

Factors influencing market participation decision and extent of participation of haricot bean farmers in Meskan District, Ethiopia

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Abstract

In the last few years, the international and domestic demand for haricot bean has increased. Despite the increased in volume of production in the country farmers still experience marketing challenges resulting into low incomes. The main purpose of this paper was to examine market participation of smallholder haricot bean producers in Meskan district, Ethiopia. Multi stage sampling technique was used to draw data from 133 smallholder farmers. The results from the Heckman two stage model revealed that the value of haricot bean produced, access to market information, farm size, education level, access to credit, membership to an organization and distance to the nearest market significantly affected market participation decision of haricot bean producers. Among the significant variables which affect market participation decision, membership to an organization and distance to market showed negative effect while all the rest showed a positive effect. The extent of market participation among haricot bean producers was significantly affected by farm size, value of haricot bean produced, access to input supply and access to credit.

Key words: Market participation decision, extent of participation, Haricot bean, Heckman two stages model, smallholder haricot bean farmers, *Kebele*

Introduction

Pulses play a crucial economic role in food and nutrition security, in Ethiopia. Recently, the production and supply of pulses, has increased due to increased demand in both local and international markets, thus enhancing smallholders' income (Shahidur *et al.*, 2010).

Ethiopia is among the top ten producers of pulses in the world with pulses being the third largest export commodity of the country (MoARD, 2008). Among the different pulse crops grown in the country, haricot bean accounts for the second largest production share of 17 percent, while the other pulses, such as horse beans, chickpea, lentils, green pea, lupines and green beans account for the remaining percent (Negash,2007). Haricot bean is considered as the main cash crop and protein source for farmers in many of the low land and mid altitude areas of Ethiopia. The crop is grown either as a sole crop and/or intercropped with either cereal or perennial crops (Rahmeto, 2007). There are a wide range of haricot bean types grown in Ethiopia, including the mottled, red, white and black varieties. The leading white bean varieties are the *Awash 1*, *Awash melka* and *Mexican 142* varieties. The pure red and pure white colored beans are the most common commercial varieties (Ferris and Kaganzi, 2007;Negash, 2007).

The increasing demand for quality haricot bean on the world export market, suitable climate of the country, low production costs, availability of arable land and access to the port of Djibouti are a great opportunity for Ethiopia to export large quantities all over the world and boost its export earnings. However, at the moment, the country is not benefiting from this existing potential. In order to identify the problems hindering the country from increasing export earning, it is important to study the marketing and distribution constraints faced by haricot bean actors along the market chains (Bisschop and Dijk, 2007).

In Ethiopia, most of the haricot bean produce comes from smallholder farmers. As such, smallholder market participation is important to economic growth and poverty reduction. Despite the potential contribution of haricot bean, some producers do not participate in the market and those who do are not getting reasonable return. A well-organized marketing system can maximize the income of all actors along the chain given the growing demand in international markets for haricot bean. Therefore, in order to improve the return of smallholders, it is important to identify factors that influence their decision to participate in the market and the extent of their participation.

Methods

Study area

Meskan district is located 130 Km South-West of Addis Ababa in the Southern Nations Nationalities and People's Regional State (SNNPRS). It is located at 8.2 North Latitude and 38.5 East Longitude. The district is situated in the central rift valley of the country. The topography ranges between dry lowlands at altitudes of around 1,500 m to 3,500 m above sea level. Average annual temperature of the district is 24⁰ C. The average annual rainfall in the district is 1,233 mm (Jansen *et al.*, 2007). The district is composed of 40 *Kebele* Administrations.

Data and sampling

Cross sectional data were collected from 133 households in Meskan district, Ethiopia in May 2012. A multi-stage sampling method was employed to draw the sample of haricot bean producers. Initially, purposive sampling was used to select the district then *Kebele* Administrations (KA) that produce haricot bean was identified. Out of 40 KAs in the district, 38 KAs produce haricot bean. For purposes of the study, 4 KAs were chosen randomly. Haricot bean producers were then grouped into two categories based on the cropping system they used to produce haricot bean (a sole crop and intercropping). From each of the KA, haricot bean producers were identified based on the information from the district agriculture and rural development office. Finally, Haricot bean farmers were selected systematically from both strata proportionate to the size of the population of haricot bean producers.

Analytical approach

In this study Heckman’s two steps model was selected because it estimates the probability of participation and extent of participation. When two decisions are involved such as participation and extent of participation, the Heckman two step estimation procedures is appropriate. The participation equation, attempts to capture the factors affecting decisions to participate. This equation was used to construct a selectivity term known as the 'inverse mills ratio'. The inverse mills ratio is a variable for controlling bias due to sample selection (Heckman, 1979). The second stage or the outcome equation involves including the mills ratio to the haricot bean supply equation and estimating the equation using ordinary least squares.

