

# Determinants of Haricot Bean Market Participation in Misrak Badawacho District, Hadiya zone, Southern Nations Nationalities and Peoples Regional State, Ethiopia

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## አሀፅርአት

ጥናቱ በደቡብ ኢትዮጵያ በባይቶ ወረዳ የቦሎቄ ምርት ገበያ ተሳትፎን በመገምገም ብሎም የገበያ ተሳትፏቸውን የሚያስተባብሩ ማኔቅ የሆኑባቸውን ዋና ጉዳዮች በመለየት የመፍትሔ አቅጣጫዎችን የሚጠቁም ነው። መረጃን በማቀናበርና የተለያዩ የትንተና ዘዴዎችን መሰረት በሚደረግ በተገኘው የጥናቱ ውጤት መሰረት ለቃለ-መጠይቅ ከተመረጡ ወኪይ 123 አርሶ አደሮች መካከል 68 ከመቶው በምርት ገበያ የተሳተፉና እነዚህም በአማካይ እንደ አርሶ አደር 5.78 ኩንታል ያቀረበ መሆኑ ታውቋል። እንዲሁም የአርሶ አደሮቹን የቦሎቄ ገበያ ተሳትፎ የሚወስኑት በዋናነት የቤተሰብ አባላት ብዛት፣ የእርሻ በሬዎች ይዘታ፣ የመገናኛ አውታሮች ቅርበት፣ የብድር አቅርቦት፣ የህብረት ሥራ ማህበር አባል መሆንና ለዋና መንገድ ያለው ቅርበት እንደሆኑ የተለዩ ሲሆን የገበያ ተሳትፎ መጠንን የሚወስኑት ጉዳዮች ደግሞ ለገበያ ማዕከል ያለ ቅርበት፣ በቤተሰብ የለማ መሬት ስፋት፣ የጋማ እና ሌሎች እንስሳት ይዘታ፣ የብድር አቅርቦት እና የቀዳሚ ዓመት የቦሎቄ ምርት ዋጋ መሆናቸው ተለይተዋል። ከዚህ ጋር ተያይዞ የአርሶ አደሮችን የቦሎቄ ገበያ ተሳትፎ እና የተሳትፎ መጠንን ለማጎልበት 1) የመገናኛ አውታሮች ተጠቃሚነትን በማጎልበት የገበያ መረጃን አቅርቦትን ማጠናከር፣ (2) የህብረት ስራ ማህበራት ተሳትፎን ማጠናከር፣ (3) የመሬት ይዘታን በቀጥታ ማስፋት ባይቻልም ምርታማነትን ማጎልበት፣ እና (4) የፋይናንስ አቅርቦት ለማጠናከር የቁጠባና ብድር አገልግሎትንና ተደራሽነትን ማስፋት ወሳኝ እንደሆኑ ጥናቱ ያሳያል።

## Abstract

This study aimed at analyzing commodity level determinants of output side market participation of haricot bean based on cross sectional primary data collected from 123 randomly selected haricot bean producers sample households in six kebeles in Misrak Badawacho District, Hadiya Zone, Southern Nations Nationalities and Peoples Regional State, Ethiopia. The descriptive result indicates about 68 % of haricot bean farmers participated in haricot bean market and on average 5.78 quintal of haricot bean was supplied to the market. The results of the Heckman two stage model indicate that number of oxen owned, access to communication facilities, use of credit, membership in cooperative, household size and distance to all weather road have significant influence on the probability of market participation decision. Whereas, number of equine owned, distance to the nearest market, cultivated land size, perception on lagged market price, use of credit, rent in and shared in farmland, livestock ownership, and inverse mills ratio were found to significantly affect the level of market participation. This implies the need to improve access to communication facilities to strengthen market information delivery systems; strengthening institutional arrangement like cooperatives through which farmers can take the advantage of bargaining power in input and output market; to institute productivity improving measures to increase the productivity of haricot bean; and strengthening the rural microfinance system to address the credit needs of farmers so as to enhance the benefit of smallholder farmers from market participation.

