
Determinants of Household Off-Farm Participation: The Case of Hulla Woreda, Sidama Regional State, Ethiopia

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Abstract: This study examines the determinants of non-agricultural household participation in the Hulla woreda, sidama regional state. For this study, 204 samples of households were selected using a multi-stage sampling method. The researcher used a structured questionnaire to collect data from the sample households. For this study Econometrics analysis method was used. the probit model was used to examine the determinants of household non-agricultural participation in non-agricultural activities. On average, households receive an income of 34,294.8930 birr/year from agriculture and 10,946.6279 birr/year from non-agricultural activities. This study suggests that governments and non-governmental organizations should pay due attention to creating a comprehensive platform to enable households to participate in non-agricultural activities, to increase community awareness and raise awareness of the importance of non-agricultural agriculture for the Livelihood and the economy sharpen security.

Keywords: Participation, Probit Model, Off-Farm, Rural Households, Hulla Woreda

1. Introduction

In various countries such as Southeast Asia, Africa and Latin America, more than half of the population depends on agriculture [2, 6]. Agriculture-led growth plays an important role in solving poverty and transforming the economies of many Asian and Latin American countries. Again, some reviews of similar literature show that most developing countries in general, and in sub-Saharan Africa (SSA) in particular, rural farmers have been forced to include rural non-farm employment as a core strategy for rural development in the Poverty Reduction Strategy Paper (PRSP) [5]. Declining soil fertility, shrinking farm size and consolidation in the agricultural sector cannot thrive without a non-agricultural sector that provides full-time and part-time employment opportunities for the growing rural population [29, 31]. Off-farm activities are complementary activities that farmers participate in off-season to support the family. These activities include casual labour, transport business, traditional dances, wine consumption, retail trade, etc. [33]. On the other hand defines non-agricultural employment as all income-generating activities other than farming, animal husbandry, fishing and hunting, located in areas primarily devoted to

agricultural activities. Various studies conducted in Africa, especially in sub-Saharan countries, have shown that most rural households engage in agricultural activities as the main source of income, but also engage in other income-generating activities to increase the main source of income [1, 13, 25, 26]. But [20, 10, 18] showed that lack of opportunities pushes households into the non-agricultural sector, as non-agricultural activities contribute more to household income. In addition, a study by [43] found that non-agricultural activities are an important source of income that can potentially increase agricultural productivity if used to purchase agricultural inputs or for longer-term capital investment purposes.

Therefore, this study contributes to the literature by finding out determinants of non-agricultural participation of households at different levels of participation rate, while the literature on determinants of non-agricultural participation does not consider the level of participation to identify factors that promote and identified non-agricultural participation also what factors drive non-agricultural household participation. This clear demarcation facilitates intervention to take action and the likelihood of achieving the policy goal is high.

1.1. Statement of the Problem

For the rural farming community, off-farm activities are seen as alternative sources of income and employment. Off-farm activations also help reduce income insecurity in rural areas. Some studies, for example and [28] in Tanzania, [33, 20, 35]. have documented the drivers of non-farm labor force participation. [41] also analyzed the interaction between agricultural and non-agricultural activities in Ethiopia.

However, it is not surprising to find households that have no activities outside of their farm. Also, participants may not benefit equally from the off-site work. Therefore, an investigation is needed to identify the factors that lead to this participation and the non-farm income differences between farm households. To close this knowledge gap, it needs to be substantiated by research. Therefore, this study addresses the potential incentives that encourage household participation and the limitations or barriers that discourage participation in non-agricultural activities. It will also seek to identify the potential limitations and opportunities in participating rural households to benefit from specific non-agricultural activities. On the other hand, various scholars refer to this study as they focus on the impact of off-farm participation as income diversification on households. However, all these related studies do not show to what extent this non-agricultural participation of rural households contributes to the total household income and whether there is a significant association between several factors (explanatory variables) and off-agricultural participation. In addition, some rural households in the study area divide their working time between agricultural and non-agricultural activities in order to provide a secure income (consumption) for their family members, while others are only engaged in agriculture. Therefore, it is not clear why some households only engage in agricultural activities while others engage in both agricultural and non-farm activities. Therefore, this study attempted to fill the gap in the analysis of the key determinants of household involvement in off-farm activities, with a specific focus on the study gaps identified above.

