

Assessing Determinant Factors of Income Diversification among Rural Farm Households in Ethiopia: The Case of Leemo and Anileemo Districts, Hadiya Zone, South Nation Nationalities People Region

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Abstract: *This study critically examine the determinants of income diversification and main income diversification sources among rural households in Leemo and AniLeemo Districts, Hadiya Zone of South Nation Nationality Regional State using primary data. Structured questionnaires administered through personal interviews. Both descriptive statistics and econometric methods were used to analyses the data. Descriptive result revealed that lion share income is obtained from farming activities. In this study we identified that rural farm household's income was basically grouped in to farm and non-farm income. Farm income sources constitutes: crop, livestock, other farm income source while nonfarm income constitutes agricultural wage, off-farm employment, nonfarm wage, self employed income sources, remittance (transfer payment) and petty trade. The simplest measure of income diversity was the average number of income sources (of the eight listed here) that households had. It was observed that rural households in the study area had an average of two sources of income. In Multiple regression model out of eleven explanatory variables included in the model, sex of household head, education level of household head, farm size, farm income and distance to market center were found significant in number of income diversification sources. While analysis of determinants of income diversification was done by logit regression model, in which probability of households' participation in off-farm activities were used as dependent variable. In this case years of schooling of household head, farm income, landholding size/farm size, member ship in farmers cooperative and distance to the market center were found significant. Hence, stakeholders who focus on promotion, encouragement and expansion of income diversification is expected to enhance educational level of household, to provide aids and subsidized inputs to improve agriculture which in turn increases farm income, to develop rural infrastructure, to create off-farm job opportunity and to take into consideration dwindling landholding size of households.*

Keywords: Determinants, Income diversification, off-farm, farm, Logit, Leemo and AniLeemo districts

1. Introduction

1.1. Background and Justification

Income diversification is the norm in rural societies, and specialization in a single activity is the exception (Dimova and Sen, 2010). It is argued that diversification smoothes the flow of household income, by diversifying risks. Thus, diversification of income sources is expected to generate higher income (Demissie, 2003). As Ellis (1998) and Maitra (2001) states, this is often necessary in agriculture based peasant economies because of numerous risks such as variability in soil quality, crop diseases, price shocks, unpredictable rainfall and other weather related events which lead to low income and continually trap them in a vicious cycle of poverty.

Rural households in many different contexts have been found to diversify their income sources, allowing them to spread risk and smoothen consumption over the year (Awoniyi and Salman, 2008). According to Davis *et al.*, (2010), one of the most established characteristics of rural households in developing countries is that they obtain their incomes from many different sources.

In recent years, there is low increasing recognition of the importance of income diversification for rural household in

our country, Ethiopia. Considering the dominance of the agrarian economy, ADLI (Agricultural Development Led Industrialization), the government's principal strategy for sustainable economic growth, focuses on the development of the rural sector. An important aspect of ADLI is to promote the rural non-farm sector and enable it to interact with agriculture. The main view of ADLI is that agricultural growth, based on technological advancement, leads to indirect growth in non-farm incomes and employment through processing, marketing and transporting services (Demissie, 2003). Therefore, diversification to non-farm activities is often seen as an opportunity to supplement or substitute farm income, or as an option for those not able or willing to earn their living from farm sources.

Finally, according to Murdoch (1995), households that engaged in different activities collect their income and wealth from diverse sources and assets. As income smoothening mechanism, income diversification plays an important role in smoothing consumptions when markets for full consumption insurance are absent. However, income diversification is determined by different factors. So that, in this study, the researcher will assess/examine the determinants of income diversification for a survey of rural households in the two districts (Lemo and Anilemo District (L and ALD) for the year 2007/2014. Furthermore, the researchers will look at what characterizes behavior of the

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survey drive household diversification patterns, identifying the main sources of income diversification and household's decision to participate in non-farm activities were well analyzed through using both descriptive and econometric analysis.

1.2 .Statement of the Problem

Different literature (Berhanu, 2006, Mulat, 2001 ; Mulat and Teferi, 1996) show clearly that poverty occurrence in Ethiopia is higher among the rural-people, that is, households that rely mainly on agricultural income and those with low paid work in the rural non-farm sector. This may not be unconnected with the rather low productivity growths that have characterized Ethiopian agriculture over the periods. Several poverty reduction strategies have been suggested from various levels and in different contexts but the best strategy for reducing rural poverty is still a subject of debate in Ethiopia. In Ethiopia, the rate of poverty reduction achieved from various poverty reduction strategies adopted is far below what is required to achieve the poverty reduction goal of Millennium Development Goals (MDG).