## Introduction

Endowed with varied agro ecological zones and diversified natural resources, Ethiopia has been known as the home land and domestication of several crop plants. Pulse crops are important components of crop production in Ethiopia's smallholder's agriculture, and it provides an economic advantage to smallholders as an alternative source of protein, cash income, and food security (EEPA, 2004). Pulses are the third largest export commodity next to coffee and sesame (Shahidur *et al.*, 2010). Haricot bean is among the different pulse crops grown in the country. It is the second most important pulse crop next to faba bean in terms of area covered and contribution to total production (Berhanu and Hoekstra, 2008). Haricot bean is an important crop in the provision of food security and as a commercial product in Ethiopia. Most of its production comes from smallholder farmers and it is widely intercropped with maize and sorghum to supplement farmers with additional income (EEPA, 2004).

In the world haricot bean export market, Ethiopia took the sixth position with a market share of 2.4%. Haricot bean ranks third as an export commodity in Ethiopia, contributing to 9.5 % of total export value of agriculture (FAOSTAT, 2010). The main markets for Ethiopia haricot bean are the domestic market followed by European, Middle East, African and Far East countries. A market demand for the haricot beans both in the domestic & export market has become growing. Due to this fact, the government has taken initiatives to modernize its export trade by linking with ECX market (ECEA, 2010).

The regular growth in the demand for export and the relative proximity of Ethiopia to this growing market are an opportunities for smallholder farmer to supply more of their produce to the market and maximize their return and to make better the export earnings of the country. However, the national marketed surplus ratio of haricot bean which describes the level of commercialization is 17%, which is perceived as low (CSA, 2013). This reveals the country as well as the farmers are not benefiting from this existing opportunities. Therefore, it is vital to identify the determinant factors which influence haricot bean producer farmers' decision to participate in the market and their level of participation in order to benefit smallholder farmers from the marketing of haricot bean in the study area.

## Methodology

### The study area

The study was conducted in Misrake Badawach District of Hadiya Zone of Southern Nations Nationalities and Peoples Regional State (SNNPRS). The district is one of the 11 districts of Hadiya zone which is located 338 Km south of Addis Ababa. The district covers an area of 43,996 ha and it has 38 rural and 1 urban *kebeles*. The total population of the district was estimated to be 203,242 of which 100,122 and 103,120 were male and female population (CSA, 2007). The number of agricultural households in the district is estimated to 31,404 with 25,140 male headed and 6,264 female headed (DOA, 2013).

The district is found within 1650 to 2050 m. It receives mean annual rainfall of 1000 mm. The district has bi-modal distribution of rain with short rainy season starts from March to May and the main rainy season extending from June to October. The average temperature is 19°C. The land use pattern of the district, 36,855 ha are cultivated, 3080 ha are grazing land, 2429 ha are covered by forest, bushes and shrubs, 1144 ha are uncultivated and 462 ha is being used for other purposes. The dominant soils types of the district are sandy and clay loam. Crop-livestock mixed farming system is common agricultural practice in the district. Teff, maize, and haricot bean are major crops grown by farmers. Beside cereals and pulses, farmers in the district produce other crops like enset, coffee, pepper and fruits. The district has three annually flowing rivers (Bilate, Bishanguracha and Chelekeleka rivers) and these rivers have a potential of irrigating 300 hectare of land (DOA, 2013).

### Sampling techniques and sample size

Cross sectional data were collected from 123 randomly selected haricot bean producer households in Misrak Badawacho District. A two stage random sampling technique was used to select sample respondents. In the first stage six *kebeles* were selected randomly. From the selected *kebeles*, haricot bean producer farm households were identified in collaboration with development agents. In the second stage a total of 123 haricot bean producer farm households were selected randomly from the selected sample *kebeles* by using simple random sampling technique. The sample size in each *kebele* was determined proportional to Size of the identified haricot bean producer households as presented in Table 1.

Table 1: Sampling frame and sample size determination.

