



## Analysis of Market Decisions and Intensity of Market Participation of Smallholder Wheat Farmers in Adola Rede District of Oromia Regional State, Ethiopia

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**Abstract:** In Ethiopia, agricultural transformation is taken as a pathway to transition from a traditional subsistence orientation to one that is market focused and commercialized. In this regard, efforts to enhance smallholders' participation in cereal market in general and wheat in particular, through surplus production have been made, but there is dearth of information on the status of market participation and its determinant factors particularly in Adola Rede district. This study was aimed at analyzing market participation of smallholder wheat farmers in Adola Rede district. Two stage sampling technique was employed to select a sample of 150 for analysis. To identify factors affecting market participation decisions and level of market participation, Heckman two step estimation procedures was used. The study shows that, households in the study area sold 39% of their wheat to the market. Perception on lagged wheat price, quantity of wheat produced, size of land allocated for wheat and literacy status of household head had significant positive effect on market participation decision, while age of household head had significant negative effect. Level of market participation affected positively and significantly by perception on lagged wheat price, size of land allocated for wheat, quantity of wheat produced, and literacy status of household head. The study result suggests that, provision of training for households on contract farming, increasing of productivity and production of wheat, improving land efficiency, strengthening of farmers' education through adult education as a means to enhance wheat market participation and level of participation of smallholders.

**Keywords:** Smallholders, Market participation, Heckman two step estimation.

### 1. INTRODUCTION

Ethiopian economy is highly dependent on agricultural sector which account for about 38.8% of national GDP (Zerihun *et al.*, 2016), 87% of export earnings and remains the main source of employment; generating 72.7% of total employment (UNDP, 2015). Wheat production in Sub-Saharan Africa is at 10 to 25% of its potential and the region could easily grow more to improve food security. According to Mason *et al.*, (2012), farmers in Sub-Saharan Africa produce 44% of the wheat consumed locally and import the rest from international markets, making the region highly vulnerable to global market and supply shocks. Ethiopia is one of the largest grain producers in Africa, and the first largest wheat producer in Sub-Saharan Africa, followed by South Africa (IFPRI, 2015). Wheat is grown on 1.6 million hectares in Ethiopia making wheat the fourth most widely grown crop in the country, after *teff*, maize, and sorghum. Wheat is mainly grown in the central and south eastern highlands during the main (*Meher*) rainy season (June to September) and harvested in October-November.

Being cognizant of role of market participation, Ethiopia has taken agricultural transformation as a means to tackle poverty and food insecurity problems through empowering smallholder farmers and pastoralists with tools, knowledge, and support needed to transition from a traditional subsistence orientation to one that is market focused and more commercialized (ATA, 2015). In Ethiopia, on average wheat farmers produce 751 kg of wheat and sell 189 kg, so that the marketed surplus ratio is 25%. The regional breakdown shows that Amhara has more wheat farmers, but the wheat production