1.2. Research Questions

- 1) What are the major factors that determine off farm participation in the study area?
- 2) Is there any significant income difference between farm and off farm participant households?
- 3) What is the share of gender participation in off farm activities?
- 4) What types of off farm participation activities are pursued by rural households?

1.3. Objectives of the Study

1.3.1. General Objective

The general objective of the study is to assess the major determinants of household off-farm participation in Hulla woreda, sidama regional state, Ethiopia.

1.3.2. Specific Objective

- 1) To identify the major factors that contributes participation in off farm activities.
- 2) To examine the income difference among farm and off farm participant households.
- 3) To identify the share of gender participation in off farm in the study area.
- 4) To identify the major off farm activities being pursued by rural households.

2. Literature Review

2.1. Important of Off-farm Practices Followed by Rural Households

Sosina Bezua, et al. 2009 [37] examined farm household labor supply decisions in the United States of America (US), which increase with expected declines in agricultural output prices and decrease with high unemployment. On the other hand, [41] showed. that an increase in agricultural production significantly increases the probability of non-agricultural self-employment, while the labor supply in wage labor decreases significantly. Means of employment outside of one's own agricultural holding, which includes gainful employment in agriculture achieved on other farms and non-agricultural income from non-agricultural wage income. [20].

According to a study by [44] cited by [33] off-farm labor decisions of French farm households found that the main effects on off-farm labor participation decisions of both members (husband and wife) are: -

1. Higher levels of general education were reflected in higher non-agricultural labor force participation among entrepreneurs and spouses. The younger women are more likely to work off-farm,
2. The number of children reduces the wife's participation in the non-agricultural labor market, i.e. increases her reservation wage, and,
3. Farmers seem to be more responsive to farming idiosyncrasies than wives [30, 36].

In addition, a study by [21] examined that farm household labor supply decisions depend on household characteristics, farm characteristics, local labor market conditions, and local and general economic conditions in a given country. However, there is no consensus on how such factors affect decisions made by farm households in a given area about non-farm labor supply. It is possible that a particular factor may have different effects over time and between households. Furthermore, [7] and Barrett [15] show that, in practice, different social and economic arrangements in a country also play an important role in decisions about the supply of family labor to farm households.

2.2. Factors Influencing Off-Farm Practices

Off-farm practices can be driven by different motivations. Various literature has identified key factors driving diversification towards off-farm activities among farm households in developing countries, these factors are roughly

divided into pull factors and push factors [8, 19, 14] Pull factors will lure households into the non-agricultural sector when the non-agricultural activities offer higher returns compared to agriculture. Reasons why an agricultural household may be drawn to the off-farm sector include higher returns on labor and/or capital and the less risky nature of investments in the off-farm sector [34] The desire to increase income to increase food security, improve housing, raise children, accumulate wealth, or otherwise improve the household's standard of living are also pull factors. Push factors (or necessity) are the involuntary reasons for diversification; These include income risk management, coping mechanisms, decreasing or fluctuating returns from productive assets, long-term restrictions or the smoothing of household consumption [34].

In four districts of Pakistan, a study by [13] showed that education increases non-agricultural productivity and induces rural Pakistani households to shift labor resources from agricultural to non-agricultural activities. An additional year of school for all adult males increases household income by 8.9%. The other human capital variable, health, also has a positive effect for men, but the result is not significant for women in rural Pakistan.

