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Full Length Research Paper

Determinants of income diversification among rural households: The case of smallholder farmers in Fedis district, Eastern hararghe zone, Ethiopia

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This paper examines the determinants of income diversification among rural households using cross sectional data collected from Fedis District of Eastern Hararghe Zone, Ethiopia. Both descriptive statistics and rigorous econometric models are used to analyze the data. Multinomial logit model was used to pinpoint factors influencing households' participation in non/off-farm activities while the determinants of non/off-farm income were analyzed by Tobit model. The descriptive statistics result shows that agricultural activities are the most important source of income for rural households in Fedis District contributing 77% of total household income with the remaining 23% originating from non-agricultural activities. About 84% of the sample households involved in non/off-farm activities and only 16% did not participate in any non/off-farm activity. Participation in non/off-farm employment activities and the level of income derived are found to be influenced by human capital related variables (gender and age of household head, number of economically active family members, education level of household head and presence of children attending school), livelihood assets (livestock holding, size of cultivated land), livelihood diversifying strategy (crop based diversification through number of crops grown and harvested) and infrastructure related variable (proximity to market). The results imply that these factors need to be considered by policy makers in the planning of agricultural and non agricultural initiatives in this study area.

Key words: Smallholder, livelihood diversification, participation decision, household income, determinants of economic choices, Ethiopia.

INTRODUCTION

In Ethiopia, the policy focus is to increase agricultural productivity and farm income so as to attain food self sufficiency at a national, regional and household levels. While substantial resources have been spent on agricultural research and extension to alleviate food shortage in the nation, research and extension activities have not been done adequately on the issues related to off/non-farm employment.

Despite this fact, farmers are engaged in a variety of off/non-farm activities to diversify their income with a view to feed and sustain themselves during crop failures. The main question and concerns of policy makers is to make sure whether or not it is possible to support farmers to engage in off/non-farm activities without sacrificing the farm productivity and food self sufficiency objectives. Hence, looking into the link between farm and non/off-farm activities and their determinants is necessary before policy measures are taken to promote non/off-farm activities (Tassew, 2000). In view of these outstanding issues, various empirical studies have pinpointed the socio-economic rationale of rural livelihoods for pursuing differentiated and contextual livelihood strategies.

According to Ellis (2000), participation in multiple activities by farm families is not new or only confined to

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the rural sectors of developing countries. Most rural families have truly multiple income sources which may indeed include off-farm wage work in agriculture and wage from non-farm activities, rural non-farm self employment (e.g. trading), and remittances from urban areas and from abroad.

In assessing diversification strategies of households, Barrett et al. (2005) and Reardon et al. (2001) indicate that because of differences in initial asset endowments, rich and poor households diversify differently. The rich typically engage in more capital intensive and more remunerative activities, while leaving the poor confined to labour intensive, highly contested niches with low barrier to entry and low returns. Wealthier households often mention "profit maximization" as their motive for entering in to rural non-farm activities, whereas lower income households emphasize "risk minimization" and "income stabilization". Poorer households have a high incentive but a low capacity to diversify successfully, even if in some cases they rely more on non-farm activity in percentage terms.

Hoogeveen (2001) and Sumberg et al. (2004) also argue that most attractive non/off-farm employment opportunities have the highest entry barriers and that the poor, who have fewer buffer stocks, less access to credit and greater interest in risk management strategies, are often not able to access the safest and most rewarding income opportunities because of entry barriers. Richer people thus have greater freedom to choose among a wider range of non-farm options than do the poor. On the other hand, the poor have little choice when diversifying out of farming: they go in to unskilled off-farm labour and other activities with low barriers and therefore generally poor returns.

Barrett and Reardon (2000), based on review of 27 case studies in Africa, showed that the average share of non-farm income in total rural household income is around 45% with non-farm wage labor income exceeding self-employment income; and non-farm earnings are substantially greater than either agricultural wage employment earnings or migration earnings.