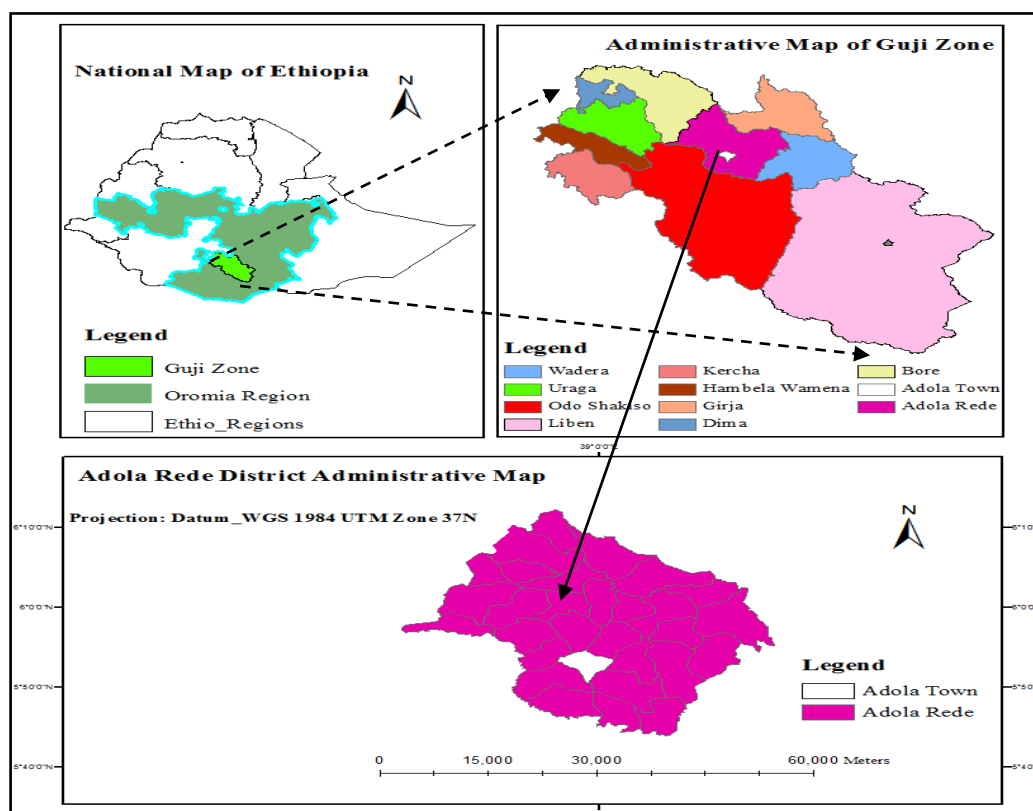
and wheat sales per farm are larger in Oromia. As a result, Oromia accounts for about half of all marketed wheat. Amhara is the second-largest supplier of marketed wheat, followed by SNNP and Tigray (IFPRI, 2015).

Adola Rede district is characterized by mixed farming activities where crop production dominates. It has different kinds of cereals, root crops, *enset* and others. Major crops grown in the area are wheat, barley, *teff*, and maize. The district is one of the potential producers of wheat in Guji zone. Wheat production in the district is both for consumption and market purpose. In the district, more than 10,000 ha of land are suitable for wheat production. Wheat yield in the district is 29 quintals, slightly more than the national average of 26.75quintals (ARANRO, 2017). Likewise other part of the country, production of wheat and other agricultural crops in the study area is rain fed and its supply varies season to season. Even though, the district is known for its various agricultural production and, crop under consideration, only adaptability test of improved varieties of *teff*, and its demonstration was done on the site by Kedir *et al.*, (2016) and, Kebede and Korji (2017), leaving market dimension of agricultural crops in general, and wheat in particular. Understanding the issue in this regard, this study was designed to analyze smallholder farmers' participation in wheat marketing in Adola Rede district of Guji zone.

## 2. METHODOLOGY

### 2.1. Location

The study was conducted in Adola Rede district. Adola Rede is one of the districts which found in Guji zone of Oromia Region at a distance of 475km from Addis Ababa. Adola rede district has an area of about 1401km<sup>2</sup>. Astronomically, the location of the district is between 5<sup>o</sup>44'10"N- 6<sup>o</sup>12'38"N and 38<sup>o</sup>45'10"E – 39<sup>o</sup>12'37"E. According to Oromia population projection made based on 2007 Population and Housing Census Result, the total population of Adola Rede woreda is about 149, 735 in the year 2015/16. From the total population, male accounted for 52%, while the remaining 48% were females. It shares boundary with Girja in North-East direction, Anna Sorra in North-West direction, Oddo Shakiso in Southern direction and Wadara in South-East direction (ARBoFED, 2017). Location of the study site is shown in figure 1.