Considering growing importance of non-farm activities, it is however worthy of note, that the rural non-farm sector in Ethiopia, as well as in the study area as it is in other parts of the world, is complex and characterized by diverse activities, whose labour and other resource requirements and returns are in no way homogenous. Participation in the non-farm activities increases the income source which results in income growth and mitigates income variability among rural farm households.

Previously in our country, few studies (Woldenhanna and Oskam, 2001; Carswell, 2002; Holden, Shiferaw and Pender, 2004; Dercon and Krishnan 1996, Block and Webb, 2001) focus on identifying determinants of income diversification, non-farm activities, household participation in off-farm employment only by focusing specific (arid and semi-arid) areas by undermined the rest part of country. These studies also fail to consider all households' income generating activities that reflect diversification behavior of rural household rather we focus on main diversification sources. Moreover, policy makers and others did not look at the way in which the rural income diversification is integrated with employment opportunities, natural resource management and other poverty reduction strategies due to the lack of empirical evidences that help to understand well the variables which motivates rural income diversification. Even though the two districts are proxy to the capital town of the zone and infrastructure (asphalt road) in the study area are mostly based on farming and income diversification were not widely practiced. This shows that there is a gap in rural households to diversify their income sources to spread risk and smoothen their consumption in the study area. Thus, a good assessing of the determinants of income diversification, decision to participate in nonfarm activities among rural farm households are essential to fill this gap and for the designing policies promoting alternative income strategies.

1.3 Significances of the Study

The results of this study enhance, hopefully, our knowledge of income diversification strategies that rural households pursue to ensure income security and to smooth consumption. This study is expected to give a better insight in this regard. Given the key role income diversification can play in stabilizing incomes and alleviating rural poverty, governments in developing countries have become increasingly interested in promoting increased output diversification (Woldenhanna and Oskam, 2001). The findings from these studies will appear mixed, warranting further empirical investigation to shed more light on the forces driving income diversification in the area.

1.4 Objectives of the Study

1.4.1 General Objective

The general objective of this study is to assesses and analyze the determinants of income diversification and households (HHs) participation in nonfarm activities among rural farm households in Lemo and Anilemo District, Hadiya Zone.

1.4.2 Specific Objectives of the Study

This study was tried to achieve the following specific objectives:

- To describe the socio-economic features of respondents in Lemo and Anilemo Districts;
- To assess the possible dominant rural households income diversification sources;
- To assess determinant factors of income diversification sources among farm households and
- To analyze determinants of households (HHs) probability to participate in off-farm activities in the study area.

1.5 Research Questions

The following research questions were answered in this research

- What are the socio economic features of the respondents?
- What are the income activities of rural households?
- Does wealth difference among households bring income diversification difference?
- Which factors determine actual number of income diversification?
- Which factors influence the households' decision to participate in nonfarm activities?

2. Research Methodology

2.1. Sampling Techniques and Sample Size

2.1.1 .Site selection

The two districts Leemo and Anilemo Districts are selected purposively because it represents a rural settlement where farming is the primary occupation, geographically proxy to the administrative town and main asphalt road of A.A to Hossana town of Hadiya Zone and suitable market infrastructure. 100 of farming households will be randomly selected from each of the two districts of the zone totaling 200 (2*100) respondents.

2.1.2. Sample size determination

Numerous rules-of-thumb have been suggested for determining the minimum number of subjects required to conduct multiple regression analyses. These rules-of-thumb are evaluated by comparing their results against those based on power analyses for tests of hypotheses of multiple and partial correlations (Green, 1991). Accordingly, in this study sample size selection is based on the rule of thumb $N \geq 50 + 8m$, where, N, is sample size and 'm' is the number of explanatory variables (X_i) where $i=1, 2 \dots 14$. Based on this rule the researcher was taken a total sample of 200 respondents from the selected districts.

2.1.3 Research Design

This research was conducted by employing descriptive method of research because descriptive research is fact finding and describes the current condition of phenomena. Due to the complexity of the issue the research were conducted by employing both qualitative and quantitative research approaches to get descriptive and relevant information about the issue. Using both qualitative and quantitative method is important to analyze the data in different manner and to minimize the weaknesses of each of the approaches. For this study, both qualitative and quantitative (Mixed) research approaches were used.

2.3. Data

2.3.1 Types and Source of data

Both primary and secondary data sources were used. Primary data which includes both qualitative and quantitative data on household socio economic characteristics were obtained through a survey of 200 farming households (HHs) in Lemo and Anilemo District, Hadiya Zone. The main instruments of data collection were well-structured questionnaires administered to mainly farming households in the study area.

