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Determinants of non-farm activities participation decisions of farm households in Burkina Faso

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The aim of the study is to address the issue of non farm activities participation decisions of rural households in Burkina Faso. The analysis is based on a multinomial Logit model using data collected over the 1999 to 2004 period from four agro-ecological zones: the Sudanese zone, the Sahelian zone, the north-Guinean zone and the south-Guinean zone. The results indicate that the contribution of non-farm activities to household income was significant in the rural area irrespective of the zone considered and households combined several strategies for diversifying sources of household income, which vary with zones. In the Sahelian-Sudanese zone, the number of working people in the household, the income from farming, the age of the head of the household, his/her level of education, the technology used in production and rainfall were found to be the factors that significantly influenced the participation in non farm activities. In the Guinean-zone, the variables that significantly influenced participation are production technology, farm income, rainfall, the number of working people in the household, the level of education of the head of the household and his/her age.

Key words: Non-farm activities, rural households, multinomial Logit model, Burkina Faso.

INTRODUCTION

The economic crises of the 1970s and 1980s brought about changes in the allocation of production factors (notably the labour factor) by farmers and fostered the rapid development of off-farm activities which people get involved in tandem with farming. In the rural area, the majority of households are involved in farm activities but many of them get their income from non-farm activities (World Bank, 2008). Thus, in the rural area, it is hard to find peasants who do only farming. As a matter of fact, households devote part of their time to farm activities and part of it to non-farm ones. Surveys carried out in several countries have indicated that between one third and two thirds of farmers reported that they were involved in a non-farm activity as well (Kimhi, 2000). Previous research had found that the income from non-farm activities was essential for the welfare of rural households (Rosenzweig, 1998). In developing countries and economies in transition, between one third and half of the

households generate their income from a non-farm source and the share of this type of income is between 20 and 70% of the total household income (Adams, 2001; Benjamin, 1992; Newman and Gertler, 1994; Rizov et al., 2000; Rosenzweig, 1980). Non-farm activities thus contribute to giving the rural economy a multi-sector dimension. They are increasingly expanding and are becoming a way out of poverty for many households. According to Hazell and Hojjati (1995), they represent a fundamental back-up for economic activities of small towns, especially in rural areas in Africa.

The growth of the farming sector activities provides opportunities to the non-farm sector, thanks to the demand for inputs and services which such a growth needs. In situations where there are no credit constraints, the non-farm income becomes a determinant in the rural households' strategy for farming investment. The growth of non-farm activities can ease the constraint on credit and liquid assets required for agricultural production and can boost agricultural competitiveness (World Bank, 2008). The savings generated by farm activities can also serve as the basis for non-farm investment. In Asia, for

instance, the high rates of savings generated by the green revolution produced the capital needed for investment in non-farm activities (World Bank, 2008).

The growth of non-farm activities can come about as a result of an anti-hazards strategy on the part of households. In this rationale, the diversification of sources of income would then be seen as a strategy to fight the hazards related to being involved in an activity that is only centred on farming. Rural households seek to protect themselves against the hazards related to their environment by diversifying crops and production zones and by using manual techniques. This behaviour of the rural household conforms to the theory of portfolio management. Households take their diversification decisions based on the life cycle model and rural households consider non-farm labour as a more stable combination in the long term (Kimhi, 2000).

Non-farm activities could arise from the bankruptcy of economic institutions. As a matter of fact, the lack of a farming insurance system to cater for the risks in a sector for where uncertainty seems a permanent feature due to climatic conditions will lead to the development of off-farm activities. For example, Kimhi (1998) found that environmental variables had considerable effects on the participation in non-farm activities and that, as a result, these rendered poor households capable of mitigating the effects of the fluctuations of their farm income or of make up for them from one year to another or within one farming season by engaging in a diversification of sources of income. Thus, the rural non-farm sector provides opportunities for compensating for the risks and uncertainties related to the variations in farm income (Islam, 1997). However, to the extent that the demand for products from the non-farm sector depends on the income from the farming sector, the level of non-farm activities will be low if the farm income is low. This means that the role of non-farm employment in compensating for the fluctuations of farm income is limited. The efficiency of the non-farm sector in stabilizing income over different seasons or consecutive years will therefore depend on the strength, the nature of links between farm and non-farm activities and the type of non-farm activities concerned.