**Fig1.** Geographical location of the study area

**Source:** Developed from Ethio-GIS (2006)

## **2.2. Farming Systems and Agricultural Practices**

Like in many parts of Ethiopia, the farming system in Adola Rede is still traditional with oxen (animal's power), and labor as the major means of production during land preparation, planting and harvesting as well as post-harvest process. Rain-fed agriculture is a common practice for many farm households in this district. However, a semi-nomadic economic activity is also practiced as a means of livelihood by some of its residents. This district has 28 rural *kebeles* and 3 urban *kebeles*. Adola Rede district is characterized by three agro-climatic zones, namely *Dega*, *Weina Dega* and *Kola*; locally known as *Bada*, *Bada Dare*, and *Gamoji* respectively. The mean annual rain fall of the district is about 1000mm and the mean annual temperature of the district is 28C<sup>0</sup>. The farmers of this district produce both in *meher* and *belg* seasons. They produce cereals such as *teff*, wheat, barley and maize, pulses such as haricot bean, and others such as fruits and vegetables. They also engaged in the production of coffee and chat as means of livelihood. Overall; wheat, barley, maize and *teff* are the major crops cultivated by the farmers in the study area. Moreover, this district has a potential for livestock production which is witnessed by farmers ownership large number of livestock. Cattles, goats, sheep, horses, mules, donkey and poultry are livestock types that the district is endowed with (ARBoFED, 2017).

## **2.3. Data Type, Sources and Methods of Data Collection**

This study used household survey data collected from Adola Rede district. Both primary and secondary data were used in this study. Before a start of actual data collection, facilitative works such as training of enumerators on interview procedures, and preliminary assessment to sampled *kebeles* was made. Primary data were collected using semi-structured questionnaire by trained enumerators. Both open and close-ended questions in line with the objective of the study were included in the questionnaire. Semi-structured questionnaire was administered on selected households to collect data on household characteristics, resource ownership, access and institutional variables relevant to meet the objective of the study. Secondary data helpful to the study were gathered from statistical abstract of Adola Rede district, journals, research findings and different reports.

## **2.4. Sampling Procedure**

Two stages sampling technique was used to select sample households for data collection. In the first stage, in consultation with agriculture and natural resources office of the district, four *kebeles* were selected from seventeen wheat producer *kebeles* using simple random sampling technique. In the second stage, from list of wheat producer households in the sample *kebeles*, 150 sample wheat producers were selected randomly using probability proportional to size using sample size determination formula developed by Cochran's (1977) indicated in equation below. The reason for choosing simple random sampling technique over other sampling techniques for selection of *kebeles* and sample was, because it gives equal chances for *kebeles* and households to be included within the sample frame.

$$n = \frac{Z^2 * p * q}{d^2}$$

Where; Z = Standard normal deviation (1.96 for 95% confidence level), p is the estimated proportion of an attribute that is present in the population, in this case proportion of wheat output market participants to wheat farmers in the district, but data on proportion of market participant at district level was unavailable. The rule for sample size determination in case where variability in p unknown is to assume p = 0.5 (Ajay and Mucuh, 2014). In this study, due to time and financial constraint, the variability in p taken as 0.11 which is used by Gobena *et al.*, (2016) based on the assumption that randomly selected sample is representative, q = 1-P, d = is degree of accuracy desired (0.05). Sampling frame and sample size determination is indicated in Table 1.

**Table1.** Sampling frame and sample size determination

Name of kebeles	Number of households (#)	Proportion of sampled households (%)	Number of sample households using PPS
Maleka	650	22	33
Gunacho	680	23	34
Hirbora Barko	516	17	26
Chembe	1130	38	57
<b>Total</b>	<b>2976</b>	<b>100</b>	<b>150</b>

Source: ARANRO (2017) and Own computation

### 3. METHODS OF DATA ANALYSIS

#### 3.1. Descriptive Analysis

Two types of analysis, namely descriptive and econometric analysis were used to meet the objectives of the study. Descriptive analytical tools such as mean, range, percentage, frequencies, and the like were used to describe households' demographic and socio-economic characteristics, and others. T-test and chi-square test were also used to compare market participants and non participants over demographic and socio-economic, and other factors. To evaluate status of wheat market participation, crop output market participation index was used. Household level degree of participation of wheat crop in the study area was estimated using the following index given as:

$$MPI_i = \frac{\text{Gross value of crop sales hh } i \text{ year } j}{\text{Gross value of crop production hh } i \text{ year } j} * 100$$