Secondary data were gathered from various sources like Agricultural Development Offices of Lemo and Anilemo Districts, Zone Bureau of Agriculture and Rural Development Office annual report, Books, from different publications, articles, Journals and the like.

2.3.2 Method of data Collection

Before actual data collection undertaken, a pre-testing questionnaire was conducted in order to revise and adjust those questionnaires that couldn't provide the required answers. Next to that, the required data was collected through farm household survey using revised structured questionnaire. The interview was conduct by six enumerators who was train on the subject matter of the questionnaire and the survey was carried out from September to June, 2006.

2.3.3. Data Analysis Techniques

2.3.3.1. Descriptive analysis

Before econometric analysis, descriptive analysis was used to explain and interpret the data obtained from household survey of the study. The result of the questionnaire survey were analyzed by the help of statistical package for social sciences (SPSS) version 16.0 Statistical Software and

Microsoft excels 2003 after editing, coding and arranging the raw data collected from survey.

2.3.3.2. Econometric Analysis

An econometric model consists of a dependent variable, also called the left-hand-side variable, and independent variable(s), also called explanatory or right-hand-side variable(s) and an error terms, or to be more precise stochastic disturbance terms, which stand for unobservable random variables not explicitly included in the model. The error term may also reflect randomness in human behavior or measurement errors, and has certain assumed properties such as a mean, variance and covariance. The estimated coefficients indicate the effect of a change in the independent variables on the dependent variable (Green, 2003).

Multiple Regression Model: - To examine the determinants of number of income diversification sources among farming households multiple regression analysis was used. A good regression equation explains a large proportion of the variation in the dependent variable, and the measure describing this proportion is R-squared, or R^2 , which is calculated by dividing the regression sum of squares (RSS) by the total sum (TSS). The R-squared can be further refined to the corrected R-squared, which eliminates the impact of increasing the number of variables in the equation. The significance of an individual coefficient can be tested using the t-test of significance and the joint significance of two or more coefficients using the F-test (Gujarati, 1998).

The general form of the model was:

$$Y = X_i B_i + U_i \dots \dots \dots (1)$$

Where: Y is income diversification sources (actual number), X_i explanatory variables, B_i coefficients of explanatory variables and U_i : is normally distributed with zero mean and constant variance. Thus, the possible explanatory variables that were used in the regression analysis were shown in Table 1.

Logistic regression model: - Also the researcher apply logistic regression model in measuring the effect of some socio economic correlates (determinants) on farming households' probability to participate in nonfarm activities in the study area. It was used to determine the probability of households to participate in non-farm activities to diversify their income.

In logistic regression, a complex formula is required to convert back and forth from the logistic equation to the OLS-type equation. The logistic formulas are stated in terms of the probability that $Y = 1$, which is referred to as. The probability that Y is 0 is $1 - q_{it}$

$$P (Y_t=1/X_t) = \frac{\exp(X_t B)}{1 + \exp(X_t B)} \dots \dots \dots (2)$$

An equivalent form can be stated thus,

$$\frac{\exp(X_t b)}{1 + \exp(X_t b)} = \frac{1}{1 + \exp(X_t b)} \dots \dots \dots (3)$$

This can be expressed as,

$$q_{it} = b x_{it} + u_{it} \dots \dots \dots (4)$$

Where q_{it} = an unobservable latent variable for household participating on non-farm activities.

X_{it} = vector of explanatory variables

b = vector of parameter to be estimated

u_{it} = error term

The observed binary (1, 0) for whether household participate in nonfarm activities is assumed as in the usual logit model (Green, 2003).

$$q_{it} = \begin{cases} 1 & \text{if } q_{it} \geq 0 \\ 0 & \text{otherwise} \end{cases} \text{ i.e. participation} = 1, \text{ otherwise} = 0$$

Probability that binary assumes the value one is, prob. ($q_{it} = 1$) = $\frac{\exp(\beta_0 + \beta X)}{1 + \exp(\beta_0 + \beta X)} = \frac{e^{\beta_0 + \beta X}}{1 + e^{\beta_0 + \beta X}}$ exp is

the exponent function, sometimes written as e. So, the equation on the right is just the same thing but replacing exp with e. We can always tell when e stands for exp if you see that there is a superscripted value with the e, suggesting that e is raised to some power.