Kebeles	Households	NO of haricot bean producing households (No.)	Proportion of sampled households (%)	Number of sampled households
Abuka	860	802	20	25
WeyraMazorria	822	762	19	23
Kenchera	530	481	12	15
1 <sup>st</sup> Chefa	580	521	13	17
Lalo Gerbe	892	881	21	25
TikareKokore	614	561	14	18
Total	4298	4008	100	123

### Data analysis

Both descriptive statistics and econometric estimation were used for data analysis in order to meet the specific objectives of this study.

### Econometric model

The econometric model were used to identify the household characteristics, resource endowment, access to service and economic factors that were hypothesized as determinants of haricot bean producers farmers decision whether or not to participate in haricot bean output market and the level of market participation. However, because sales are only observed for a subset of the sample population there exists a sample

selection problem. The missing observations would cause incidental truncation (Greene, 2003). To address the selectivity bias, the study adopts the usually used Heckman two stage model. In selectivity models, the decision to participate can be seen as a sequential two-stage decision making process (Key *et al.*, 2000 and Bellemare and Barrett, 2006). In the first-stage, haricot bean farmers make a discrete decision whether to participate or not in haricot bean market. In the second-stage, conditional on their participation decision in haricot bean market, farmers make continuous decision on level of market participation.

Heckman selectivity model consists of two steps. First a selection equation is estimated using a probit model. This model predicts the probability that an individual household participate or does not in haricot bean output market, and the inverse Mills ratio is obtained from this model. Then the second stage is estimated using ordinary least square (OLS) regression equation by including the inverse Mills ratio ( $\lambda$ ) from the first model as a regressor and produces consistent estimates, by eliminating selectivity bias (Greene, 2003).

### First stage of heckman two stage model (Probit model)

This model is used to identify factors that influence household's haricot bean market participation decision. The dependent variable in this model has a value of 1 if the household participated in haricot bean market; 0 otherwise. The probit model is built on a latent variable with the following formulation (Wooldridge, 2002).

$$Y_i^* = \beta_i X_i + u_i \quad u_i \sim N(0,1)$$

$$Y = 1 \text{ if } Y_i^* > 0,$$

$$Y = 0 \text{ if } Y_i^* \leq 0$$

Where:  $Y_i^*$  is a latent (unobservable) variable representing farmers discrete decision whether to participate in haricot bean market or not  $X_i$  is a vector of independent variables hypothesized to affect farmers decision to participate in haricot bean market,  $\beta_i$  is a vector of parameters to be estimated which measures the effects of explanatory variables on the farmers decision  $u_i$  is normally distributed disturbance with mean (0) and constant variance and captures all unmeasured variables  $Y$  is a dependent variable which takes on the value of 1 if the farmers participate in haricot bean market and 0 otherwise.

### The second stage of heckman model (Ordinary Least Square)

Conditional on participation decisions, the variables determining level of participation are modeled using the second-stage Heckman selection model (Heckman, 1979). The Heckman selection equation is specified as

$$y_i = x_i \beta_i + \mu \lambda_i + \varepsilon_i$$

Where  $y_i$  is the volume of haricot bean sold;  $\beta_i$  vector of the explanatory variables determining the volume sold;  $x_i$  explanatory variable to be estimated in the volume sold;  $\lambda_i$  an inverse Mill's Ratio;  $\mu$  the coefficient of inverse mill's ratio and  $\varepsilon_i$  the error term.

Table 2 indicates the summary of hypothesized variables which was used in the econometric analysis with the expected sign.

Table 2: Hypothesized variables with expected sign

Variable definition	Value	Expected sign
Sex of the household head	1=male,0=female	+
Age of the household head	Years	+/-
Education of the household head	1=literate,0=illiterate	+/-
Household size	Number	-
Cultivated land size	Hectare	+
Land rented or shared in	Hectare	+
Number of oxen owned	Number	+
Number of active family labor	Man equivalent	+
Number of Livestock owned in Tropical livestock unit	TLU	+/-
Number of equine owned	Number	+
Distance to the nearest market	Kilometer	-
Distance to all weather road	kilometer	-
Household membership in a cooperative	1=membership,0=otherwise	+
Access to communication facilities	1= access, 0=otherwise	+
Perception on lagged market price	1=bad,2=fair,3=good	+
Use of credit	1=use,0=otherwise	+