The Market Participation Index (MPI) is a measure of household specific level of crop output market participation (Gebremedhin and Jaleta, 2010). In this study, the index measures the ratio of the gross value of wheat crop sales by household *i* in year *j* to the gross value of wheat crop produced by the same household *i* in the same year *j* expressed as a percentage. The index also measures the extent to which household wheat crop production is oriented toward the market. A value of zero would signify a totally subsistence oriented household and the closer the index is to 100, the higher the degree of participation.

#### 3.2. Econometric Analysis

So far, empirical studies on analysis of the smallholder market participation have used various analytical models depending up on their nature of dataset. These analytical models include, Ordinary Least Squares (OLS), tobit model, heckman sample selection models, and double hurdle model. As to which type of model to use among these models depends up on the nature of dataset and underlying assumptions of the model. Following the nature of data set at hand, this study have used heckman two step model to identify factors that influence smallholder wheat farmers' participation decision and intensity of wheat sales in the study area. In sample selection model the first procedure is to estimate the probability of participation using the Maximum Likelihood Probit estimation and estimating Inverse Mill's Ratio (IMR) as a right hand variable in the corresponding wheat market supply function. First, the selection equation (probit model) evaluating market participation decision is specified as:

$$\begin{aligned} Z^* &= w'\gamma + u & u_i &\sim N(0, 1) \\ Z &= 1 \text{ if } Z^* > 0 \\ Z &= 0 \text{ if } Z^* \leq 0 \end{aligned}$$

Where  $Z^*$  denotes latent or unobserved wheat market participation decision of households,  $\gamma$  is vectors of parameters to be estimated,  $w'$  represents vectors of independent variables which affect market participation decision and  $u$  is random error term. Second, outcome equation (OLS) estimating level of market participation by including an estimate of Inverse Mill's Ratio, denoted by  $\lambda$  as an additional regressor is specified as:

$$Y = X'\beta + \lambda'\mu + \varepsilon \quad \varepsilon \sim N(0, \sigma^2)$$

$Y$  is quantity of wheat sold for observed ( $Z = 1$ ), and  $X'$  represents vectors of independent variables,

And  $\beta$  is vectors of parameters to be estimated,  $\varepsilon$  is normally distributed error terms.  $\lambda' = \frac{\phi(w'\gamma)}{\Phi(w'\gamma)}$ ;  $\phi$  and  $\Phi$  are the density and distribution functions respectively;  $\mu$  is associated parameters to be estimated.  $Corr(u, \varepsilon) = \rho$ ; where  $\rho$  is correlation coefficient for the error terms  $u$  and  $\varepsilon$ .

According to Reddy *et al.*, (2013), a commonly appearing problem in most of the econometric data is the correlated input variables or problem of multicollinearity. Therefore, it is important to check it before modeling variables. To detect whether the data at hand exhibits multicollinearity problem or not, Variance Inflating Factor (VIF) was used. The Variance Inflation Factor (VIF) shows how the variance of an estimator is inflated by the presence of multicollinearity. With increased multicollinearity, the VIF approaches infinity and in the absence of multicollinearity, VIF will be equal to 1. Variance Inflating Factor for each explanatory variable ( $X_i$ ) can be calculated as stated in Reddy *et al.*,(2013):

$$VIF(X_i) = \frac{1}{1 - R^2}$$

Where,  $R^2$  is the coefficient of correlation derived when one of explanatory variable regressed over all the other explanatory variables.

**4. DEFINITION OF VARIABLES AND HYPOTHESIS**

**4.1. Dependent Variables**

*4.1.1. Market Participation Decision (Partdc)*

It is binary dependent variable and it takes a value of 1 if the household participates in wheat output market as a seller and, 0 otherwise.