In Latin America, Deininger and Olinto (2001) showed that in the Colombian case, non-farm income contributes between 30 to 40% of total household income. Escobal (2001) shows that about 51% of the net income of Peruvian rural households comes from off-farm activities while in Mexico, off-farm activities generate more than half of farm households' incomes.

Despite the fact that agriculture is the main source of livelihood in rural Ethiopia, farmers are engaged in a variety of off/non-farm activities to diversify their income and enable them cope with the risk of crop failures. However, there is a wide difference between literatures regarding the share of non/off-farm income in total household income in Ethiopia. Barrett and Reardon (2000) reported that the share of non/off-farm income in rural Ethiopia averaged about 36% in 1989/90. On the other hand, Reardon et al. (2006) found that non/off-farm share of total income in rural Ethiopia was about 20% in 1999 fiscal year. Despite the differences in the percentage of income share derived from non-farm employment, the role of non-farm income in total household income is significant. Sara (2007) found that about 75% of rural households engage in off-farm activities and approximately 31% of their livelihood income is generated from off-farm employment indicating that income from farming is not sufficient to support the household economy. The working hypothesis of this study is that motivation for and participation in livelihood diversification strategies is contextually varied.

Thus, this present study tries to explore the determinants of income diversification among rural households in one of the most drought risk prone districts in eastern Ethiopia. This study attempts to address the following questions. What are the types and characteristics of non/off-farm activities existing in this study area? What inspires participation in rural non/off-farm activities? What contributes to the variation in non/off-farm income level of households?

DATA AND SAMPLING DESIGN

This study is conducted in Fedis district of Eastern Hararghe Zone of Oromia National Regional State in Ethiopia. Fedis, one of the 18 districts of East Hararghe Zone, is among the food insecure districts of the Zone where rain-fed agriculture is the mainstay of the local economy. A simplified formula provided by Yamane (1967) is employed to determine the required sample size. Data for the study was collected from 120 sample households residing in four farmers' associations (*'kebeles')* using structured questionnaire. Sample households were selected using a two-stage random sampling technique. In the first stage, four farmers' associations were randomly selected out of the 19 farmers' associations of Fedis district. In the second stage, using the fresh household list obtained from each sampled farmers' association, households were classified into participant and non-participant categories. Data collected by field personnel of International Committee for the Development of People (CISP) during the 2009/2010 production year had been utilized as an input in the stratification process. Then sample households were randomly selected from each category with probability proportional to size (PPS).

Method of analysis

This study intended to identify the determinants of households' participation into non/off-farm activities using multinomial logistic regression model with a particular interest to explore factors influencing households' choices between varying income diversifying activities. This study also analyzed factors contributing to variations in participating households' income. To this effect, Tobit model is used to understand why some households were able to derive better/lower income from specific non/off-farm activities than others. The characteristics of multiple non/off-farm activities in this study area were explored using the different techniques of descriptive statistics. Following the work of Tassew and Oskam (2001), the multinomial logit model can be specified as follows:

Let U_{ij} denote the utility that the household í gets from choosing alternative activity j and

$$U_{ij} = u_{ij} + e_{ij} = X_{ij}\gamma_j + e_{ij} \quad (1)$$

Where γ_j varies and X_i remains constant across alternatives; and e_{ij} is a random disturbance term reflecting intrinsically random choice behavior, measurement or specification error and unobserved attributes of alternatives.

Let also $P_{ij\,(j=0,1,2,3)}$ denote the probability associated with the off/non-farm activities choices of household í with; $j = 0$ if the household does not participate in non/off-farm work, $j = 1$ if the household participates in non/off-farm wage employment, $j = 2$ if the household participates in non/off-farm self employment, and $j = 3$ if the household participates in both non/off-farm wage and self employment.