Heckman’s two step procedure is specified as follows:

Step 1: Haricot bean market participation equation or probit equation

$$Pr (HBMP) = B_0 + B_1*(ACISS)_i + B_2*(OFFI)_i + B_3*(GND)_i + B_4*(AESV)_i + B_5*(LBR)_i + B_6*(VHBP)_i + B_7*(DISMRK)_i + B_8*(ACCRD)_i + B_9*(ACMI)_i + B_{10}*(EDLV)_i + B_{11}*(FRSZE)_i + B_{12}*(TYHB)_i + B_{13}*(FEXP)_i + B_{14}*(MBOG)_i$$

$$Y_{li} = X_{li}\beta_1 + U_{li} \qquad U_{li} \sim N(0, 1) \dots\dots\dots (1)$$

$$HBMP = 1 \text{ if } Y_{li} > 0 \dots\dots\dots (1a)$$

$$HBMP = 0 \text{ if } Y_{li} \leq 0 \dots\dots\dots (2b)$$

Where Y_{li} = the latent dependent variable which is not observed

X_{li} = the vectors that are assumed to affect the probability of sample haricot bean market participation (HBMP)

β_1 = vectors of unknown parameter in Market participation equation, U_{li} = residuals that are independently and normally distributed with a mean of zero and a constant variance.

Step 2: The observation equation or the extent of Haricot bean market participation

$$EHBMP = B_0 + B_1*(ACISS)_i + B_2*(OFFI)_i + B_3*(GND)_i + B_4*(AESV)_i + B_5*(LBR)_i + B_6*(VHBP)_i + B_7*(DISMRK)_i + B_8*(ACCRD)_i + B_9*(ACMI)_i + B_{10}*(EDLV)_i + B_{11}*(FRSZE)_i + B_{12}*(TYHB)_i + B_{13}*(FEXP)_i \dots\dots\dots (6)$$

Checking for the presence of multi co linearity problems among variables was carried out before fitting the explanatory variables.

Results and Discussion

Out of the total sample of household taken 73% were participating in the marketing of haricot bean while the rest used their produce for home consumption. Among the sampled

households 66.9% were white haricot bean producers, 27.8% were red haricot bean producers and the rest were producing both types of haricot bean.

Table 1: Mean and standard deviation for continuous variables that influence market participation decision & extent of participation of haricot bean producers

	Participants		Non participant		Total		t value
	Mean	Std	Mean	Std	Mean	Std	
Age	40.92	1.050	42.50	1.936	41.35	10.68	0.758
Farm experience	21.03	8.985	20.42	9.467	20.86	9.086	0.337***
Distance to the nearest market	6.79	3.19	10.05	5.447	7.67	4.17	0.001***
Off farm income	2252.6	5878.7	663.89	1785.2	1809.26	5120.87	0.000***
Value of haricot bean produced	1107.24	735.41	436.30	253.8	925.79	706.96	0.000***

*** p<0.01

Source: computed from survey data (2012)

Results on Table 1 indicate that the average age of sampled households was 41.35 years. The average age per household head among market participants in the haricot bean marketing was 40.92 years and the age of the non participants was 42.50 years. The t value indicates that there was no significance difference in age between those who participate and those who do not participate in the marketing of haricot bean. The average farming experience of sampled households was 20.86 years with standard deviation of 9.086. For households who participate in the marketing of haricot beans, the average farming experience was 21.03 years while the average age of the non participants was 20.42 years. Statistically there was statistical significant difference between those who participated and those who do not participate in the marketing of haricot beans in terms of farming experience.

As it is showed on Table 1, the average distance to the nearest market was 7.67 km with a standard deviation of 4.17 as shown in Table 13. The mean distance for the farmers who participated in the market was 6.79 km with standard deviation of 3.19 while the mean distance for non-participants was 10.05 km with standard deviation of 5.44. Statistically there was a statistical significant difference related to distance to market between those who participated and those who did not participate in the marketing of haricot beans at 1% level of significance.

The mean annual off farm income of the sampled households was birr 1809.26 with a standard deviation of 5120.87 as shown in Table 15 below. The mean off farm income of haricot

bean farmers who participated in the market was birr 2252.63 with standard deviation of 5878.78 while the mean off farm income for non-participants was birr 663.89 with standard deviation of 1785.20. The t-test result revealed that there was statistical significant difference between haricot bean market participant and non participant with respect to off farm income.

Determinant of market participation decision of haricot bean farmers

Out of the 14 explanatory variables that were hypothesized to influence the decision of the haricot bean producers whether to participate or not, 8 variables were found significant as shown in Table 1. These were education level, farming experience, membership to an organization, farm size, access to credit, and value of haricot bean produced, distance to market, and access to market information. All the significant variables have positive sign except distance to market and membership to organization.