*4.1.2. Quantity of Wheat Sold (Qsold)*

It is the quantity of wheat actually supplied to market measured in quintal and it takes positive value for those households who have supplied.

Description of variables hypothesized to affect both market participation decision and intensity of wheat sale are given in Table 2.

**Table2.** *Description of the model variables and hypothesis*

Variables	Units of measurement	Expected effect on	
		Prob. of market participation	Level of market participation
<b>Dependent variables</b>			
Market participation decision	Dummy		
Quantity of wheat sold	Quintal		
<b>Independent Variables</b>			
Age of household head	Years	+	+
Family size	Adult equivalent	+/-	+/-
Literacy status	Dummy	+	+
Perception on lagged market price	Dummy	+	+
Size of land under wheat crop	Hectare	+	+
Quantity produced	Quintal	+	+
Total livestock holding	TLU	+	+
Proportion of non-farm income	%	+/-	+/-
Mobile ownership	Dummy	+	
Access to credit	Dummy	+	+
Membership in cooperatives	Dummy	+	+
Distance to extension service	Minutes	-	-
Distance to the nearest market	Kilometer	-	-

**Note:** *Prob.:* Probability



## **5. RESULTS AND DISCUSSION**

In this chapter, the main findings of the study are presented and discussed. First, descriptive results including demographic and socio-economic characteristics are presented and then, econometric results such as factors affecting smallholder's decisions to participate in a market, and the level of production marketed are presented and discussed.

## **6. DESCRIPTIVE RESULTS**

### **6.1. Demographic and Socio-Economic Characteristics of Sample Households**

Table 3 discloses demographic and socio-economic characteristics of sample households in the study area. The study showed that, out of 150 households in the survey, 74% were market participant while the remaining 26% were non participants of market. It also showed that majority of the households (i.e. 90% of the households) were male headed and the remaining 10% were female headed households. Among market participants, male headed and female headed households constitute 96% and 4% respectively. Out of non-participants, 74% were male headed while the remaining 26% were female headed households. Chi-square test of proportional difference shows, the existence of statistically significant difference between two groups (Market participants and non-participants) at 1% significance level. The average age of participants was 46.95 years, while for non-participants it was 48.31 years, and 47.31 years for pooled sample. The average number of household members of participants in adult equivalent was 4.80, while 5.12 among non-participants, and 4.88 for pooled sample. On average, 82% of the households were literate. Out of participants and non-participants, 88% and 64% were literate respectively.

Household's perception on lagged market price of wheat is important in altering marketing decisions of households. In this study, out of the total sample, 47% of the households perceived as the lagged market price of wheat was high. Among participants, 58% of the households perceived as lagged price of wheat was high, while out of non-participants, 15% of the households were perceived lagged price of wheat as high. Statistically significant difference was observed between the participants and non-participants in terms of perception on lagged market price of wheat from chi-square test at 1% significance level.

On average, size of land allocated under wheat for market participants was 0.45 ha; while for non-participant was 0.15 ha and, for the pooled sample, size of land allocated for wheat was 0.37 ha. The T-test of variability between the groups showed that there was a statistically significant difference in terms of size of land allocated wheat between participants and non-participants at 1% significance level. Production characteristics of sample households' showed that mean amount of wheat produced by participants was 1362.16 kg, and by non-participants was 374.36 kg. For the total sample households mean amount of wheat produced was 1105.33 kg. There was statistically a significant mean difference in amount of wheat produced between participants and non-participants at 1% significance level. Distribution of output among sample households shows that, on average, 491.8 kg of wheat was consumed at home for all sample households, while average wheat consumption among market participants and non-participants was 533.06 kg and 374.36 kg. Out of the total production, mean amount of wheat sold was 558.87 kg for the total sample; while for participant and non-participant it was 755.22 kg and 0, respectively. A significant mean difference was also observed in both quantity of wheat consumed and quantity of wheat sold between the two groups at 5% and 1% significance level respectively, indicating that, on average market participants consumed and sold more quantities of wheat than non-participants.