3. Results and Discussion of Findings

3.1 Descriptive Analysis

Age distribution of sampled household's head

The age distribution of respondents is that the highest, 180 (90 percent) of the total number of respondents belong to 15 – 64 age group which is known by productive age in our country context. Indeed that in this age, men are most active, able to think quickly, intelligently and have found gainful employment in farming, hence their involvement in different activities and are duty-bound to provide for their household while 20 (10 percent) belongs to >65 age group respectively. The average age of the sample farm household heads was 52 years with the overall standard deviation of 11.48 at range of 34 to 95 years. The proportion of younger household heads ≤ 15 years of age were null. In general the results implies that diversification of income is common among the young household heads who are more energetic and could afford to take the risks associated with income diversification. The study revealed that most respondents are males representing 162 (76 percent) while very few respondents are females 38 (24 percent). This indicates that most men have the sole responsibility to carter or serve for the family and female headed family are fewer proportional to the male headed families in the study area. This could be attributed to cultural and religion affiliation or link.

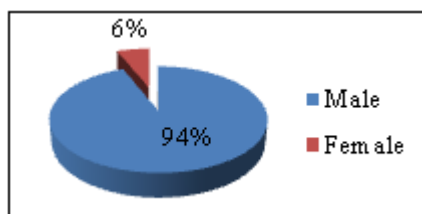


Figure 2: Gender distribution of sampled households
 Source: Survey result, 2015

The study revealed that most respondents are males representing 188 (94 percent) while very few respondents are females 12 (6 percent). This indicates that most men have the sole responsibility to carter or serve for the family and female headed family are fewer proportional to the male headed families in the study area. This could be attributed to cultural and religion affiliation or link (see figure 2).

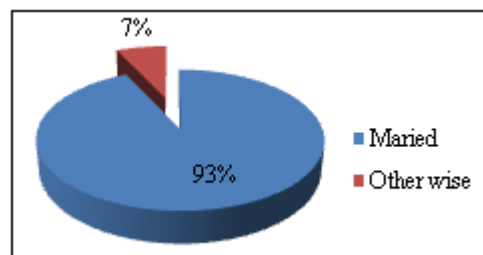


Figure 3: Marital status of sampled households' head
 Source: Survey result, 2015

The result of the analysis in figure 3 indicates that over three fourth of those surveyed households, 186 (93 percent) are married. The overall standard deviation was 0.228. Out of the total respondents 14 (7 percent) of them are single, divorced and widowed. The distribution generally shows that there are more married respondents than their single, divorced or widowed counterparts.

Family size of sampled households' head

The study revealed that in terms of the number of household members, 120 (58 percent) of the respondents have 5-8 family size, 40 (20 percent) of them have 1-4 members and 35 (17.5 percent) of them have 9-12 family size, while the rest 5 (3.5 percent) of farm households have more than or equal to 12 members. It is obvious that households whose membership is large easily diversify their income due to readily available family labor than those with few members. The overall average family size was 6 members that range between 1 to 12 members with standard deviation of 2.16.

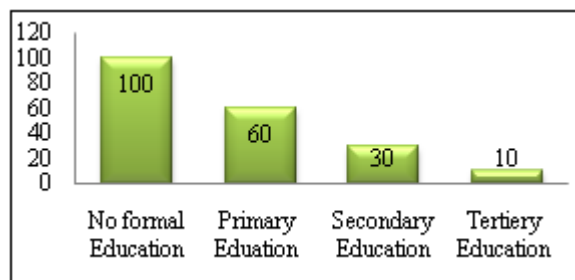


Figure 4: Education level of the sampled households (in years of schooling)
 Source: Survey result, 2015

The lion share of the respondents had no formal education accounting for 100 (50 percent), primary education 60 (30 percent), secondary education 30 (15 percent) and only 10 (5 percent) had tertiary education, various years of schooling ranging from zero year of schooling to 15 years of schooling. The average years of schooling of household head was 3 years with the standard deviation of 4.04. It is therefore noteworthy that educational level is very low among the farming households which undoubtedly affect their income diversification patterns.

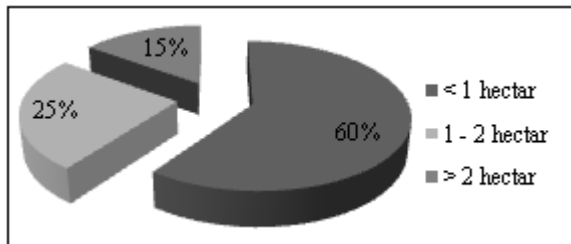


Figure 5: Farm size of sampled households' head (in hectare)

Source: Survey result, 2015

The study revealed that households have varying cultivated land sizes which indicate that 50 (25 percent) had 1-2 hectares, 120(60 percent) had less than 1 hectare while 20 (15 percent) which is the lowest had above 2 hectares. The overall average cultivated land size was 1.04 hectares that range between 0.1 to 2 hectares with standard deviation of 0.457. This implies that the large majority of rural households in the study area own land of the size less than one hectare so, most respondents are subsistence farmers and developing different production means or income sources will of course help raise their standard of living above poverty level (See Figure 5).