## Results and Discussion

The descriptive statistics result reveals the distribution of haricot bean producer farm households on their position in haricot bean market. About 68% of the sample households were participant and the remaining 32% were non participant. On average the volume of haricot bean sold per sample household head was estimated 5.78 quintals. The average age and family size of the sample households were 40 years and 6.87 persons, respectively. On average households own about 0.92 hectares of land, 3.55 man equivalents of family labor, 1.43 and 0.73 oxen and equines, respectively and 4.54 TLU of livestock owned. About 35 percent of the sample households were involved in rented in or shard in farmlands with an average 0.25 ha of farm land. The sample households located 4.15 kilometer away from the nearest market place and 3.43 kilometer away from all weather road (Table 3).

Table 3: Descriptive statistics of dependent and continuous independent variables for empirical analysis

Variables	Mean	SD
Dependent variables		
Market participation decision(1=yes,0=No)	0.68	0.46
Level of market participation (quintal)*	5.78	5.79
Independent variables		
Age of the household head(years)	40	8.33
Age square of the household head	1658	679
Household size(Number)	6.87	2.19
Family Labor (man equivalent)	3.55	1.49
Number of oxen owned(number)	1.43	1.11
Number of equine owned (number)	0.73	0.98
Number of livestock owned (no oxen & equine)(TLU)	4.54	2.05
Cultivated land size(hectare)	0.92	0.72
Distance to the nearest market(Kilometers)	4.15	4.09
Distance from all weather roads(Kilometers)	3.43	3.10
Land shared in and rent in (hectare)	0.25	0.82

\*1 quintal=100kilograms

Source: Computed from Survey data (2014)

## Results of Econometric Analysis

Before the execution of the econometric analysis data should be cleared. In cross sectional data the presence of multicollinearity and heteroscedasticity are very common problem. While fitting important variables in the model a test for multicollinearity problem among variables was computed using variance inflation factor (VIF). The results show that the highest value of VIF was 2.46. These values are well below the maximum value of 10 that is used as a rule of thumb to indicate the presence of multicollinearity. This indicates that multicollinearity was not a serious problem as indicated in appendix Table 1. Thus, all hypothesized explanatory variables were included in the econometric analysis.

Breusch-Pagan/Cook-Weisberg test was also employed to test heteroscedasticity (Gujarat, 2004). The test result shows the chi-square value was big, indicating heteroscedasticity was a problem. OLS assumes that errors are both independent and identically distributed. In addition, because the data are censored, the variance estimates obtained would be smaller than the true population variance. This, in turn, produces underestimated standard errors in the second stage of the heckman two-step model. As a result, researchers need to correct these standard errors using a consistent errors estimator referred to as robust standard errors (Bushway *et al.*, 2007) Hence, when heteroscedasticity is present, robust standard errors tend to be more trustworthy. Accordingly, robust method was used to correct the possible problem of heteroscedasticity. Outliers were checked using the box and whisker plot and detected outliers were dropped.

## Determinants of haricot bean market participation decision 1<sup>st</sup> stage of heckman estimation

The result of the heckman first stage model i.e. a probit model is summarized in Table 4. To run the first stage of heckman two stage model at least one exclusion restriction variable is needed (Wooldridge, 2005). Based on this access to communication facilities of the household head was included in the participation equation but not in the outcome equation. The model chi-square tests applying appropriate degrees of freedom indicate that the overall goodness of fit of the probit model was statistically significant at a probability of less than 1%. This shows that at least one of the coefficient of independent variables included in the probit model regression explain the variations in the farmers' probability to participate in haricot bean market is not zero (Field, 2005). Second, Pseudo R<sup>2</sup> values indicate that the independent variables included in the regression explain 76% of the variations in the likelihood to participate in haricot bean market.

The decision to participate in haricot bean market were significantly affected by household size, number of oxen owned, use of credit, membership in cooperative, access to communication facilities and distance to all weather road and all with the expected signs.