As the distance between the farmer and the market increases it becomes costly to farmers to transport the produce to the market. The nearer a farmer is to the market, the easier to take the products to the market since the farmer may not incur a high cost for transportation. The marginal effect also indicates that, when the household is located one Kilometer away from the market the probability of market participation decrease by 0.9277%. Distance to market was significant at 10% significant level. A study done by Geberemedhin *et al.* (2009) revealed that the longer the distance to the nearest market the lower the participation of smallholder farmers in the marketing of their produce.

The analysis shows that education level is significant at 10% significance level. This shows that the household head with higher education level acquires knowledge and gets information about the market therefore, the likelihood of participation for that producer with higher level of education increases. The marginal effect indicates that an increase of formal schooling of the household head increases the probability of market participation by 2.42%. These results are in line with Makhura (2001) who found a positive and significant relationship between average education and maize producer market participation decision.

Farming experience of the household head was found to be significant at 10% significance level. The result shows that, when the household experience increased by 1 year the probability of participation in the marketing of haricot bean increased by 0.36%. Similarly a study done by Masoku *et al.* (2010) found a positive and significant relationship between smallholder farmer's maize market participation and experience in marketing channels.

A farmer who has a large farm size would have a probability to allocate more land for production of haricot bean. The results revealed that farm size was significant at 5% probability level. The results show that an increase in farm size of household has the probability of increasing market participation by 2.61%. Similarly, study done by Masoku *et al.* (2001) showed a positive significant relationship between land size and market participation in maize market.

Access to credit was significant at 5% probability level. As indicated by the marginal effect results, having other factors constant an increase in credit access has a probability of increasing the participation of farmers by 6.75%. Access to credit helps the farmers to buy different inputs for production, to fulfil their need for covering labour cost, transportation cost and different costs related to their operation. Therefore, it contributes positively to their decision to participate in the market. Similarly, a study done by Alene *et al.* (2007) found positive and significant relationship between access to credit and maize market participation decision.

The value of haricot bean produced was significant at 1% probability level. The marginal effect coefficient revealed that a unit increase in the value of haricot bean produced increased the probability of market participation by the haricot bean producers by 0.024%. When households produce more, they have surpluses to supply to the market and the price can also act as a motivation for them to participate or not to participate in the market. The findings are in line with Geberemedhin *et al.* (2009) who found out that the value of crop produced increased the probability of market participation of small holder farmers.

As expected the higher the farmers' access to market information the higher the probability of participating in marketing of the products. The marginal effect result shows that access to market information resulted in a 40.79% increase in the probability of market participation by the farmer. Market information is very important for farmers to supply their produce at the right time and at the right place. Farmers who have more access to market information incur less transaction cost that is related with searching for market information, less transaction cost increases market participation of famers. The findings are similar; to those of Randela *et al.* (2008) who found out a positive and significant relationship between access to market information and participation decision in cotton market.

Membership to an organization was hypothesized to influence the participation status of farmers positively but it was found to affect the participation status of farmers negatively. It was found to be significant at 10% probability level. The marginal effect results revealed that membership to an organization decreased the probability of market participation by 6.76%. This negative relationship may be because of lack of strong organization in the study area. Generally it is known that being a member of an organization is advantageous to farmers since they can get information easily, can access different services and there access to the market will be improved. A study conducted by Mathenge *et al.* (2010) showed that membership to an organization had a significant effect on market participation but positively influenced their participation.

Table 1: Estimation of selection model or probit model

Variables	Coefficient	Standard error	Z	P > Z	Marginal effect
Constant	-2.459706	1.856624	-1.32*	0.061	
Gender	-0.4580441	0.650219	-0.70	0.481	-0.0245527
Education level of the HH	0.3296404	0.195889	1.68	0.092*	0.024227
Farming experience of the HH	0.049089	0.029028	1.69	0.091*	0.0036078
Availability of labor	0.8522833	0.564948	1.51	0.131	0.0469175
Membership to organization	-0.7742091	0.460713	-1.68	0.093*	-0.0675754
Farm size	0.3553424	0.177727	2.00	0.049**	0.026116
Access to credit	0.9447049	0.447776	2.11	0.035**	0.0675754
Access to input supply	-0.9582115	0.942477	-1.02	0.309	-0.146386
Value of haricot bean	0.0032992	0.000808	4.08	0.00***	0.0002425
Distance to the nearest market	-0.1262296	0.066611	-1.90	0.058*	-0.0092773
Access to market information	2.391239	0.509140	4.70	0.00***	0.4079684
Access to extension service	0.2188363	0.635708	0.34	0.731	-0.0188063
Off farm income	0.000048	0.00007	0.65	0.517	3.4e-06
Type of haricot bean produced	0.4532814	0.430156	1.05	0.292	0.033311
Rho	0.42856	Uncensored observation		97	
Sigma	52.235562	Wald chi2(26)		253.54	
Number of observation	133	Prob >chi2		0.0000	
Censored observation	36				