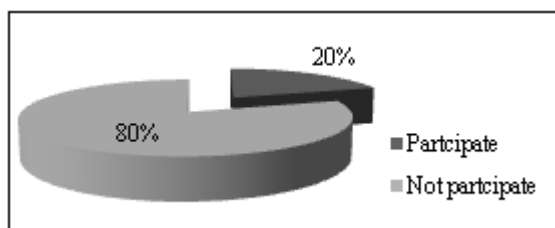


Figure 6: Respondents Membership in formal farmer's cooperatives

Source: Survey result, 2015

Result in figure 6 revealed that most of the respondents are not member of formal farmer's cooperative organization. Out of the total respondents 150(75 percent) farm

households were not member of the cooperative organizations. But, the remaining 50 (25 percent) of the respondents were member of farmers cooperatives. The overall standard deviation and variance were 0.343 and 0.118 respectively.

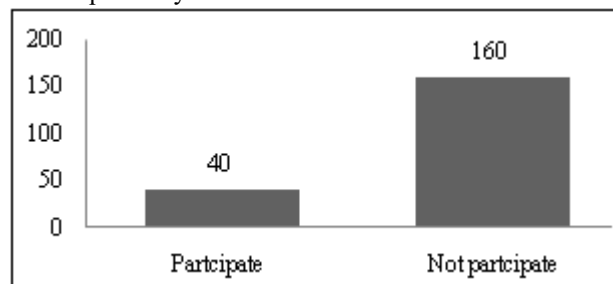


Figure 7: Respondents Participation on Saving

Result in figure 7 revealed that most of the respondents are not participate on saving. Indeed, saving is a good habit which is given special attention by government organization and nongovernmental organization currently. Out of the total respondents 160 (80 percent) farm households were not participate on saving. But, the remaining 40 (20 percent) of the respondents were participate on saving. The overall standard deviation and variance were 0.134 and 0.018 respectively.

3.1.2 Livestock Holding

The study revealed that Livestock are important physical assets for rural farm households next to land in study area and serve as means of household income and other service rendering assets. The result of this survey indicates the average livestock holding in Tropical Livestock Unit (TLU) was 4.23 with 1.76 standard deviation that range 0.00 and 10.00 minimum and maximum, respectively.

3.1.3 Income diversification sources

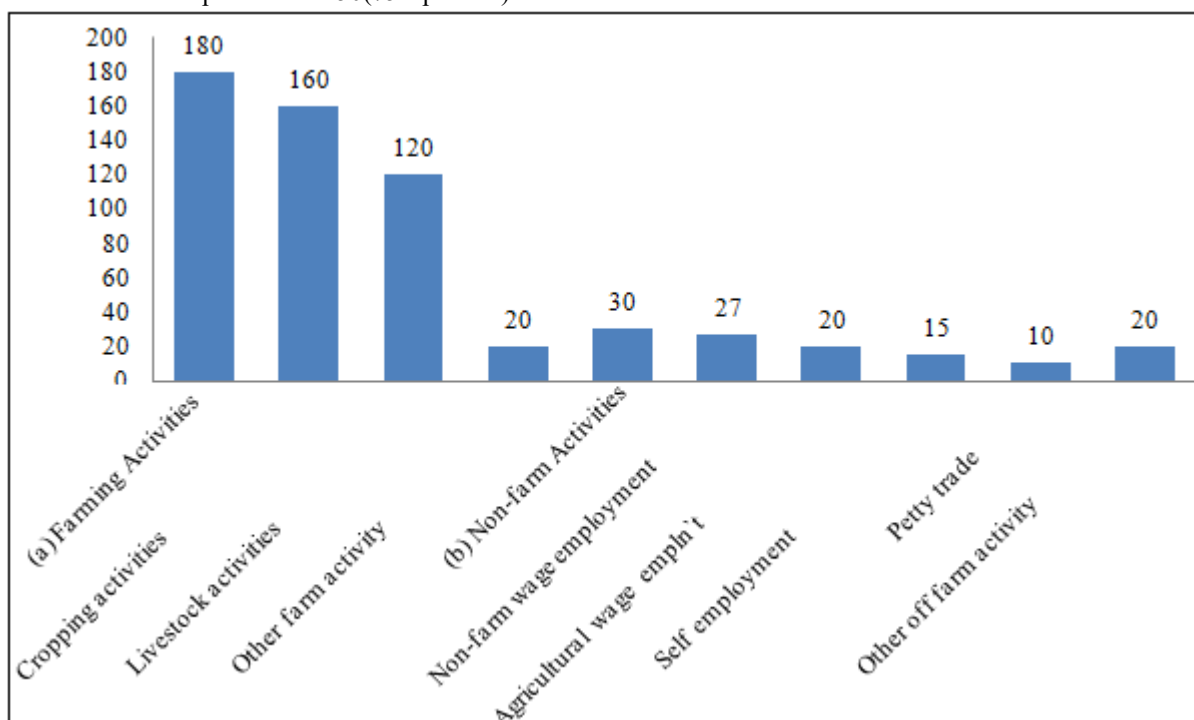


Figure 8: Households' main income diversification sources (N = 200), Source: Survey result, 2015