**Household Size:** It was significant and negatively associated with the probability to sell haricot bean at 5% level of significance. The implication is that households' participation decision in haricot bean market could depend on household size or the per capita consumption requirement that could be satisfied from own production. This confirms the finding of Siziba *et al.* (2011); Agwu *et al.* (2012) and Musah *et al.* (2014), that households with larger family size tend to fail produce marketable surplus beyond their consumption needs. Thus, the marginal effect result indicates that a unit increase in household size decreases the probability of participation in haricot bean market by 4.3%.

**Number of oxen owned:** It was positive and statistically significant at 1% of significance level. This is as expected that the number of oxen available to the household positively enhances the probability of being a seller. Since ox is a critical production asset in smallholder farm households having a direct effect on the production of haricot bean and thereby marketable surplus with a significant amount. This confirms the finding of Barrett (2007) that asset endowments have higher probability of market participation. Thus, for a unit increased in the number of oxen owned the probability of participation decision as a seller in haricot bean market increase by 20 %.

**Use of credit:** It was positive and statistically significant at 5% level of significance. This might be due to use of credit eases liquidity constraints of households that contribute to market oriented production. Likewise, use of credit provide for the farm households a power to spend in input market like purchase of fertilizer ,improved seeds and others that boost yields and thereby leading to more marketable surplus. This result is consistent with the finding of Yaynabeba and Tewodros (2013) and Musah *et al.* (2014), that credit has found a positive relationship with maize and haricot bean market participation decision respectively. Therefore, the marginal effect result indicates use of credit increases the probability of participation in haricot bean market by 15%.

**Access to communication facilities (ACOMMF):** It was positive and statistically significant at 5% level of significance. This implies that households who have high access to communication facilities like telephone eases information flow which enables farmers to link with buyers at a lower cost. In doing so it lowers the fixed transaction costs of market participation. This confirms the findings of (Okoye *et al.*, 2010). Hence, the marginal effect result indicates on average a unit increase in access to communication facilities increases the probability of participation in haricot bean market by 13 %.

**Membership in cooperative (MCOOP):** It was positive and statistically significant at 1% level of significance. The implication is that membership in cooperative could have better access of market information, inputs, extension services and/or technical advice, and credit facilities important to production and marketing decisions. This agrees with the findings of Agwu *et al.* (2012) and Adeoti *et al.* (2014) that being a member of producer group motivate farmers to participate in the market through networking and provision of up-to-date information to members. As a result, the likelihood of farm households who involved in farmers cooperative was more likely to be a participant than to be non-participant. Therefore, being a member of cooperative increases the probability of participation in haricot bean market by 20%.

**Distance to all weather roads:** the marginal effect was significant and negatively associated with the probability of participation decision in haricot bean market at 5 % level of significance. The assumption here is that the closer a household farm or house to all weather road, the more will be the transportation facilities access. Proximity of farmers to all weather road is essential for timely input delivery and output disposal. This implies that farm households located far from all-weather road facing high transportation costs and thereby leading to decide not to participate. This confirms with the findings of Okoye *et al.*(2010) nearness to good road conditions, farmers were likely to remain autarkic other than buyers and sellers other than autarkic in their market participation decision. Therefore, a kilometer increase in distance to all weather road decreases the probability of participation in haricot bean market by 35%.

## **Determinants of level of participation: 2<sup>nd</sup> Stage of heckman estimation**

The second stage of heckman estimation model identifies the significant factors that determine the level of participation conditional on expected market participation. In these stage heckman correction to the variance covariance matrices for the second stage regression model is used to eliminate the selection bias. OLS regression component include inverse mills ratio (Lambda) (Table 4). Seven variables were found to significantly affect the level of participation. These are cultivated land size, number of equine owned, distance to the nearest market, perception on lagged market price, livestock owned in TLU, credit used and total rented in and/or shared in farmland.

