Determinants of smallholder farmers' participation in sesame production: Evidence from Diga, Ethiopia

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Abstract: Considering that agriculture remains a key sector in Ethiopia, commercialization of the sector necessitates improving participation of smallholder farmers in markets, hence improving their incomes and livelihoods. Promoting smallholder commercialization through cash crop production is one avenue of such efforts. The main argument for smallholder commercialization through cash crop production is that it can allow households to increase their income directly. Sesame in Ethiopia can be taken as a good example in this regard. Although Diga has a potential land and the area is among the few areas which are agro-ecologically suitable for sesame production and productivity in the country, smallholder farmers are not participating actively in its production (constrained by a number of factors). This study assesses factors determining smallholders' participation in sesame production in Diga, West Ethiopia. Using structured questionnaires, the data was collected from a random sample of 120 smallholder farmers and analysed by using a double hurdle approach. After all, this study highlighted that access to credit, farm landholding size, family labour, household assets (oxen, donkey), access to family food for the whole year and proximity to extension service centres significantly influence smallholders' decision probability of participating in sesame production. On the other hand, access to credit, number of oxen owned and number of active family labour significantly determine the level of smallholders' participation in sesame production. The implication is that production potential due to favourable agro-ecological condition is necessary but not sufficient for smallholder farmers to participation in sesame production. Indicating household specific and institutional factors also influence their decision. Thus, if active participation of smallholder farmer is required in the field, institutional innovations should be developed and strengthened—in a way to involve all smallholder farmers.

Media grab: In addition to rainwater, other internal and external factors influence smallholder's decision to change the available sesame production potentials and opportunities into livelihood advantages

Introduction and background of the study

In Ethiopia, smallholder agriculture represent about 95% of the total agricultural output. In addition to producing staple crops, smallholders produce large share of export potential crops such as sesame. Sesame is an important crop to Ethiopian agriculture, it is quite extensively cultivated and it yields in relatively poor climatic conditions. In the recent years, it is an important component of Ethiopia's agricultural exports. Different reports indicate that Ethiopia is among the top-five sesame producing countries in the world, ranked in fourth place in 2011/2012 (FAOSTAT 2012). As a smallholder farmer's crop and an export potential crop, it is an opportunity for smallholder farmers to produce sesame and change the available potential into the livelihood improvement.

However, in addition to the limited availability of agro-ecologically suitable areas for sesame production and productivity in the country,[6] smallholder farmers' production and marketing participation did not match the available potential. The extent of cultivation is poorly known and there is little information on yields or productivity in the country. That is, even in areas where the agro-ecology is favourable for sesame production, smallholder farmers' participation is far below the available potential. For example, in Diga *woreda* (part of East Wellega), there is suitable agronomic conditions for growing sesame and there is high potential arable land to do so. This is an opportunity for smallholder farmers in this area, since sesame is an export potential cash crop with high demand and price at both local and international markets. Despite the available potentials and opportunities, many smallholder farmers are not participating in its production and marketing in this area. Currently only about 29% of the potential arable land was cultivated under sesame in this area. This indicates that there are external and internal (household specific) factors that constrain some households from participation in the activity. In addition, the extent to which the participant farmers participate varies significantly and the overall participation is incomparable with the available potential. Due to these factors, smallholder farmers in Diga *woreda* are differently responding to the available potential and thus obtain different welfare benefits from the available opportunities.

Based on this statement, certain key questions became relevant: What factors, other than agro-ecology influence smallholder farmer's participation decision to produce sesame in Diga? What factors determine the level of production participation in this area? The objective of the current paper is to address the foregoing questions, among others. Specifically, the paper is intended to assess the determinants of smallholder farmer's participation decision in sesame production, taking Diga as case study. In addition, the paper tries to identify factors influencing the extent of smallholders' participation in sesame production.

The study settings

Study area and data sources

This study is based on primary data collected from 120 farm household heads randomly selected from Diga district, part of East Wellega, Oromia Regional State. Diga is located in southwest of Blue Nile basin. Agro-ecologically, the district is divided into two; namely midland which comprises about 40% and lowlands accounting for the remaining 60% .The area is one of the major sesame producing areas in Ethiopia, known for the production of high oil content sesame. Though seasonal water scarcity during the dry seasons is a problem, the area receives high amount mono-modal rainfall from mid-March through September. Mixed crop–livestock farming system is the common livelihood strategy of the community. Crop production is primarily characterized by rainfed system. Thus, the performance of the sector and the overall livelihood of the populations in this area are highly dependent on the time onset, duration and amount of rainfall. This implies that livelihood strategy in the area should focus on rainfed crops like sesame if encouraging and linking smallholder farmers to market as a pathway to come out of poverty in the area is required.

Method of analysis

Double-hurdle model was employed to analyse the above discussed farm household decision problem. This model assumes farmers faced with two hurdles in any agricultural decision-making processes (Sanchez 2005; Humphreys 2010). Accordingly, the decision to participate in an activity is made first and then the decision regarding the level of participation in the activity follows. In this study, thus, double-hurdle model was chosen because it allows for the distinction between the determinants of production participation and the level of participation in sesame production in two separate decisions. Double hurdle estimation procedure involves running a probit regression to identify factors affecting the decision to participate in the activity using all sample population in the first stage and a truncated regression model on the participating households to analyse factors affecting their of level of production participation, in the second stage.

6.*While there is some potential to grow sesame in different parts of the country, its production is mainly concentrated in the northern and northwestern regions of Ethiopia—Humera, Metema and East Wellega (ECX 2010).*

Results and discussion

Determinants of sesame production participation decisions (Probit regression)

Table (1) presents factors influencing smallholders' probability decision to participate in sesame production. Eleven variables were considered and regressed as explanatory variables in influencing decision probability of farmers in this regard. The regression result revealed that farm landholding size is one of the determinant factors in influencing decision of farmers to produce sesame in Diga. The findings by Poulton et al. suggests that land is an important factor in influencing farmer's decision to produce any cash crop (Poulton et al. 2001), hence support the current finding.