The result of descriptive analysis on primary activity depicted in Figure 8 shows that about 160 (80 percent) of those surveyed are fully engaged in agriculture activities especially in crop production. This is closely followed by those engaged as livestock rearing 120 (60 percent) the remaining engaged in other agricultural activities constitutes 20(10 percent). In other words, farming is their main occupation. Even though farming was their main occupation households in the study area were participates in nonfarm activity. The distribution generally reveals the relative importance of farming as the main occupation and largest employer of labor in Leemo and Ani Leemo districts, Hadiya Zone.

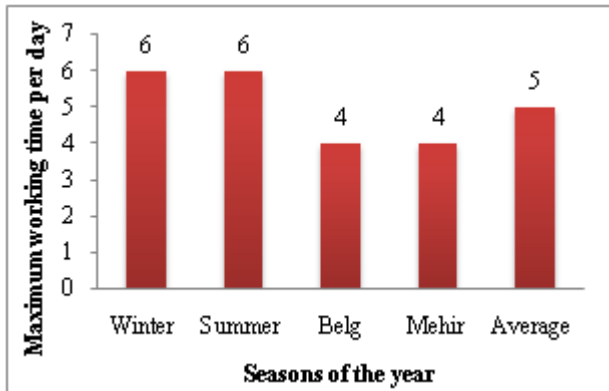


Figure 9: Season of the year and Working hours per day
 Source: Survey result, 2015

As we observed from the above figure the entire rural farm households in the study area were spent an average working hour per day is 5 on farming activity. Obviously this implies that households in the study area have free time to diversify their income sources in to nonfarm actives beyond farm activities. But, as expected households were not diversified their income sources to different off farm activities. So the government and concerned stake holders take attention to create awareness to rural households to diversify their income sources which will smoothen their consumption and income.

3.2 Econometric Analysis

3.2.1 Determinants of income diversification sources

Table 10: Multiple Regression Result

Explanatory Variables	Estimated Coefficients	Standard Error	T-statistics	Sig.
Constant	1.145	0.504	2.272*	0.025
AGE (X1)	-0.006	0.007	-0.880	0.380
SEX (X2)	0.965	0.483	2.200*	0.054
HHs (X3)	0.031	0.034	0.905	0.367
EDUC (X4)	0.042	0.017	2.470***	0.098
WEALTH (X5)	-0.024	0.192	-0.123	0.902
FARMS (X6)	-0.326	0.130	-2.509**	0.013
FARMI (X7)	0.000	0.000	2.429**	0.014
MSFC (X8)	-0.131	0.225	-0.583	0.561
ACF (X9)	-0.185	0.155	-1.194	0.235
DISTANCE (X10)	0.176	0.054	3.263***	0.001
LIVESTOCK (X11)	0.003	0.042	0.083	0.930
Sample size = 200 R² = 70.4 Adjusted R² = 68.4				

***, **, * are significant at 1, 5 and 10% probability level, respectively

Source: Computed from survey data, 2015

The number of income sources that each household has at a given point in time is used as a measure of income diversity while the difference in the number of income sources that one household has at different points in time indicates the level of income diversification pursued by that household over that corresponding period. Accordingly, households with more income sources are treated as households with higher levels of diversity in income and the greater the increase in the number of sources over time the greater increase in diversification over time. This indicator, the number of income sources, has the advantage that it is simple to understand and provides an easily visible picture of income diversification.

The empirical result of this study is startling and forcefully persuasive in general. The empirical result is both consistent and inconsistent with the theoretical postulations of the model. The coefficient of multiple determination of .704 indicates that about 70% of the variation in the income diversification sources in the study area has been captured by the model. This clearly shows that the model is strong and has good predictive ability. The implication of this outcome is that 70% of income diversification is induce/caused by the explanatory variables. The multiple correlation coefficient of .701 also indicates strong positive relationship between the variables. Furthermore, the adjusted R² of .684 which is significant has further consolidated the goodness of the model, hence, its econometric significant and reliability.