Then the multinomial logit model can be given by:

$$P_{ij} = \frac{\exp(X_i\gamma_j)}{\sum_{j=0}^{3}\exp(X_i\gamma_j)} \quad . \quad (2)$$

Setting $\gamma_0 = 0$, the multinomial logit model can be written as:

$$P_{ij} = \frac{\exp(X_i'\gamma_j)}{1+\sum_{i=1}^{3}\exp(X_i'\gamma_j)}(j = 1,2,3) and\ P_{i0} = \frac{1}{1+\sum_{j=1}^{3}\exp(X_i'\gamma_j)} \quad . \quad (3)$$

This can be estimated using the maximum likelihood method;

Similarly, Based on Sesabo and Tol (2005), the Tobit model can be specified as follows:

$$y_i^* = X_i'\beta' + \varepsilon_i'$$

For a Tobit model, the dependent variable (activity income) can take the value of zero or positive values as follows:

$$y_i = y_i^{0} \text{ if } X_i'\beta' + \varepsilon_i' > 0 \text{ and } y_i = 0 \text{ if } X_i'\beta' + \varepsilon_i' \leq 0 \quad (4)$$

Where y_i^* is a latent dependent variable that captures the i^{th} household propensity to earn income from a certain source, X_i' is a matrix of variables such as household asset endowments, household characteristics, institutions and location characteristics, which describe the potential benefits of participating in various activities, β' is a parameter vector to be estimated, ε_Ω is a random disturbance term. The model assumes that $\varepsilon_\Omega \sim N(0,\sigma)$.

The coefficients of activity income are estimated by the maximum likelihood estimation and the log-likelihood function for the Tobit model is expressed as follows:

$$\ln L = \sum_{y_i>0} -1/2\left[\ln(2\pi) + ln\sigma^2 + \frac{(y_i - \beta'X)^2}{\sigma^2}\right] + \sum_{y_i=0} ln\left[1 - \Phi\left(\frac{\beta'X}{\sigma}\right)\right] \quad (5)$$

Where, Φ is the Cumulative Density Function (CDF) of the standard normal distribution function; Here the first part of the likelihood function is essentially the classical regression model for the non-zero observations, while the second half represents the probabilities for the censored observations. The maximum likelihood estimator has the desirable properties for being both consistent and asymptotically efficient (Greene, 2003; Sesabo and Tol, 2005).

The explanatory variables used for the analyses are grouped into household demographic characteristics, assets and mediating factors. The demographic characteristics include age, sex, and family size and number of economically active family members. The asset variables include size of cultivated land, livestock wealth, education of household head and number of children attending school. Mediating factors include variables such as perceived quality of land, number of crops harvested per year, access to credit, proximity to market and agro-ecology in which rural households make and earn their livelihoods.

RESULTS AND DISCUSSION

Descriptive statistics

The descriptive statistics results show that 84% of sample households have participated in non/off-farm activities while 16% did not engage in any form of non/off-farm employment and their sole employment was only farming. Of the total sample households, about 86% were male and 14% were female headed households. From the group of participants, 58% of sample households involved in sole wage employment, 12% in self employment and 30% in both self and wage employment activities. Non/off-farm employment income contributed to about 23% of total household income of participants. Of those participating in non/off-farm wage employment, 70, 16 and 14% were involving in the government productive safety net program (PSNP), agricultural daily wage and other casual non/off-farm wage activities, respectively.

Determinants of participation in non/off-farm activities

The result of multinomial logit model showed that there is disparity in the effect of explanatory variables on participation decision of households in non/off-farm wage and self employment activities. Sex, age and education of household head, number of economically active family members, and number of children attending school significantly affected participation into wage employment activities. Whereas participation in non/off-farm self employment was significantly influenced by sex, age, education of household head, number of economically active family members, distance to market, livestock holding and crop based diversification strategy, that is, number of crops grown and harvested in a season. Similarly, the variables: sex, age, education, number of economically active family members, distance to market and livestock holding have significantly influenced participation in multiple self-wage employment activities.

The age of household head has significantly and

Table 1. Multinomial Logit estimation result of determinants of participation.