Empirical evidence from developed countries suggests a significantly positive relationship between education and the off-farm labor supply of farm households [13]. Contrary to expectations, however, a study [9] suggests that while other human capital variables such as health and skilled trades have a significantly positive effect on non-agricultural employment, the education of agricultural household members has no impact on the likelihood of non-agricultural employment in Ethiopia.

3. Methodology of the Study

Both quantitative and qualitative data are used in this study. Data for the study are collected from both primary and secondary sources. Information on the demographic and socio-economic condition of the households, which was collected using a structured questionnaire in a closed survey format with open-ended follow-up questions. The structured questionnaires are mailed to the heads of households with personal interviews.

The secondary data, which consists of relevant information for this study, was collected from concerned organizations including the Agency for Agriculture and Rural Development and the Central Statistics Agency (CSA), reports and other documents.

According to Yemane, (1967) cited in Glenn and Israel, (2013), to obtain a representative sample for the proportion when the target population is > 20,000 with an accuracy of 7%, the sample size 204 is representative.

This study used a multi-level sampling procedure to select sample households. In the first phase, Hulla Woreda was

specifically selected from the 36 woredas in sidama regional state because most of the non-agricultural activities in the regions were observed in this woreda.. In the third stage, 204 sample households were selected proportionately from four kebeles each using systematic random sampling techniques. Accordingly, every Nth household was included in the sample from a random point in time. Where N determines the total household population of the four Kebele divided by the sample size and the result obtained, which is the starting point and the next Nth term.

All information gathered from the household was used to create the final outcome of the study. The method of data analysis performed in this study includes both descriptive and econometric analysis. Quantifiable information gathered from closed-ended questions was used for analysis and discussion using descriptive statistics such as minimum, maximum, mean, and standard deviation. In addition, descriptive statistics were used to analyze data on selected personal and socioeconomic characteristics in participants and non-participants. After computing descriptive statistics, probit regression was used to identify determinants of off-farm participation in the study area. Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 20 and STATA 13.

Econometric Model Specification:

The logit and probit models are the most commonly used models when the dependent variable is dichotomous [16]. The probit and logit models are quite similar, so they usually produce predicted probabilities that are almost identical. The study is interested in the analysis of external participation [8, 11, 22]. The researcher applies the probit model to identify the determinant variables and their marginal effect on household participation in non-agricultural activities. This is because we assume that households' decision to participate in these activities may not be independent.

In this study the problem under investigation will be estimated using the following model.

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{12} X_{12} + \varepsilon_i$$

Z_i is the function of participant and non-participant households.

X_i = are independent variables for $i, i=1, 2, \dots, 12$.

X_1 = Sex of household head (SEX).

X_2 = Age of the household head (AGE).

X_3 = Education (EDUC).

X_4 = Family size (FS).

X_5 = Distance from developmental agent office (DAKM).

X_6 = Distance from market center (DMRTKM).

X_7 = Size of cultivated land (LANDSIZE).

X_8 = Irrigation participation (IRR).

X_9 = Farm income (FY).

X_{10} = Distance from the nearest all weather road (AWROAD).

$$SOFI = \beta_0 + \beta_1 SEX + \beta_2 AGE + \beta_3 EDUC + \beta_4 FS + \beta_5 DAKM + \beta_6 DMRTKM + \beta_7 LANDSIZE + \beta_8 IRR + \beta_9 FY + \beta_{10} AWROAD + U_i$$

Where, status of off-farm involvement (SOFI) is a dichotomous dependent variable which assumes 1 for household participating in off farm activity and zero for non-participant household. This selection or choice model is going to be estimated using Probit regression.

4. Results and Discussion

In this section, the selected explanatory variables were used to estimate the probit regression model to analyze the determinants of household non-farm participation. However, before fitting the probit model, it was important to consider whether there is a serious issue of multicollarity and association between the potential continuous and discrete explanatory variables of the model estimate. To this end, variance inflation factors (VIF) and contingency coefficients for the continuous and discrete variables were used to check for multicollinearity. This study also used robust estimation options that are often proposed for heteroscedasticity.