The coefficients on explanatory variables such as: distance from the market, sex, education, and farm income is statistically significant and confirmed expected outcome except distance from market. The F-statistic is significant and Dubin Watson statistic reveals a minimal autocorrelation of random variables implies little fall in the efficiency of the econometric model. Significant explanatory variables were interpreted as follow:

Interpretation of significant variables

Gender affects diversification sources, including the choice of income-generating activities (both farm and non-farm) due to culturally defined roles, social mobility limitations and differential ownership of/access to assets (Galab *et al.*, 2002). In the study, as expected sex of household head is found to positively and significantly influence income diversification sources (actual number) at 10% of significance level. Thus, keeping the influence of other factors constant; the number of diversification sources increase by 96.5 % when the sex of household head is male (male headed households). The opposite is true for the female counterparts. This result is in agreement with previous studies conducted by Adugna (2005) and Berhanu (2007).

As expected, the level of education is significant at 10% level of significance, and has a positive relationship with the income diversification sources (actual number). This implies as the level of education (years of schooling) of the household increases, the number of income diversification sources increases by 0.042, *ceteris paribus*. This is consistent with (studies that found similar results as this study are (Bogale A., and K. Hagedorn 2003; Dercon and

Krishan, 1996; Abdulai and Crole Rees, 2001; Babatunde and Qaim, 2009 and Minot *et al.*, 2006).

As expected, households with more land have fewer income sources, being more specialized in crop production. So it is interesting to find that farm size in this study, is found significant at 5% significance level and has a negative relationship with the number of income diversification sources. This result implies that if households' farm size increases by one hectare the number of diversification sources will decrease by 32.6 %, *ceteris paribus* This confirms the works of (Minot *et al.*, 2006).

The results reveal that distance to market center is found to have a significant (at 1% and 5% level of significance) and have a positive correlation with number of income diversification sources. This positive relationship tells us the effect of other factor holding constant that the far the distance from market center the more the tendency of households to diversify and vice versa. The coefficient of the variable also confirms that when a household is far from market centre by one kilometer, diversification sources increases by a factor of 17.6. This finding is in agreement with that of Ibrahim (2009), Omamo (1998) but, contrary to Adugna (2005) and Minot *et al.*, (2006).

3.2.2 Probability To Participate in Off-Farm Activities

Explanatory variables	Estimated Coefficients	Standard Error	Sig.	Odds ratio
Constant	-1.745***	0.231	0.000	0.175
AGE (X1)	0.033	0.064	0.612	1.033
SEX (X2)	-17.818	7.358E3	0.998	0.000
HHs (X3)	-0.211	0.274	0.440	0.809
EDUC (X4)	0.222*	0.134	0.097	1.248
WEALTH (X5)	-14.189	5.985E3	0.998	0.000
FARMS (X6)	-1.933*	1.328	0.096	0.140
FARMI (X7)	0.002***	0.001	0.005	1.003
MSFC (X8)	-2.078**	1.563	0.049	0.122
ACF (X9)	-0.079	1.636	0.629	0.454
DISTANCE (X10)	-0.877**	0.717	0.021	0.401
LIVSTOCK (X11)	0.948	0.686	0.167	2.580
Number of observation = 200		R ² = 0.603		

***, **, * are significant at 1, 5 and 10% probability level, respectively

Source: Computed from survey data, 2015

Logit regression was used to determine the probability of participation of household members in non-farm activities since they are basically farmers.

The result of Logistic regression in this study show that, the level of education (years of schooling) is significant at 10% level of significance and positive correlation with the probability of participation on nonfarm activity. This implies as the level of education of the farmer increases, the probability of the farmer participation on nonfarm activity increases. In fact, the odds ratio of education implies that if education of the farmer increases by one year, the likelihood of the farmer participation increases by a factor of 1.40, *ceteris paribus*. The explanation for this result is quite obvious. Education increases human capital and hence, increases the chances of the farmer to secure non-farm jobs). This result is in agreement with the works of (Schwarze,

2004, Dercon and Krishan, 1996; Abdulai and Crole Rees, 2001; Babatunde and Qaim, 2009).

Farm land owned by the household has a significant at 10% level of significance and negative correlation with the probability of participating on nonfarm activity. This implies the chances of choosing agriculture in the context of having large land size decreases the probability of participating on nonfarm activities. Increased role of off/nonfarm activities such as nonfarm wage employment, agricultural wage employment, self employment and remittance especially for poor households with less land holding and other necessary resources, signify how households respond to a decreasing ratio of farm size to household. This supports the view that off-farm and on-farm activities compete over the limited household resources.