Variable	Non/off-farm wage employment		Non/off-farm self employment		Non/off-farm wage + self employment	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
Intercept	0.6279	0.5430	0.0703	0.9189	0.7621	0.8703
Age	-0.2486	-3.0271***	-0.2377	-2.3485**	-0.2753	-3.0725***
Sex	4.5047	3.3780***	3.1444	2.2431**	3.6672	2.6894***
Family size	0.4059	0.7649	0.0049	0.1886	0.7164	1.2490
Education	-2.4452	-2.7692***	0.0091	2.1802**	2.5173	2.4069**
Ec. active members	3.3062	2.3551**	3.0583	2.0593**	2.0558	2.8960**
Children in school	-2.2489	-2.2800**	1.7879	2.6120***	2.6204	1.2584
Credit amount	0.1305	0.9807	0.0733	0.9981	0.1326	0.8961
Cultivated land	3.5584	0.7492	2.7342	0.6174	0.5081	0.9946
Livestock holding	1.6658	1.6315	0.5402	2.2447**	1.5748	2.4512**
Number of crops	0.2329	0.0647	-0.9521	-2.1078**	0.5622	1.2221
Distance to market	-0.8459	-1.7544	-1.2668	-2.0476**	-1.0654	-2.7081***
Agro-ecology	-3.1444	-1.4928	0.8914	0.4633	1.0970	0.0753
Soil fertility	-0.6098	-0.5264	1.0069	0.6334	0.6706	0.6372

***, **and * indicate statistical significance at 1, 5 and 10% probability levels, respectively. Dependent variable: Participation. Weighting variable: one; Number of observations: 120; Log likelihood = - 79.66; Restricted log likelihood = -117.67; Chi-square = 105.62.

negatively affected participation in sole wage, self employment and multiple self-wage employment activities at 1, 5 and 1% levels of significance, respectively (Table 1). This implies that supply of labor to sole and combined non/off-farm employment activities was higher for younger households than older households. Hence, younger households rely on non/off-farm employment to support their livelihoods while the older ones concentrate on farming instead of opting for engagement in non/off-farm work. Existence of entry barriers and lack of *a priori* exposure might be the push factors for the elderly, while shortage of arable land and ability to meet graduation requirements are the pull factors, for the rural youth.

Sex of household head became a significant and positive determinant of participation in non/off-farm wage, self and mixed self-wage employment activities at 1, 5 and 1% levels of significance, respectively revealing that the male headed households were able to participate in all non/off-farm employment activities compared to female headed households.

The presence of large number of economically active members in the household has a significant and positive influence on participation in all the three forms of non/off-farm activities (wage, self and mixed employment) at 5% significance level in agreement with *a priori* expectations. A possible explanation is that households with abundant economically active and working age members could participate in non/off-farm employment activities with a view to generate more income by absorbing the available extra labor force from the farm work. Educational level of household head is found to significantly and negatively affect participation in non/off-farm wage employment at 1% significance level while this variable influences participation in sole self and multiple self -wage employment opportunities significantly and positively at 5% significance level.

It is understood through this research that number of children attending school do significantly and negatively affect the households' participation in wage employment at 5% significance level but its effect on non/off-farm self employment participation is significant and positive at 1% level. The interpretation could be that households with more number of children going to school have high probability and preference to participate into self employment activities than the wage employment activities weighed against households with no or small number of children in school.

Distance to the main market center appears to determine participation into non/off-farm self employment and mixed self-wage activities significantly and negatively at 5 and 1% levels of significance, respectively while its influence on participation in wage employment activities is insignificant. The possible reasons for obtained results might be the following. Since most of the wage employment activities are dominated by the Government rationing productive safety net program (PSNP) public works, which are carried out within the vicinity of the villages, participants may not be obliged to travel to far distant areas to access and undertake safety net public works. Conversely, farmers residing at far distant locations from market centers are less likely to participate in non/off-farm self employment and the mixed self-wage activities.

The multinomial logistic regression analysis result also

showed that the livestock holding significantly and positively influence participation in sole self and mixed self-wage activities at 5% level of significance. Households with more livestock holding do have the capacity to participate in lucrative non/off-farm employment activities, putting them in a better position than those households with no or small size livestock holding.