4.1. Diagnostic Test

4.1.1. Multicollinearity Test

VIF were used to test for multicollinearity, and correlations were tested for all explanatory variables and for dummy variables. A value of VIF greater than or equal to 10 was indicative of a severe multicollinearity problem [27] and previously omitted such variables from the model. However, in this analysis, the VIF values were less than 10. Therefore, there was no serious problem of multicollinearity. The contingency coefficients for the discrete variables were calculated uniformly. χ^2 was calculated to check the degree of association between the discrete variables. The contingency coefficient ranges from 0 to 1, with a value of 0 indicating no association between the variables and a value closer to 1 indicating a strong association. Accordingly, the results of calculating the contingency coefficient showed less than 0.8. Therefore, there was no serious association problem in explaining discrete variables in this work.

4.1.2. Model Specification Test

This test is used to determine if there is a model specification error when one or more relevant variables are omitted from the model or one or more relevant variables are included in the model [32] This can mainly affect the estimates of the regression coefficients. This test is complemented by the link test, hatsq's test was significant. This means that the link test failed to reject the hypothesis that the model is correctly specified. Therefore, no model specification error occurred here.

4.2. Probit Regression Result

STATA 13 software was used to estimate the parameters and marginal effects of the determinants of the extent of household participation in non-agricultural activities. Based on the result all signs of the result are consistent with the researcher's expectations, and the seven explanatory variables

have a significant impact on the level of household involvement in non-agricultural activities. The log pseudo-probability is -102.00546 and 204 observations in the data set were used in the analysis. The model has a p-value of .000, which means that the overall model is significant and therefore fits the data well.

Household participation levels were estimated using the Probit model by analyzing the determinants of the extent of household participation in non-agricultural activities. The probit model's parameter estimates only indicate the direction of the effect of explanatory variables on the dependent variable, but the estimates represent neither the actual size of the change nor the probabilities [24]. However, the marginal effect measures the expected change in the probability of a particular choice being made in terms of the unit change in the explanatory variable.

The probit model was applied to examine the effect of each explanatory variable on the dependent variable (off-farm participation). The econometric result shows that among 10 hypothetical explanatory variables, seven variables were found that each significantly influence the choice of off-farm strategies. The result of the probit model shows the sex of the householder (SEX), the age of the householder (AGE), the distance to the nearest market (DMKT), the size of the cultivated area in hectares (LANDSIZ), the irrigation participation (IRR) and the agricultural Household Activities Income (FY) and distance from the nearest all-weather road (AWROAD) determined household choices for non-agricultural activities.

In contrast, it was found that the remaining 3 of the 10 explanatory variables, i. H. Household educational level (EDUC), family size (FS) and distance from foreign aid (DA_KM) did not have a significant impact on the likelihood of off-the-job participation. For this reason, only significant explanatory variables that affect the participating external household are discussed below.

Table 1. The marginal effect of the explanatory variable on the level of off-farm participation.

variable	dy/dx	Std. Err.	z	P> z
SEX	-.2654255	.13632	-1.95	0.052**
AGE	-.0072758	.00348	-2.09	0.036**
EDUC	-.0444504	.03653	-1.22	0.224
FS	-.017985	.01867	-0.96	0.335
DA_km	-.0366312	.03831	-0.96	0.339
DMRT_km	-.0875489	.03725	-2.35	0.019**
Land_SIZE	.1722015	.03729	4.62	0.000***
IRR_PART.	-.3741348	.10293	-3.63	0.000***
FY	-6.45e-06	.00000	-2.99	0.003***
AW_ROAD	.1789799	.10801	1.66	0.098*

*significance at 10%, ** significance at 5%, ***significance at 1%

Source: own survey, 2021.