Farm income, is found significant at 1% level of significance and has a positive relationship with the probability of household's participation on nonfarm activity. This result implies that if farm income of household increases in one birr the probability of participating in non-farm activities will increase by 0.3%. In fact, the odds ratio of farm income implies that if income of the farm increases by one birr, the probability of the farmer participation increases by a factor of 1, *other things remaining constant*. This is may be farm income increases financial capacity which in turn helps households to invest on nonfarm activities. This finding appears to confirm the finding of (Adewunmi *et al.*, 2011 and Babatunde and Qaim, 2008).

As expected, in this study the membership of farmers in cooperative organizations found negative correlation with probability of household participation on nonfarm activity. This implies as the membership in farmers cooperative increases, the probability of the farmers participation in nonfarm activity decreases. In fact, the odds ratio of membership in cooperative implies that if membership in farmers cooperatives increases by one, the likelihood of the households participation decreases by a factor of 0.122, *ceteris paribus*. The reason is that most cooperative serve farmers by supplying input with credit and farmers may not worry for purchase of input or additional income for purchase of input. Hence, they are interested to expand farm activities rather than participating in nonfarm activities. It is significant at 5% significance level. This result is in agreement with Olale (2011).

Distance from market center was found negative relation with probability of household participation on nonfarm activity. It is significant at 5% significance level. This result implies that when we far one kilometer away from market center the probability of participating in nonfarm activity will decrease. Other variables holding constant in fact, the odds ratio of distance from market center implies that if one kilometer far (increases) in distance the likelihood of the farmer participation decreases by a factor of 0.401. This result revealed that road infrastructure is the most important factor in participation of off-farm activities in all cases of rural income diversification strategies to earn income from off-farm employments in addition to farming income. This result is consistent with findings of (Adugna, 2005 and Debebe, 2012).

4. Summary, Conclusions and Recommendations

4.1 Summary and Conclusions

Most rural farm households have been adopted rural economic activity diversification, while some households did not engage in any off-farm activities rather they rely on agricultural activities alone. On the other hand, the number of income diversification sources and the probability of household's participation on nonfarm activity were not the same among farm households. Hence, this study was focused on the determinants of both number of income diversification sources and households probability to participate in off farm activity among rural households by taking data from 200 sample households from Leemo and Anileemo Districts, in Hadiya Zone.

The descriptive analyses of this study revealed that around 40% of the respondents earned income from off-farm employments, while over half of households obtained income from farming. Demographic, socio-economic and access for rural infrastructure were found the main factors for rural income diversification. On the other hand, multiple regression models was used for the analysis of number of income diversification sources among rural farm households while Binary logit model was employed to analysis the determinants of households' probability to participate in nonfarm/off-farm activity.

Econometrics results that number of income diversification sources was significantly influenced by sex of household head, education level of household head, farm size, farm income and distance to market center, while sex of household head, education level of household head and distance to market center were influenced the number of diversification sources positively. On the other hand, years of schooling (level of education) of head, farm size/land holding size, farm income, membership in farmers cooperatives and distance to market center were found the main determinants for households probability to participate on nonfarm activity. Years of schooling (level of education) of head and farm income were influenced participation positively while the remaining significant variables were influenced negatively.

Years of schooling, is the most important factor that encourages farm households' decision to engage into off-farm activities. As expected, farm income was found a positive influence in participation of farm households in nonfarm activities rather than relying only on farming activities. But, farm size, member ship in farmers cooperatives and distance from market center were the most influential factors that negatively enforced households to participate in nonfarm activity, in order to obtain additional income from off-farm activity.

Multiple regression model estimation allowed us to understand which explanatory variables play an important role in number of income sources. The regression result shows that sex of household head, education level of household head, farm size, farm income and distance to market center were significantly influence number of

income sources. To identify and analysis the determinants of income diversification in terms of the probability to participate in off-farm income sources, Logit regressions was carried out. As a result, years of schooling of household head, farm income, farm size, member ship in farmers' cooperative and distance to market center were found significant explanatory variables.

4.2 Recommendation

Based on the findings of the study, the following policy directions are recommended;

- Education should be given for rural communities to promote and expand off-farm activity and to enhance high income earning capacity of farmers from income diversification strategies.
- Aids and subsidized inputs should be provided for rural farm households to improve agriculture to increases farm income which in turn improve financial capacity of households to diversify nonfarm activity.
- Maintaining sustainable rural livelihood, especially road accessibility play vital role in facilitating access to markets, Hence, need to provide more rural roads and rehabilitate eroded ones in order to reduce the high transaction cost of buying from or selling to markets, as transaction cost reduces the returns from market sales. This will encourage the development of rural road to facilitate farmers' participation in diversified economic portfolio.
- Developing the rural off-farm sector in the study area to make the sector more jobs creating means as more farm household's members involved in the activities but without put in endanger the farm sector of the nation.

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