The insignificant effect of livestock ownership on participation into wage employment could be attributed to the fact that households with no or small livestock holding are pushed towards the less rewarding wage employment activities like the Government rationing programs (PSNP) in which the resource poor households are targeted.

The number of crops grown and harvested per year which can be taken as a proxy for temporal diversification has a statistically significant and negative effect on participation in non/off-farm self employment activities at 5% significance level. But this variable appears to be insignificant with regard to sole wage and mixed self-wage employment activities participation. The result confirms the argument that farmers who cultivate diverse crops are less likely to participate in non/off-farm activities. A possible explanation is that such farmers devote more of their time to farm operation to sustain their livelihoods.

Censored regression results of determinants of non/off-farm income

Non/off-farm income is calculated as income derived from a certain non/off-farm activity as the result of participation of the household into the specific income diversifying activity. Tobit model was applied for the analysis of determinants of non/off-farm activity income using

LIMDEP 7.0 software package and the parameter estimation were done through MLE procedure. Tobit model was applied because of its superiority in identifying the intensity of explanatory variables on non/off-farm self and wage employment incomes of participant households.

Non/off-farm self employment income

The Tobit model result showed that the variables age, sex and education of household head, number of economically active family members, size of cultivated land, number of crops grown and harvested, livestock holding and distance to market have statistically significant effects on off-farm self employment income.

Sex of the household head has significantly and positively affected off-farm self employment income at 5% level of significance revealing that male household heads earned more income than the female headed ones. Thus the male headed households have obtained better self employment income because of their ability to access more lucrative non/off-farm self employment activities than the female headed households.

The number of economically active family members in the household had also significantly and positively influenced non/off-farm self employment income at 1% significance level. The positive relationship indicates that as the number of working age family members increases, the probability of the household to earn non/off-farm self employment income also increases. This could mean that households with large economically active labour force were able to participate in different self employment activities and earn more income compared to households with small number of working labour force.

Size of cultivated land operated by the household had significant and positive effect on non/off-farm self employment income at 1% probability level. Though result obtained from multinomial logit analysis hinted that size of cultivated land does not significantly affect participation, the Tobit analysis revealed that, for participant households, non/off-farm self employment income is significantly and positively influenced by the size of cultivated land. The justification for this finding could be that farmers who cultivate large area of plots have the capacity to produce more and that would enable them to accumulate startup capital for participation in non/off-farm self employment.

Education level of household head was a significant and positive determinant of non/off-farm self employment income at 5% significance level (Table 2). It is presumed that household heads with formal education are better in their perceptive values, knowledge and decision making ability to participate into rewarding self employment activities and earn better income than the illiterate households. The size of livestock holding measured in TLU per sample household is found to be the significant and positive determinant of off-farm self employment income at 5% level of significance. Households owning large livestock holding have the capacity to accumulate capital and overcome cash constraints for participation and obtain non/off-farm self employment income as compared to those households with small or no livestock holding. Age of the household head has a significant and negative relation with non/off-farm self employment income at 1% level of significance, indicating that as age increases the likelihood of obtaining non/off-farm self employment income declines. Results show that younger heads of households could obtain more income from non/off-farm self employment compared to their older fellow farmers. Ageing heads of households concentrate and devote more of their time on farm operation instead of searching for income diversifying non/off-farm activities.

The effect of number of crops grown and harvested (temporal crop based diversification strategy pursued) is significantly and negatively related to non/off-farm self employment income at 1% significance level implying that

Table 2. Tobit Maximum Likelihood estimates of determinants of off-farm employment incomes.