**Cultivated land size:** the regression coefficient of cultivated land size of the household was found to have a positive and significant influence on level of participation at 1%

significance level. The possible explanation is that the larger the cultivated land size allocated to haricot bean production the larger the quantity produce and thereby increasing the quantity produce available for sale. Thus, the per unit production costs will be lower due to the economics of scale. A hectare increase in cultivated land under haricot bean production increase the quantity of haricot bean sold by 2.1 quintals, keeping other factors constant. The result is consistent with various findings (Eleet *et al.*, 2013; Tufa *et al.*, 2013 and Adeotiet *et al.*, 2014).

**Number of equine owned:** as hypothesized, the regression coefficient of number of equine owned was found to have a positive and significant influence on level of participation at 5% significance level. Equine ownership plays vital role in lowering transportation costs as well as boosting the proportion of haricot bean sales to the market. The result showed that an increase in equine owned by one unit increase the level of participation by 1.09 quintals, other factors held constant. The result is consistent with various findings including (Key *et al.*, 2000 and Jagwe *et al.*, 2010).

**Distance to the nearest market:** was expected to negatively affect the level of market participation. However, the opposite has been observed in the result. Distance to the nearest market was significant and positively affect the level of participation at 10 % significance level. The possible explanation for this is that those farmers farther away from market place have large size of farmland, thus produce more and their marketed surplus also larger than those near to the market. The result showed that a kilometer increase in distance to the nearest market increases the marketed surplus by 0.13 quintals, other factors held constant. The result is consistent with the findings of (Rehima, 2006).

**Perception on lagged market price:** The regression coefficient was significant and positively influenced the level of participation at 5% significance level. This implies that as households who perceived the lagged market price of haricot bean was good, farmers would be interested to produce and supply more than those who did not perceived the lagged market price was as such. Therefore, price is expected to have positive relation with volume of crop sold. This confirms the economic theory that output price is an incentive for farm household to supply more marketed surplus. So, as household's perception on lagged market price of haricot bean increase from bad to good, increases the level of participation by one quintal, by keeping other factors constant.

Table 4: Determinants of haricot bean market participation decisions and level of participation

Variables	Heckman two stage model				
	1 <sup>st</sup> stage of heckman model (probit model) market participation decision			2 <sup>nd</sup> stage of heckman model (OLS) Marketed surplus	
	Coefficient	SE	Marginal effect	Coefficient	Robust SE
Constant	4.893	6.252		1.215	6.665
Sex	0.429	1.278	0.035	1.467	1.059
Age	-0.399	0.307	-0.033	-0.260	0.339
Age square	0.058	0.003	0.000	0.003	0.004
Education	-0.258	1.102	0.010	1.008	0.912
HH size	-0.569**	0.254	-0.043	0.096	0.199
Family labor	0.306	0.316	0.034	-0.012	0.229
No xen	2.570***	0.895	0.203	0.016	0.631
Noe quine	0.789	0.934	0.078	1.094**	0.525
TLU	-0.040	0.124	-0.003	-0.331**	0.133
CUL size	1.263	1.400	0.131	2.103***	0.771
TSRIL	19.825	11.615	1.761	1.232*	0.741
DISTNM	-0.173	0.122	-0.015	0.131*	0.073
DISTAWR	-0.462**	0.205	-0.358	-0.058	0.121
MCOOP	2.109***	0.833	0.203	0.826	0.951
UCREDIT	1.659**	0.813	0.154	1.756*	0.912
INOFI	-0.477	0.690	-0.028	-0.943	0.758
PLYP	0.534	0.419	0.045	1.016**	0.441
PLYP1	0.029	0.978	0.002	0.798	0.962
ACOOMF	1.882***	0.790	0.134		
Lambda				-0.913**	0.362
Number of obs = 119 LR chi <sup>2</sup> (18) = 116.08 Prob > chi <sup>2</sup> = 0.0000 Pseudo R <sup>2</sup> = 0.7547 Log likelihood = -17.233692 Wald chi <sup>2</sup> (17) = 66.06*** F = 8.54*** R-squared 0.7036					
***, ** and * represents significance level at 1%, 5% and 10% ,respectively					
PLYP1 perception dummy from bad to fair and PLYP is perception dummy from bad to good					

**Livestock owned:** the regression coefficient of livestock owned was found to have a negative and significant influence on level of participation at 5% significance level. The possible explanation is that livestock serve as a means of generating income through sale of livestock and livestock products i.e farmers with large TLU are not encouraged in producing haricot bean as a means of income generation. Therefore, as livestock owned increased by one TLU the level market participation decline by 0.33 quintals by holding other factors constant. This is consistent with the findings of (Rehima, 2006).