Non farm activities in rural areas are an important phenomenon in Burkina Faso. Research conducted by ICRISAT over the 1981 to 1985 periods (in three agro-ecological zones) suggests that between 26 and 57% of the total household income come form non-farm activities (Reardon et al., 1992). Recent studies in the same zones have indicated that non-farm income represents between 22 and 40% of the total household income (Zahonogo, 2002). In Burkina Faso, households are faced with several risks: rainfall, natural disasters, cricket invasions, and the volatility of the prices of farm products. For instance, Reardon et al. (1992) reported a coefficient of variation of crop income of 67% for the Sahelian zone (an arid zone) and 52% for the Sudanese zone (better suited

to farm activities). Faced with these risks, the alternatives for farmers are few. Insurance is precluded because of high geographic covariance of risk, high moral hazard, and high geographic dispersion of production – that is, a given area accounts for only a very small part of total production in most parts of the country, with some possible exceptions for the cotton zones. Credit is limited due to a lack of collateral: land has little value and livestock is an uncertain stock, as it can be either stolen or exterminated by disease. Credit is also limited by the paucity of lending institutions more or less suited to this type of situation. Because of the failure of these common mechanisms to combat risk, farmers rely on agent-level mechanisms, diversification, and asset accumulation for consumption smoothing, and on society-based insurance arrangements.

There are several diversification strategies that farmers could adopt: producers from zones with a high agricultural potential and with access to the market have a good opportunity for diversification through new markets. By diversifying high-value products, they can thus overcome the problem of falling prices for cereals and traditional exports. Countries like Brazil, Chile, China and Mexico dominate the market of non-traditional exports while the least developed countries like Burkina Faso have a very limited share in this type of market (World Bank, 2008). In Asian countries farmers tend to specialise in scale production. In Burkina Faso, households combine two main strategies of diversification of sources of income: (i) diversification in farming (ii) diversification outside farming. The former type of diversification consists in diversifying forms of speculation. This type of strategy ties in with that of trying to face the risk that comes with climate change. For its part, diversification outside farming consists in selling the workforce and engaging in trade activities. This strategy ties in with that of preparing to face risks that go with farming and of maximizing revenue.

Understanding the behaviour of farming households with regard to how they allocate their time between farm activities and non-farm ones is crucial for adjusting farming and rural policies. This is all the more relevant because many economic policy instruments get focused on improving and reducing the variation in income in the rural area while decision-makers do not seem to attach much importance to the non-farm income as a supplement to the farm income as a part of a strategy to lessen fluctuations (Lamb, 2001; Mishra and Goodwin, 1997). In this rationale, an analysis of non-farm activities can provide interesting and very useful information for decision-makers. First of all it enables us to understand the reasons why households engage in such activities and to assess the impact of these on income. The analysis also enables us to highlight the constraints that hinder the development of non-farm activities. This analysis of the case of Burkina Faso can also provide the necessary elements for formulating development policies

for the rural world in a country where the bulk of the population is engaged in rural economy. Considering the heterogeneity of the farming areas in Burkina Faso, the reasons for engaging in non-farm activities and the nature of these are not the same; they vary with regions. It is therefore necessary to have at one's disposal the best information possible on this type of activities before any policy aimed at improving income in rural areas is made, since either the lack of such information or inadequate information could lead to a worse situation than that which the policy in question is meant to improve.

The present study focus on rural households' participation in non farm activities in four agro-ecological zones in Burkina Faso (Sahelian zone, Sudano-Sahelian, north-Guinean zone and south-Guinean zone) over a period covering five farming campaigns (1999 to 2004). It uses data collected for 1280 households in 8 villages.