- (i). Gender of head of household (SEX):- is a significant and negatively influenced household involvement in non-agricultural activities with a significance level of 5%. The result shows that female-headed households were able to participate in all non-agricultural jobs

compared to male-headed households. The marginal effect shows that male-headed households are 26.54% less likely to be involved in non-agricultural activities when other variables remain constant. This is because female executives have relatively lower farm incomes compared to male executives and thus focus on self-employment outside of agriculture to support their families. Other researchers have also found similar results in Ethiopia [38].

- (ii). Age of head of household (AGE) significantly and negatively influenced participation in non-agricultural activities, each with a significance level of 5%. This implies that the labor supply for non-agricultural activities was higher for younger households than for older households. As a result, younger households rely on non-farm employment for their livelihoods, while older households focus on farming rather than opting for off-farm work. The presence of barriers to entry and lack of prior exposure could be the push factors for the elderly, while lack of farmland and ability to meet graduation requirements are the pull factors for the rural youth. [23] supported this claim that rural households are less likely to engage in non-agricultural activities as they age. This result may be due to older households being more rigid and less flexible to increase their participation in non-agricultural enterprises. The model result shows that all else being equal, the marginal effect shows that a one unit increase in household age leads to a 0.7% decrease in participation in non-agricultural activities. This can be explained by the fact that older households significantly reduce their non-agricultural participation. This result contrasts with [17] in which they found that the variable age distribution of respondents has a positive and significant effect on their participation.
- (iii). Distance to the main market center (DMRT_KM) appears to significantly or negatively determine participation in non-agricultural activities at a significance level of 5%. The possible reasons for the obtained results can be as follows. The negative sign at the conventional significance level shows that the household is less likely to have an off-farm income the further away it is from the homestead to the market center. The model result shows that all else being equal, the marginal effect shows that as a unit's market access increases, the probability that the household engages in off-farm activities decreases by about 8.75%. The possible explanation is that access to markets gives the household the opportunity to participate in income-generating activities or non-agricultural activities, it enables it to meet its basic needs through competitiveness at reasonable prices, it enables it to sell its various products to fair prices, and The implication is also that households living far from market centers are less likely to access and

participate in opportunistic off-farm activities. The result agrees with studies by [3] & [42].

- (iv). The size of farmland farmed by the household (LAND_SIZE) had a significant and positive effect on non-farm employment with a probability of less than 1%. Although the results of the probit analysis showed that the size of the farmed area significantly affects participation, the probit analysis showed that the off-farm income of the participating households is significantly and positively influenced by the size of the farmed area. The marginal effect shows, among other things, that the constant in favor of off-farm participation increases by 17.22015% if the household area increases by one hectare. The reason for this result could be that farmers cultivating large plots have the capacity to produce more and this would allow them to accumulate seed capital to engage in non-agricultural activities. The results agree with [45].
- (v). Participation in Irrigation (IRR): - As expected, this variable has a 1% probability of having a negative and significant impact on household decisions for non-agricultural activities. The negative coefficient implies that the irrigation used by the household is less likely to result in non-farm income-generating activities. The possible rationale is that irrigation options lead to multiple crops, which would create agricultural surpluses. This surplus can be used for extracurricular activities. The model result shows that under otherwise constant conditions, the marginal effect shows that the probability of a household diversifying into non-agricultural activities decreased by 37.4% for each household engaged in irrigation activities. the result is agree with [4].
- (vi). Farm Income (FY): -The study result showed that farm income was significant and negative. The marginal effect value for farm income was statistically significant at the 10% level. This implies that a decline in farm household income will encourage their decision to enter an off-farm business. Thus, higher-income households have a higher risk tolerance. Therefore, they are most likely entrepreneurs. Limited financial resources available to households act as barriers to entry into off-farm business investment. The fact that farm income determines participation in off-farm activities implies that entry into lucrative off-farm activities may be more difficult for low-income households. This could increase inequality where the poor are more vulnerable due to their dependence on limited sources of income. The marginal effect shows that, all other things being equal, the probability that a household will engage in non-agricultural activities decreases by 6.4% in each case. This result is in conflict with the results of [39, 40] who reported in their studies in Nigeria that households with higher agricultural income are more likely to focus on

activities that generate income outside of agriculture and thus outside of agricultural work.