Variable	Non/off-farm wage employment income		Non/off-farm self employment income		Non/ off-farm wage + self employment income	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
Intercept	0.6279	1.5430	0.0703	1.9189*	0.4700	1.2365
Age	-0.0034	-2.4720**	0.0051	-7.4721***	-0.0232	-3.2457***
Sex	-0.0922	-2.7512***	0.0204	2.5014**	0.0085	2.3021**
Family size	0.0022	0.8111	0.0203	1.0112	0.0742	1.2540
Education	-0.0489	-2.6325***	0.0339	2.2783**	0.0066	2.4953**
Ec. active members	0.0642	2.4305**	0.0227	2.8112***	0.0455	3.2052***
Children in school	-0.0112	-2.2423**	0.0355	1.1163	0.0321	1.2541
Credit amount	0.0056	0.1837	0.0005	0.0811	0.0029	0.9624
Cultivated land	-0.0357	-1.9814*	0.0697	4.4551***	0.0015	2.3215**
Livestock holding	-0.0074	-1.3822	0.0049	2.5009**	0.0094	1.6355
Number of crops	0.0108	-1.0782	0.0477	-5.7195***	-0.0028	-1.4126
Distance to market	-0.0086	-1.0155	0.0210	-3.5742***	-0.0245	-2.8743***
Agro-ecology	-0.0004	-1.0046	0.0014	0.6633	0.0038	1.0214
Soil fertility	-0.0098	-1.0991	0.0069	0.5334	0.0071	0.6427

*, **and *** indicate statistical significance at 10, 5 and 1% probability levels, respectively. Dependent variable: Activity income; Threshold values for the model: lower = 0 and upper = +infinity; Weighting variable: one; Number of observations: 120; Log likelihood for self employment income: -73.15; Log likelihood for wage employment income: - 49.78; Log likelihood for wage + self employment income: -88.51.

farmers who decide to diversify the cropping system have less probability of obtaining self employment income as they invest more time on their farm work in order to ensure food availability for their household.

Distance to market influences non/off-farm self employment income significantly and negatively. The negative sign, at conventional level of significance, shows that as the distance from homestead to market center increases, the likelihood of the household to earn non/off-farm self employment income declines. The implication is that households residing far from market centers have less probability to access and participate into opportunistic non/off-farm self employment activities.

Non/off-farm wage employment income

Non/off-farm self employment income is significantly influenced by age and sex of household heads, number of economically active family members, education, number of children in school and size of cultivated land. In agreement to the result obtained in analyzing self employment income, age of the household head is found to be significantly and negatively affecting non/off-farm wage employment income at 5% level of significance which showed that as age increases, the intensity of non/off-farm wage employment income decreases (Table 2). Thus, the result reveals that younger household heads derived more wage employment income compared to their older fellow farmers. The findings of Mohammed (2008) and Sosina et al. (2009) is similar to our result, while Escobal (2001) reported that age is not significant determining factor of off-farm wage employment income.

The Tobit analysis also yielded that sex of household head has a significant and negative relationship with non/off-farm wage employment income at 1% level of significance indicating that male headed households were able to generate better income from non/off-farm wage employment compared to female headed households. As the wage employment activities are physically demanding and less preferable to women, the likelihood of their participation in income diversifying livelihood strategies is minimal.

The number of economically active members has significant and positive relationship with non/off-farm wage employment income, as expected. The presence of large number of economically active members in the household improves the capacity and ability of household to participate in different income earning activities such as non/off-farm wage employment.

The effect of education of household head on non/off-farm wage employment income is found to be significant and negative at 1% level of significance (Table 2) showing disparity on the effect of education between self employment (positively related) and wage employment incomes. The result shows that heads of households with little formal education, the probability and willingness to search for wage labour may be low as they are pulled towards the more profitable non/off-farm self employment activities. Hence, the illiterate heads of households are mostly pushed to the less attractive wage employment activities. De Janvry and Sadoulet (2001), in their study

conducted in Latin America, reported that education has no role to play on agricultural wage employment income but it was a key factor in determining the income level derived from the more remunerative off-farm self employment activities.

Number of children attending formal school is also a significant and negative determining factor for non/off-farm wage employment income at 5% level of significance (Table 2). Households who have more children in school have less preference to participate and obtain income from non/off-farm wage employment activities. A possible explanation is that such households might opt to involve in self employment activities than wage employment activities to supplement their on-farm income.