MATERIALS AND METHODS

Model and econometric issues

Farming household's models are useful in the analysis of the behaviour of households in the rural area. Most of the modern research on the behaviour of farming households was based on these models (Singh et al., 1986; Kimhi, 1995; Kimhi, 2000; Kimhi, 2004; Kazianga, 1996; Zahonogo, 2002). The present research was inspired by the farming household's models. Following Bardhan and Udry (1999), it is assumed that the farming household has an individual utility function which is written as:

$$U = U(c, L; \theta) \qquad (1)$$

Where c represents the consumption of goods and l the consumption of leisure. For its part, θ is a vector of the demographic characteristics that serve to move the area of the utility in the utility-consumption-leisure space.

The household's goal is to maximize this function under the production, budget and time constraints. In this maximization strategy, the household must decide on the allocation of its time between farm and non-farm activities. It is therefore, useful to investigate the factors that govern this decision. This demand leads to an empirical framework based on a model non farm activities participation decisions.

The aim of this research is to model factors that affect the non farm activities participation decisions in Burkina Faso. In this case, the dependent variable, namely diversification, is not a continuous variable but one that takes two or several modalities depending on whether the household engages in non-farm activities or not and according to diversification scales. Since the dependent variable is not continuous, the application of linear regression models is not appropriate; Probit or Logit models must be used. Kimhi (2000, 2004) used this type of models. The present study will use a multinomial Logit model to model the options of income diversification by households.

Let Y_{is} corresponding to the involvement of household i in strategy s of income diversification. Y_{is} is a multinomial variable that characterises all the diversification strategies s.

$s = 1$ if the household engages in activities of factor diversification (sale of labour force);

$s = 2$ if the household engages in activities of non-factor

diversification (trade); $s = 3$ if the household engages in a diversification strategy in farming (diversification of production); $s = 0$ for households that are not engaged in any non farm activity. The probability P_{is} for the household to engage in a non farm activity s is given by the expression:

$$P_{IS} = P_S(X_I, \theta) = \frac{\mathrm{EXP}(X_I \gamma_S)}{\sum_T \mathrm{EXP}(X_I \gamma_T)} \qquad (2)$$

Where X_i represents the vectors kx_1 of explanatory variables and θ represents the parameters to be estimated and which are either characteristic of the type of activity s (γ_s) or of all the other activities (γ_t). This model has too many parameters (Cramer, 1991). Indeed, in this model the γ parameters are specified except for one constant. One can add a constant α to all the γ parameters without affecting the probability Pis. It is the differences (γ_s-γ_t) that are the determining factors and, in this case, one of the modalities (one of the kx_1 vectors of parameters) is redundant (the difference of parameters is equal to zero). A solution to this problem consists in eliminating a vector r of the kx_1 vectors of parameters, which is by subtracting γ_r from the γ_s. The corresponding $s=r$ modality is called the reference modality. The model will then be written in two equations:

$$P_S(X_I, \theta) = \frac{\mathrm{EXP}(X_I \beta_S)}{1 + \sum_T \mathrm{EXP}(X_I \beta_T)} \qquad \text{for } s \neq r \qquad (3)$$

$$P_R(X_I, \theta) = \frac{1}{1 + \sum_T \mathrm{EXP}(X_I \beta_T)} \qquad \text{for } s = r \qquad (4)$$

Where $\beta_s = \gamma_s = \gamma_r$. The β_s parameters to be estimated are those that maximize the likelihood function.

It is assumed that a household's decision to participate in non farm activities is the result of an expected benefit ANA* (known only by the household). One can thus, determine the probability that a household is engaged in a process of income diversification. The latent variable ANA* is defined as the profit or utility derived from the diversification of income. It is hypothesized that this profit or utility is linked to household characteristics as follows:

$$ANA^* = \beta V + E \qquad (5)$$

V represents the set of explanatory variables that are supposed to affect the involvement in non-farm activities, β is a vector of the parameters to be estimated, and e is the term of error assumed to be normally distributed with a unit variance, which is a necessary condition for the identification of the vector of parameters θ and at the same time ensures that there are efficient estimators for θ (Savadogo et al., 1998). The explanatory variables comprise the household's socio-demographic characteristics (age of the head of the household, his/her level of education, his/her gender, the production technology used by the household, and the level of the household's farm income) and environmental variables (rainfall). The estimation will be done using the maximum likelihood method.

