0)
***, **, and * are significant at 1%, 5%, and 10% significance levels, respectively.

Distance to nearest market detracts from crop input market participation due its effect on increasing marketing costs of both inputs and outputs. A 10 km reduction in distance to nearest market increase the proportion of purchased input use by about 5% for the population of study and by about 7% for those who are already in the input market, and increases the probability of input market participation by about 18%.

Similar to the effect of distance to nearest market, we also find that nearness to all-weather road increases crop input market participation. A 10 km reduction in distance to all-weather road increases the proportion of purchased input use by about 6.6% for the population of study, by about 9% for those already in the market, and increases the probability of crop input market participation by about 25%. Rainfall has positive effect on crop input market participation since external inputs are likely to be complementary to soil moisture. On average for the population of study, an increase in rainfall by 100 mm increases the proportion of purchased input use by about 2%, and by about 3% for those who are already in the market, and increases the probability of crop input market participation by about 7.7%.

We also find indication of a U-shape relationship between crop input market participation and diversification. Households who are relatively more specialized have higher crop input market participation than those who are highly diversified. Although the effect is statistically insignificant, those household who are moderately diversified tend to have lower market participation than those who are highly diversified.

6. Conclusions and Implications

Commercial transformation of smallholder agriculture entails production decisions based on market signals and significant participation in input and output markets. Hence, analysis of the commercial transformation requires analysis of market orientation and market participation. Policy, institutional and technological strategies to enhance commercial transformation based on the analysis of market participation alone may not be adequate if the determinants of market orientation and market participation are not the same. However, the literature on commercialization of smallholders rarely makes the distinction between market orientation and market participation. This study is an attempt to fill this gap of knowledge in the commercialization literature.

Market orientation of smallholders is found to be moderate. Only about 30% of annual crop produce is sold, while only 20% of total annual crop input used is purchased. Factors related to household characteristics, household resource endowment, market and transportation factors, extension service, and the village factors of rainfall and altitude are

important in explaining variations in household market orientation. Access to and ability to process information, productivity factors (household labor supply, land quality, and rainfall), and transportation cost advantage due to ownership of equines or nearness to all-weather road, and technical efficiency advantage due to involvement in extension programs all increase market orientation of households. On the other hand, higher domestic consumption requirements due to larger family size and location in higher altitudes detract from market orientation. These results imply that market and transport infrastructure development, interventions to increase productivity, and family planning interventions could enhance market orientation of households. Promotion of more market oriented crop technologies in higher altitude areas also deserves better attention.

Information advantage due to literacy, ownership of traction power, and cost advantage due to proximity to markets are important in increasing household crop output market participation. Cost advantages due to ownership of equines, and proximity to market place and all-weather road are important determinants of higher crop input market participation. Ownership or availability of factors that are likely to be complementary to external inputs is also important to enhance crop input market participation. These results imply that, in addition to market and transport infrastructure development, interventions to promote input market participation may need to address the problem of availability of complementary inputs.

Market orientation is strongly translated into higher output market participation, but not into higher crop input market participation. We also find that the determinants of market orientation and market participation in output markets are not the same. Several of the explanatory variables that have significant effect on market orientation failed to have significant effect on output market participation. However, we do not find inconsistency in the direction of effect of the factors that explain market orientation and those that explain market participation. These results imply that while interventions to enhance market orientation could also help in promoting market participation, interventions to promote market participation may not be adequate to promote market orientation. These results also confirm our overall proposition that the analysis of commercial transformation of smallholders needs to addresses market orientation and market participation separately.

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