The effect of size of cultivated land on non/off-farm wage employment income is also significant and negative at 10% significance level. The result shows that cultivation of more land increases households' crop production level and hence better cash for investing in self employment activities which tends to reduce the willingness to search for and participate in less remunerating daily wage activities.

Non/off-farm wage + self employment income

Determinants of multiple non/off-farm self-wage employment income were analyzed by employing Tobit model. The income from the combined non/off-farm self + wage employment activity was significantly influenced by age and sex of household heads, number of economically active family members, education, size of cultivated land and distance to the nearest market center.

The age of the household head has significantly and negatively affected non/off-farm self + wage employment income at 1% level of significance showing that as age increases, the level of non/off-farm self-wage employment income decreases (Table 2). The result reveals that younger household heads derived more non/off-farm wage with self employment income as compared to the older farmers.

The sex of household head has significantly and positively influenced non/off-farm (wage + self) employment income at 5% level of significance indicating that it was the male headed households who were able to generate better income from the multiple non/off-farm self and wage employment activities than the female headed households. As women have less access to different non/off-farm activities due to different factors such as cultural, religious and financial constraints, the likelihood of their participation and/or income level derived from such mixed income diversifying livelihood strategies is less.

The effect of educational attainment of household heads on the multiple non/off-farm self and wage employment income is found to be significant and positive at 5% level of significance (Table 2). The result confirms that households with formal education had the possibility and capacity to participate into both wage and self employment activities than the households with no formal education. Based on this result, one may argue that literate households have willingness and knowledge to participate in multiple non/off-farm self and wage employment activities as compared to those households with no formal education.

The number of economically active members has significantly and positively influenced non/off-farm self + wage employment income. The presence of large number of economically active members in the household improves the capacity and ability of household to participate in multiple non/off-farm self and wage activities. This enables to generate better income than those households constrained by availability of working age family members. The result is similar to the analysis found with respect to the sole wage and self employment activities.

Distance to market has significantly and negatively affected non/off-farm self + wage employment income. The interpretation is that as the distance to reach the nearest market center increases, the probability of the household to participate in and generate income from multiple non/off-farm self and wage employment activities decreases. This could be attributed to the fact that households residing in the villages distant from market centers have less access and opportunity to engage in multiple self and wage employment activities.

The size of cultivated land was a significant and positive determinant of non/off-farm self with wage employment income at 5% significance level (Table 2). This means that farmers who cultivate more land have the capacity to obtain high level of crop production which might enable them generate capital for investment in multiple non/off-farm activities.

SUMMARY AND CONCLUSION

Study concluded in 2009 depicts that activities outside of the agricultural sector play an important role in this study area contributing about 23% of the total household income. In terms of participation, about 84% of sample households are participants of non/off-farm employment and of these households, 58% involved in sole wage employment, 12% in self employment and 30% were involved in both self and wage employment activities. The descriptive statistics result shows that from the wage employment participants, 70, 16 and 14% were participants of productive safety net program (PSNP), agricultural daily wage and other casual non/off-farm wage activities, respectively.

Econometric results obtained go somewhat towards establishing and clarifying relationships between various explaining variables and livelihood diversifying options.

Based on these results the following concluding remarks are made. Various human capital related variables (gender, education, number of children, number of economically active family members and age of household head) are found to be strongly associated with non/off farm income employment decisions. Age of household head has significantly and negatively affected participation in sole wage and self employment as well as the mixed self-wage employment activities implying that younger households rely on non/off-farm employment to support their livelihood. In contrary to this, ageing heads of households concentrate and devote more of their time on farm operation instead of searching for income diversifying off-farm activities.

Gender of household head and the number of economically active family members significantly and positively influenced households' participation in non/off-farm employment activities. This indicated that the male household heads and households with abundant working age members were more able to participate and derive income from sole wage, self employment and multiple self and wage employment activities. One policy implication is that entry barriers for female household heads and disadvantaged groups who are lacking working age family members to participate in non/off-farm activities need to be overcome.