Total livestock holding varies from 0.68 to 23.84 TLU. The mean livestock holding in TLU for participant and non-participant was 8.03 and 6.95 respectively, and 7.53 for total sample households. Mean proportion of non-farm cash income of households was 7.3%. Sale of labor, and petty trade were among non-farm income sources of households. For participants and non-participants, proportion of non-farm income out of total annual income of household was 6.4% and 10% respectively.

Likewise other factors, it is important to understand access to institutional and market access factors in market participation analysis as they proxies the accessibility of production technologies, information, and transaction costs. Survey result shows that, 27% of the households had access to

credit; while among participants and non-participants, 30% and 18% of households respectively had access to credit. Out of the total survey respondents, 33% of sample households were members of cooperatives. Membership in cooperatives by groups shows that, 38% of households were members of cooperatives from participants where as 18% of households were members from non-participants. There was statistically significant difference between the two groups in membership to cooperatives at 5% significance level. On average, the sample households travelled 32.6 minutes to arrive at extension service center. The average travel time taken among participants and non-participants to arrive at extension service in minutes was 32.65 and 32.46 respectively. The mean distance from the nearest market for the whole sample was 5.62 kilometers. The mean distance from the nearest market for market participants was 5.89 kilometers while it was 4.83 kilometers for non-participants. T-test result shows that, there was statistically significant difference between participants and non-participants in distance from the nearest at 10% significance level.

**Table3.** Demographic and socio-economic characteristics of sample households

Variables	Mean/Proportions			T-value/ $\chi^2$
	Total	Participant	Non-participant	
<b>Number of samples</b>	<b>150</b>	<b>111</b>	<b>39</b>	
Sex of household heads	0.9	0.96	0.74	14.32***
Age of household heads	47.31	46.95	48.31	0.61
Family size	4.88	4.80	5.12	0.64
Literacy status	0.82	0.88	0.64	11.44***
Perception on lagged market price	0.47	0.58	0.15	21.6***
Land allocated for wheat (ha)	0.45	0.15	0.37	-6.36***
Quantity of wheat produced (kg)	1362.16	374.36	1105.33	-8.44***
Quantity of wheat consumed (kg)	533.06	374.36	491.8	-2.42**
Quantity of wheat sold (kg)	755.22	-	558.87	-7.91***
Total livestock holding (TLU)	7.73	6.96	7.53	-1.20
Proportion non-farm income	7.3	6.4	10	1.07
Ownership of mobile phone	0.71	0.77	0.54	7.88***
Access to credit	0.27	0.30	0.18	2.05
Membership in cooperatives	0.33	0.38	0.18	5.61**
Distance to extension service	32.6	32.65	32.46	-0.04
Distance to the nearest market	5.61	5.26	6.62	2.17**

\*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% respectively Survey result, 2017

## 6.2. Characterization of Households by Degree of Market Participation

A statistical summary of market participation status indicators of the sample households are displayed in Table 4. Household survey result shows that households head in the study area produced on average wheat valued approximately 5,750 Birr. Sells dimension of households under study shows that, on average, households in the study area sold wheat crop worth nearly 2,910 Birr. Market participant households produced and sold wheat worth nearly 7,090 Birr and 3,930 Birr respectively, while non-participants on average produced wheat worth 1,950 Birr and sold nothing out of their production. The degree of market participation for the households in the study area computed at average community level price was 39% which indicates that on average households in the study area sold 39% of their total wheat production sales ranged from 0% to 95.8%. This degree of market participation is relatively more than the national average level of market participation of 20.78 percent and level of market participation in Guji zone (32.03%) indicated in CSA (2016).