Data

The data used in the present study to identify the determinants of non farm activities participation decisions come from surveys carried out in rural households in four agro-ecological zones of Burkina Faso: the Sahelian zone (Djibo), the Sudanese zone (Yako), the north-Guinean zone (Boromo) and the south-Guinean

Table 1. Distribution of households according to their level of involvement in non-farm activities by agro-ecological (%).

Zone	Households with ANA	Households without ANA	Total
Sahelian	71.9 (230)	28.1 (90)	100.0
Sudanese	40.63 (140)	59.37 (190)	100.0
North-Guinean	75.0 (240)	25.0 (80)	100.0
South-Guinean	75.0 (240)	25.0 (80)	100.0
Sample	65.62 (840)	34.4 (440)	100.0

Source: Survey data. Number of observations is presented in parentheses.

zone (Banfora). With the exception of this last zone, the other three are former sites where ICRISAT (International Crop Research Institute for Semi-Arid Tropics) collected survey data from 1981 to 1985. The choice of villages to be surveyed by the present was thus well thought-out, since they systematically correspond to those that were surveyed in the ICRISAT survey. Regarding the villages in the south-Guinean zone, the main criterion for selecting them was the same as that used by ICRISAT, namely the degree of isolation (accessibility to the village through transport means). In this connection, an isolated village and a relatively non-isolated village were selected by locality. So, the villages of Kolbila and Ouonon were selected in the Sudanese zone, those of Wouré and Silguey were in the Sahelian zone, those of Koho and Sayéro were in the north-Guinean zone, and those of Toumousséni and Djongolo were in the south-Guinean zone. In each village, thirty-two households were selected, which means a total of 256 households in each farming campaign. The data were collected over a period covering five farming campaigns (1999 to 2004), which means a total of 1280 households surveyed.

The information collected comprises data about the households' socio-economic characteristics, animal and vegetable production, the households' food and non-food consumption, transfers (in cash or in kind) done by the households, the use of the labour factor and the households' involvement in non-farm activities. The data on rainfall were obtained from the national meteorological department; they cover the Djibo, Yako, Boromo and Banfora zones. Although, there are no detailed data available by village, there is no big disparity in rainfall in each zone: the households often face the same climatic shocks within those zones.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Degree of involvement in non-farm activities

Table 1 presents the distribution of households in their involvement in non-farm activities in the four zones. For the sample, 65% of the households were found to be engaged in such activities. There are disparities between the zones, with the lowest percentage of households involved in non-farm activities being found in the Sudanese zone "Diversification strategies".

Table 2 presents the distribution of the households' strategies of diversification of sources of income by agro-ecological zone. Overall, the non-factor diversification (39.1%) was found to be the first diversification strategy, followed by the factor diversification (33.55%) and the

diversification in farming (27.35%). These overall results hide disparities between zones, though. In the Sahelian zone, the main diversification strategy is the factor diversification that consists in the sale of the labour force, while in the Sudanese and Guinean zones it is the non-factor diversification that is the main strategy. The diversification in farming was a more important strategy in the Guinean zone than in any other.

Income level

The average income by adult equivalent was estimated to be CFAF 55,000 for households involved in non-farm activities against CFAF 46,000 for those not involved in such activities with a bimodal distribution: two peaks in the distribution for the Guinean zones and two lowest levels in the Sahelian and Sudanese zones (Table 3).