Educational status of household head significantly and positively affected participation and income from sole non/off-farm self employment and mixed self and wage activities while its effect was significant and negative on participation and income that households derived from wage employment activities. This implies that household heads with formal education were found to have better information and knowledge to participate and earn better income from non/off-farm self and self with wage employment activities than the illiterate households. The negative effect of education on wage employment could be justified that due to lack of skill and knowhow, the illiterate households are mostly pushed to the less attractive wage employment activities. Therefore, efforts should be made in improving skill and knowledge of farmers through provision of training.

Number of children in school has significantly and negatively affected participation in off-farm wage employment activities but significantly and positively affected participation in sole self and self with wage employment activities. This implies that households with more number of children in school have low probability and preference to participate into wage employment activities compared to households with no or small number of children in school. Hence development efforts shall be made to the education sector in order to pave the ground for the rural people so that they access the opportunity to participate in the best paying self employment activities.

Infrastructure related variable is found also to determine participation in livelihood diversifying strategy.

Accordingly, travel distance to reach the main market center significantly and negatively affected participation and income level derived from non/off-farm employment activities. Here, it is mirrored that as the distance from homestead to market center increases, the likelihood of the household for participating and earning income from income diversifying activity declines. This is possibly because households residing far from market centers have less probability to access and participate into non/off-farm self employment activities. Therefore, the policy should give due emphasis for the development of rural infrastructure and improve transport services in the area.

Akin, crop based diversification strategy, that is, number of crops grown and harvested (temporally and spatially) is found to significantly and negatively influence income derived from non/off-farm employment activities. Farmers living in drought prone and risky areas like Fedis tend to cultivate diverse number of crops as a strategy to minimize the risk of staple crops failure and to maintain food availability. Hence supports to improve the farm production and income of farmers through provision of extension services, yield enhancing inputs should be a possible area of intervention to support rural households produce beyond the subsistence level.

Access to livelihood asset endowment such as livestock and arable land are found to affect involvement in rural non/off-farm sector. In line with this, number of livestock owned has a significant and positive influence on participation and income derived from sole self employment and multiple self and wage employment activities implying that households with more livestock holding had the capacity to participate and generate income from non/off-farm self and self-wage employment activities than those households with no or small livestock holding. More number of livestock ownership, particularly oxen, provides an opportunity for increased crop production and better capacity to generate capital needed for non/off-farm activity participation and thereby increased total household income. Livestock wealth is a key asset of rural livelihood in the districts like Fedis because livestock, particularly oxen, serve as means of draught power, source of capital and serve as prestige. Apart from these, livestock are source of food (animal products and by-products), enable farmers to absorb risks through disposal (destocking) and play a vital role in livelihood diversification (option). Hence the policy environment shall aim at supporting the livestock sub-sector development, in this study area.

The size of cultivated land significantly and positively influenced income obtained from self employment and self-wage employment activities while its effect was significant and negative with respect to off-farm wage employment income. The justification could be that farmers who cultivated large area of plots had the capacity to increase farm production and income which enabled them to accumulate startup capital for off-farm

self and self-wage employment participation which contributed to increased total household income than those households constrained by land shortage. The negative effect of size of cultivated land on wage employment income could be justified that households deriving better income from their farm operations are pulled towards self employment than the wage employment activities. The result shows that there are important complementarities between farm and off-farm activities suggesting for appropriate policy instruments that can actually serve both purposes.

This study result shows that despite the high level of participation in non/off-farm activities, the contribution of non/off-farm income to total household income is small compared to farm income. If success is to be achieved in terms of poverty reduction and food security, it is important to support both agricultural and non agricultural sectors. Factors deterring farmers' participation in lucrative non-farm activities need to be addressed through provision of training, credit, improving infrastructure and promotion of employment opportunities with emphasis of targeting the poor and women household heads.

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