**Table4.** Sample households' status of market participation

Degree of participation	Total (Mean)	Participant			Non-participant		
		Mean	Min.	Max.	Mean	Min.	Max.
Value of wheat produced (a)	5.75	7.09	1.56	16.67	1.95	0.52	6.24
Value of wheat sold (b)	2.91	3.93	0.52	13.01	0	0	0
Market participation (%)	39	52.8	11.7	95.8	0	0	0

**Note:** 'a' and 'b' displayed values are measured in thousands Birr. Source: Survey result, 2017

### **6.3. Econometric Results**

The results for factors affecting decision to participate in wheat output market and intensity of wheat sale are displayed in Table 5. Diagnostic test for multicollinearity shows that, the mean VIF of explanatory variable included in the model was 1.59 indicating that there was no serious problem of multicollinearity. The Wald chi-square value of 223.27 is statistically significant at 1% indicating that at least one of the explanatory variables included in the model jointly explain the probability of participating in wheat output market and intensity of wheat sale. Inverse Mills Ratio was statistically significant at 5% indicating presence selectivity bias (Existence of some potential levels in the sample population in wheat market participation, but are not observed due to sample selection problem). Age of household heads, perception on lagged wheat price, land allocated for wheat, quantity of wheat produced, and literacy status of household heads were factors affecting wheat marketing decision. Factors such as Perception on lagged wheat price, land allocated for wheat, quantity of wheat produced and literacy status were found affect intensity of wheat sale. Ownership of mobile was used as exclusionary variable fitted in to wheat market participation decision model but not intensity of wheat sale.

### **6.4. Age of Household Head**

Age of household head had negative and significant effect on smallholders' decision to participate in a wheat market. A year increases in age of household decreases probability of participation in wheat market as seller by 0.4%. The reason could be elder households less likely adopt innovations (agricultural technologies, market information, etc.) that would increase their productivity to produce more output raising larger marketable surplus than younger households and make them end up with have a lower likelihood of selling than younger households.

### **6.5. Households' Perception on Lagged Price of Wheat**

Households' perception on lagged market price of wheat affected probability of market participation positively and significantly at 1% significance level and intensity of wheat sale at 10% significance level. Perception of the households on lagged wheat price is important in altering production and marketing decision of households. This is because; households form their expectations based on the lagged price of wheat and allocates available resources according to their expectations. Alternatively, the higher the lagged price of wheat they perceive, the more quantity of wheat they produce and the higher the probability they participate in market as seller. Average marginal effect of this variable on probability of market participation shows that, as compared to households with low perception on lagged market price of wheat, probability of market participation for households with high perception on lagged market price of wheat increases by 15.3%. Intensity of wheat sale increases by 1.26 quintals as one move from low perception on lagged wheat market price to high perception. This finding is in conformity with priori expectation and the findings of Abera *et al.*, (2016) that shows level of participation increases as household's perception on lagged market price increases from bad to good.

### **6.6. Land Allocated for Wheat Production**

Another socio-economic characteristic that affects households' market participation decision and intensity of wheat sale is size of land allocated for wheat production. Size of land allocated for wheat production was positive and significant for both market participation decision model and intensity of wheat sale model at 5% significance level. Among variables found significant in affecting market participation decision and intensity of wheat sale of households, size of land allocated for wheat production has strong explanatory power over other variables. Average partial effect of this variable implies that, for a hectare increase in land allocated for wheat, probability of market participation increases by 62.7%. This is because, as the size of land allocated for wheat crop increases, the production of wheat increases which in turn increase farmers' probability of being seller in wheat output market. The findings of Seyoum *et al.*, (2011) confirm this result. Coefficient of size of land allocated for wheat production on intensity of wheat sale implies a hectare increase in land allocated for wheat, intensity of wheat sale increases by 3.88 quintals.