**Rented and/or shared in farmland:** It significantly and positively influences haricot bean producing household’s level of participation at 10% level of significance. This confirms the findings of Moti and Berhanu (2012) that production from rented in or shared in farmlands is more likely to sell than consume. This is due to the fact that to compensate their expenses from the half of haricot bean produce and to pay back the rent from shared in and rented in land, respectively. Hence, a hectare increase in shared in and rented in farmlands increases the level of participation by 1.23 quintals by keeping other factors constant.

**Use of credit:** It was significant and positively associated with the level of market participation at 10% level of significance. This means that credit services are the major sources to solve financial constraints that hinder the use of improved agricultural technologies. Therefore, households who use credit can have a financial strength to purchase improved technologies, this leading to produce more marketable surplus. Thus, Households who use credit sell 1.75 more quintals than non users by keeping other factors constant. This result is consistent with the findings of Yaynabeba and Tewodros (2013).

**Inverse Mills ratio (LAMBDA):** It was significant and negatively related to level of participation at 5% significance level which implies that the error term in the selection and outcome equation is negatively correlated. This indicates that there was a sample selection bias, or the existence of unobserved factors that determine farmers' likelihood to participate in haricot bean market and thereby affecting the level of participation.

## Conclusion and Implications

Determinants of haricot bean market participation were analyzed by heckman two stage model. The result reveals number of oxen owned, access to communication facilities, membership in cooperative, use of credit, household size and distance to all weather roads had a significant effect on the probability of haricot bean market participation. The significant variables that affect the level of participation were livestock owned, cultivated land size, number of equine owned, distance to the nearest market, perception on lagged market price of haricot bean, use of credit and inverse mill's ratio. Based on the findings of this study, some relevant implications can be drawn that can assist to design appropriate intervention mechanisms to improve market participation of haricot bean in the study area are presented as follow.

Distance to all-weather road has become important determinant factor which affects farmers' participation decision in the marketing of haricot bean crop negatively. Thus, improving rural infrastructure in the form of establishing all weather road would assist non participant farmers to participate in the market due to low cost of transportation; in addition it improves the integration of markets and thereby farm households have an incentive to produce and supply more haricot bean; since the price they receive for their produce would be high.

Membership in cooperatives was also positively related to market participation, Therefore, encouraging farmers to form cooperatives/farmers organization or join existing ones will be a step in the right direction, through which can take advantages of bargain power in the input and output market. In so doing cooperative should be the major channel for farmers to secure better income from haricot bean sold in order to encourage farmers' production objective to be market based.

Access to communication facilities was found positively affect the participation decision through providing better information and thereby decreasing fixed transaction costs like searching and processing information, and etc. Commercialization requires market

oriented production system and market oriented production system requires information about markets. However, smallholder farmers often face information asymmetry in the factor and product markets which forces them in to production for subsistence. Therefore, provision of communication facilities infrastructure and improving the existing one to avoid information asymmetry should be given prior attention.

Cultivated land size had positive effects on level of participation. However increasing the size of land cannot be an alternative for marketed surplus of haricot bean due to the fact that land is a limited resource. Therefore, looking for productivity improving measures through proper management of land increases the production per unit area. Use of credit had a positive and significant effect on market participation decision and level of participation. Therefore, Governmental and nongovernmental organization should strengthen rural financial or microfinance system to address the credit needs of farmers for enhancing market participation.

Perception on lagged market price of haricot bean was positive effect on level of participation. The output price is an incentive for farm households to supply more produce for sale. Therefore, in order to increase the quantity supplied interventions by regional, zonal or district level marketing office should focus on bringing down transaction costs which increase the price received by farmers and encourage farmers to form group marketing arrangements and linking farmers with exporters through which farmers can take the advantage of bargaining power in output market.

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