Table 1. Probit regression, reporting marginal effects (Probit Regression Result)

Prodpart (D.V.)	Coefficients	Robust S.E.	Z-value
Age of hh head	0.0000284	0.0000905	0.54
Education level	0.129457	0.626501	0.69
Family labour	0.0009162**	0.0021514	2.07
Land size	0.0069887***	0.0160255	3.08
Number of oxen	0.0014022***	0.0033945	2.88
Number of donkey	0.0013355**	0.0032398	2.06
Non-farm income	0.0686414	0.001387	1.34
Access to credit	0.0075744**	0.0163355	2.39
Access to family food	0.0133033**	0.0287685	2.69
Distance to extension	−0.0000356*	0.0000832	−1.91
Distance to market	−7.35e–06	0.0000202	−0.83
Obs. P 0.7583333			
Pred. P⏐ 0.9995549 (at x-bar)	Number of obs = 120		
Wald chi^2 (9) = 24.62	Prob > chi^2 = 0.0000		
Log pseudo likelihood = −12.431611	Pseudo R^2 = 0.8127		
NB: (^) dF/dx is for discrete change of dummy variable from 0 to 1			

z-value correspond to the test of the underlying coefficient being 0 and thus
*, ** and *** indicates significance of the coefficients at 10%, 5% and 1% levels, respectively.
Source: survey estimation result 2012.

In addition, this result revealed that family labour is one of the critical variables in influencing decisions of households to produce sesame in the study area, ceteris paribus. Thus, farmers who have more access to family labour are more likely to participate in such activity. The possible reason is that labour markets are highly imperfect in this area while sesame productions—from land preparation to its harvest—require labour and lack of such access has a great impact on farmer's decision to produce the crop. This indicates that farmers who have access to more family labour are likely to produce sesame under ceteris paribus assumption.

Furthermore, access to credit is one possible solution for such related problems. These farmers reported that, even if they have access to labour from market, they lack cash to hire that labour. Based on the result, we obtained the evidence that support such positive linkage between access to credit and probability to produce such export potential cash crop—sesame. This result indicates that access to credit is an important factor in influencing the probability of participation in sesame production. Access to household assets such as oxen and donkey also determines the probability of farmers' decision to produce sesame significantly. Thus, these two household assets are among the factors that influence farmers' decision to produce sesame in the study area.

Determinants of the level of sesame production participation

This section focuses on analysing factors affecting farmers' participation decision in sesame production by employing a truncated regression model. The regression result indicates that the estimated coefficient of three variables found to be statistically significant in determining the size of land allocated to sesame production.

As the case of production decision, the survey result revealed that farmers' access to credit reflects positive and statistically significant impact on the level of sesame production participation. This implies again that smallholders' access to credit is one of the major factors in determining the extent of land allocated to sesame production, in

addition to influencing their decision to produce the crop. In addition, the finding by Burke suggests that credit prevalence is an important determinant factor in all stages of the farmer's production and marketing decisions (Burke 2009). Furthermore, the number of active family labour significantly and positively determines the extent of smallholder's participation in sesame production. Thus, the number of active family labour is among the significant factor explaining farmers' decision regarding the extent of sesame production participation in the study area.

Table 2. Determinants of the extent of sesame production participation (Truncated regression)

Cultivated land (dependent variable)	Coefficients	R.S.E.	t-value
Sex of hh head (SEX)	0.0739903	0.0738267	1.00
Number of active family labour (FAMLAB)	0.0984799***	0.0317001	3.11
Total land size (TLS)	0.0955035	0.0708308	1.35
Access to non-farm activity (NONFRM)	−0.0628714	0.016872	−0.62
Number of oxen owned (OXEN)	0.0564588*	0.0312789	1.81
Access to credit (CRDT)	0.2072571**	0.076324	2.72
Educational level of hh head (EDCN)	0.0177086	0.0144058	1.23
Sesame production problems (PROBLEM)	−0.0502468	0.060166	−0.47
Constant	−0.0833815	0.633525	−0.51
Wald chi^2 (8) = 85.19 Prob > chi^2 = 0.0000 Log pseudo likelihood = −106.78			

*, ** and *** indicates significance of the coefficients at 10%, 5% and 1% levels, respectively.
Source: author computation 2012.

This study also gives evidence that shows the number of oxen owned has a positive and significant impact on the level of sesame produced by sampled farmers. The result from this regression, coupled with result obtained from the previous probit regression, confirms the key role of having more oxen in sesame production participation in the study area.

Conclusion and recommendations

 A key premise of smallholder commercialization as a development agenda is that markets provide increased incomes to households who are able to maximize the returns to land and labour through market opportunities. Promoting smallholder commercializing through cash crop production is one avenue of such efforts. This study assesses factors determining smallholders' participation in sesame production in Diga, West Ethiopia. This study highlighted that access to credit, farm landholding size, family labour, household assets (oxen, donkey), access to family food for the whole year and proximity to extension service centres significantly influence smallholders' decision probability of participating in sesame production. On the other hand, access to credit, number of oxen owned and number of active family labour significantly determine the level of smallholders' participation in sesame production. The implication is that production potential due to favourable agro-ecological condition is necessary but not sufficient for smallholder farmers to participation in sesame production. Indicating household specific and institutional factors also influence their decision. Thus, if active participation of smallholder farmer is required in the field, institutional innovations should be developed and strengthened,—in a way to involve all smallholder farmers.

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