*** P<0.01, ** p<0.05 and * p<0.1

Source: computed from survey data (2012)

Determinants of extent of market participation of haricot bean farmers

The second stage of the Heckman two stages model, (OLS regression) was used to estimate the factors influencing the extent of market participation by haricot bean farmers. Out of 13 variables included four were found to affect the extent of participation significantly namely; farm size, access to credit, access to input supply and value of haricot bean produced. All the significant variables were found to affect extent of participation of haricot bean marketing positively.

The inverse Mill's Ratio (LAMBDA) was found to be positive but insignificant as given in Table 2. This showed that there was little sample selection bias or in other words, there were no unobservable characteristics affecting the household market participation decision and extent of their participation. The sign indicates that the error terms in the participation and outcome equation are positively related. A farmer who has more land could allocate more land for production of haricot bean resulting into surpluses to be sold in the market. Farm size was significant at 1% significance level. An increase in the farmland led to a 16.43kg increase in the amount of sold in the market at *ceteris paribus*. Balagta *et al.*(2007) also found that the size of land exploited had a significant and positive relationship with the extent of livestock marketing.

Table 2: Estimation of output model

Variables	Coefficient	Standard error	Z	P > Z
Constant	31.16839	36.18686	0.18	0.860
Gender	-19.206335	17.62146	-0.99	0.324
Education level of the HH	0.227327	4.860485	0.04	0.965
Farming experience of the HH	-0.5951486	0.655809	-0.81	0.419
Availability of Labor	7.173735	13.07352	0.46	0.642
Farm size	16.43449	4.720873	3.04	0.002***
Access to credit	21.89614	11.76247	1.69	0.091*
Access to input supply	47.2574	25.34797	1.77	0.076*
Value of haricot bean produced	0.1054605	0.008249	10.62	0.000***
Distance to the nearest market	-3.050997	1.527489	-1.22	0.264
Access to market information	-7.139277	11.99615	-0.43	0.665
Access to extension service	-19.33217	18.46404	-0.70	0.482
Off farm income	-0.0002912	0.001079	-0.29	0.774
Type of haricot bean produced	12.50293	8.421098	1.53	0.126
Lambda	22.385849	Censored observation	36	
Rho	0.42856	Uncensored observation	97	
Sigma	52.235562	Wald chi ² (26)	253.54	
Number of observation	133	Prob >chi ²	0.0000	

*** P<0.01, and * p<0.1

Source: computed from survey data (2012)

Value of haricot bean produced was found to be significantly at 1% level. It implies that when the household produced more, there were obviously surpluses to supply to the market. A unit increase in the value of haricot bean produced leads to a 0.11kg increase in the amount supplied to the market. Similarly, a study done by Geberemedhin *et al.* (2009) showed that value of crop produced had positive and significant effect on the extent of participation in crop marketing.

Access to credit was also significant at 10% probability level. The results reveal that the extent of market participation was higher by 21.9kg among haricot bean producers who had access to credit compared to those who did not have access to credit. Access to input supply was significant at 10% probability level. It was found that the haricot bean producers who had ease of access to input supply participated in the market more by 47.25kg compared to those who did not have access.

Conclusions and implications

Heckman two stages model was used to identify factors that affect market participation decision of farmers and extent of their participation in the haricot bean marketing. The result show that the value of haricot bean produced and access to market information were the main determinants of market participation among haricot bean farmers. The other significant factors were farm size, distance to the nearest market, membership to an organization, access to credit and the education level of the household head. The major variables that affected farmers' extent of market participation were farm size, value of haricot bean produced, access to input supply and access to credit.

Recommendations

Given that access to market information significantly influenced haricot bean market participation, it is crucial to work on the improvement of farmers' access to market information, so as to improve their income. There are different ways of improving producer's access to market information such as strengthening farmer contacts with development agents, through radio and through different posts.

It is also important to strengthen the established cooperatives and establishing more cooperatives in the district, especially around the two KA (Semen Shershera and Dirama), would also encourage market participation by farmers.

Membership to organization was found to affect participation decision of farmers negatively and this is may be because the organizations that were operating in the district were weak. Therefore, it is important to strengthen the farmer's organization in the district in order to improve farmer's knowledge and access to different market information and agricultural inputs. Lastly, it is evident that access to credit positively influenced both the haricot bean market participation decision and the extent of participation. Therefore, it is very important to provide credit access for producers by establishing more microfinance or any other credit services in the study area.

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