- (vii). Distance to the nearest all-weather road (DW_ROAD): As expected, the distance to the all-weather road has a positive and significant influence on the choice of households for income diversification towards non-agricultural activities, each with less than 10% significance. This implies that being close to the household from the high street is more likely to lead to extracurricular work. Holding other factors constant, the likelihood of agricultural households pursuing an off-farm strategy increases by 17.8% if the household's home is less than an hour from an all-weather road. The result is consistent with [12].

5. Conclusion and Policy Implication

5.1. Conclusion

In this research, we examined the relative importance and determinants of participation in non-farm employment. In Ethiopia, agriculture is a mainstay of the economy. The development of agriculture has a direct influence on the overall development of the country. However, agriculture is still largely traditional and of the subsistence type. Therefore, agriculture alone cannot provide sufficient livelihoods to achieve food security. There are other methods to deal with the problem of food security, such as B. Non-agricultural rural activities. Therefore, the main objective of the paper is to assess the main determinants of off-farm household participation in the case of Hulla Woreda in Sidama Regional State. To achieve this goal, cross-sectional data were collected from 204 sample households. And to gather the data needed for the study, primary and secondary sources were used. All information gathered from the household was used to create the final outcome of the study. The method of data analysis performed in this study includes both descriptive and econometric analysis.

The econometric result found determinant factors that motivate and promote off-farm participation in the study area. The analysis of the probit regression model was shown that changing household characteristics will change the probability that a given individual household becomes participate on off-farm activities. Therefore, the model result indicated, out of the 10 factors included in the model 7 variables were found to have a significant influence on the probability of off-farm participate at less than 10 percent level of significance. The variables considered were Sex of household head, Age of the household head, Distance from the nearest market, Irrigation participation, Household farm Income are significant and negative effect on off-farm activity at less than 10% probability level while that Size of cultivated land in hectare and distance from the nearest all weather road are significant and positives effect on off-farm activity at less than 10% probability level. Therefore by holding other variables constant the probability of

households participate in off-farm activity decrease by 26.54%, .73%, 8.75%, 37.41%, 645ETB and increased by 17.22% and 17.89% respectively, Whereas, the remaining 3 of the 10 explanatory variables i.e. household level of Education, Family Size and Distance from developmental agent were found to be no significant influence on the probability of off-farm participating. This may imply a push nature of off-farm activities for households' asset base; insufficient crop income and market imperfections make individuals resort to off-farm activities to supplement their meager agricultural income and to smooth inter season cash flow and consumption.

5.2. Policy Implication

Based on the main findings of the study, the following policy implications are drawn. The result of the survey showed that non-agricultural income contributes 32.71% to the total income of the sample households. In this regard, interventions need to be designed that expand the possibility of non-agricultural activities through investments that create employment and job opportunities to attract rural households to diversify their sources of income. Therefore, the rural development strategy should not only focus on increasing agricultural production, but also pay attention to promoting such activities in rural areas. The econometric analysis showed that the rural farm households in the study area are likely to have a diversified income if they have access to markets, roads and use irrigation. Therefore, the authorities concerned are recommended to improve marketing access for farmers in rural areas. This includes not only the usual physical infrastructure of road construction and maintenance, but also efficient and reliable market information and improved communication. Infrastructure development is a backbone for any development. On the contrary, the infrastructure development of the study area, especially roads, is poor. This has a negative impact on the diversification trend among rural smallholders. Therefore, government policy should pay more attention to road construction to lower entry barriers and facilitate access to non-agricultural activities. Since the area has good potential for the development of irrigated agriculture, the development of small-scale irrigation systems at the community level needs to be emphasized to improve income diversification. Therefore, development planners need to develop a small-scale, locally owned development strategy.

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