### **6.7. Quantity of Wheat Produced**

Quantity of wheat produced positively related to probability of market participation and intensity of wheat sale was significant at 1% significance level. Quantity produced is critical in semi-commercial



farming system where output is firstly produced for home consumption purposes and only sell surplus. Therefore, higher output enables farmers to have more marketable surplus as indicated in Jaleta *et al.*, (2009). The average marginal effect on probability of market participation was 0.034; meaning that a quintal increases in quantity of wheat produced increases the likelihood of market participation by 3.4%. Coefficient of quantity produced on intensity of wheat sale indicates that, a quintal increase in quantity of wheat produced increases quantity of wheat marketed by 0.64 quintal. This finding is in line with priori expectation and consistent with the finding of Reyes *et al.*, (2012) who found that quantity of potato produced significantly influenced the probability of market participation among smallholder farmers in the central highlands of Angola. Also, the finding of Moono (2015) shows that, likelihood of participation in rice market increases with quantity of rice produced. The finding of Gani and Adeoti (2011) also is in agreement with this finding that shows probability to participate in a market increases with size of output produced. The findings of Benjamin (2013), Adeoti *et al.*, (2014), Hailua *et al.*, (2015), Melaku and Ashalatha (2016), and Mohammed *et al.*, (2016) also affirm the importance of size of production in determining level of market participation.

### 6.8. Literacy Status of Households

Literacy status of households was also hypothesized to affect smallholders' market participation decision and intensity of wheat sale because of its capability in equipping smallholders with knowledge and skills that would help them in making decisions related to farm management, input use and information searching. As expected, literacy status affected both smallholders decision to participate in a market and intensity of wheat sale positively and significantly at 10% and 5% significance level respectively. As compared to illiterate households, the probability of participation in wheat output market and intensity of wheat sale for literate households' increases by 9.9% and 269 quintals. The result is consistent with the findings of Tufa *et al.*, (2014) and Mazengia (2016) that states educated household head can have better market networking and bargaining power and good managerial skill of enterprises and their tendency to accept different agricultural technologies is high, so that they can produce more surpluses for market.

**Table5.** H2SE result for factors affecting probability and intensity of wheat sale

Variables	1 <sup>st</sup> stage (Probit)		AME	2 <sup>nd</sup> stage (OLS)	
	Coefficient	Std. Err.		Coefficient	Std. Err.
Age of household heads	-0.04*	0.022	-0.004	0.01	0.028
Family size	0.01	0.096	0.001	-0.14	0.130
Literacy status	0.85*	0.492	0.099	2.69**	1.055
Perception on lagged market price	1.31***	0.494	0.153	1.26*	0.670
Land allocated for wheat	5.37**	2.630	0.627	3.88**	1.752
Quantity of wheat produced	0.29***	0.088	0.034	0.64***	0.073
Total livestock holding	-0.01	0.065	-0.001	0.11	0.099
Proportion non-farm income	0.12	1.086	0.014	1.52	1.876
Ownership of mobile phone	-0.40	0.529	-0.046		
Access to credit	0.18	0.469	0.021	0.75	0.697
Membership in cooperatives	-0.04	0.496	-0.005	-1.10	0.690
Distance to extension service	-0.01	0.011	-0.002	0.01	0.014
Distance to the nearest market	-0.05	0.067	-0.005	-0.01	0.103
Constant	-0.84	1.433		-7.43	2.162
IMR				(2.84)**	1.135
Number of observations	150				
Censored observations	39				
Uncensored observations	111				
Rho	0.89				
Sigma	3.19				
Wald $\chi^2$ (12), Pr > $\chi^2$	223.27***				

**Note:** \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% respectively, AME: Average Marginal Effect, H2SE: Heckman two step estimation, Std. Err.: Standard Error.

**Source:** Model output, 2017

## **7. CONCLUSION**

In this study, households' status of wheat market participation, and factors affecting market participation decision and level of participation of households in Adola Rede district were analyzed. Analysis of household market participation indicates that, the households in the study area are nearly moderately market participators in wheat output market with average sales of 39% of total production in monetary value with a maximum level of 95.8% and minimum of zero. Heckman two step estimation results revealed that, households' decision to participate in a market positively and significantly affected by households perception on lagged price, size of land allocated for wheat, quantity of wheat produced, and literacy status of household head while it was negatively affected by age of household heads. Households' extent of market participation was affected positively by households' perception on lagged price, size of land allocated for wheat, quantity of wheat produced, and literacy status of household.

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