Socio-demographic variables

The socio-demographic variables used in the present study are the age of the head of the household, the number of working people in the household, the level of education of the head of the household and the production technology used. The statistics obtained for these variables indicate that the majority of heads of households were aged between 31 and 50 years (45% of the households), while old heads of households (71 years and above) represented 10% (Table 4). Table 5 shows that individuals, potential in the working age bracket were about 40% for all the four zones with a relative stability between zones. Overall, about 11% of male heads of households were literate, against only 3% for female heads of households. Strong disparities were observed, though: for instance, almost all the heads of households in the Sudanese zone were illiterate (Table 6).

Table 7 shows that 41% of the households used animal traction in their production activities. Strong disparities were observed between zones, with the Sahelian and south-Guinean zones having a low level of mechanized agriculture.

Level and structure of the rural households' non-farm

Table 2. Strategies of diversification of sources of income by zone (%).

Zone	Factor diversification	Non-factor diversification	Diversification in farming	Total
Sahelian	67.2	20.3	12.5	100
Sudanese	35.6	47.1	17.3	100
North-Guinean	14.1	46.7	39.2	100
South-Guinean	17.3	42.3	40.4	100
Sample	33.55	39.1	27.35	100

Source: Survey data.

Table 3. Average annual income by adult equivalent by agro-ecological zone according to type of household (in CFAF).

Zone	Households with ANA	Households without ANA
Sahelian	34,890.99 (230)	47,656.26 (90)
Sudanese	45,463.76 (140)	36,976.37 (190)
North-Guinean	62,930.32 (240)	53,302.16 (80)
South-Guinean	68,766.46 (240)	64,303.04 (80)
Sample	55,223.41 (840)	46,442.17 (440)

Source: Survey data. Number of observations is presented in parentheses.

Table 4. Distribution of heads of households according to age by agro-ecological zone (%).

Age	Sahelian	Sudanese	North-Guinean	South-Guinean	Sample
Below 30 years	4.7	10.9	4.7	6.1	6.6
31-50 years	51.5	36.0	54.8	37.9	45.1
51-70 years	36.0	35.9	31.3	46.9	37.5
71 years and above	7.8	17.2	9.2	9.1	10.8
Total	100.0	100.0	100.0	100.0	100.0
Observations	320	320	320	320	1280

Source: Survey data.

Table 5. Distribution of individuals according to age by agro-ecological zone (%).

Age/Zone	Sahelian	Sudanese	North-Guinean	South-Guinean	Sample
0-5 years	21.8	22.0	22.8	18.0	21.2
6-15 years	25.2	31.7	30.5	30.7	29.5
16-60 years	47.9	39.6	43.2	43.1	43.5
61 years and above	5.1	6.7	3.5	8.2	5.9
Total	100.0	100.0	100.0	100.0	100.0
Observations	320	320	320	320	1280

Source: Survey data.

income: The average annual non-farm income by equivalent adult was estimated at CFAF 11,000, with a bimodal distribution: two peaks in the distribution for the Guinean zones and two lowest levels in the Sahelian and

Table 6. Literate heads of households by agro-ecological zone by gender (%).

Gender/Zone	Sahelian	Sudanese	North-Guinean	South-Guinean	Sample
Male	4.8	0.0	19.0	19.7	10.9
Female	0.0	12.5	0.0	0.0	3.1
Observations	320	320	320	320	1280

Source: Survey data.

Table 7. Distribution of households according to the use of animal traction by agro-ecological zone (%).

Zone	Households using traction	Households not using traction	Total
Sahelian	21.88 (70)	78.12 (250)	100.0
Sudanese	66.7 (210)	33.3 (110)	100.0
North-Guinean	56.25 (180)	43.75 (140)	100.0
South-Guinean	21.88 (70)	78.12 (250)	100.0
Sample	41.41 (530)	58.59 (750)	100.0

Source: Survey data. Number of observations is presented in parentheses.

Table 8. Level (in CFAF) and significance (in %) of the average annual income by adult equivalent by agro-ecological zone.

Zone	Sahelian	Sudanese	North-Guinean	South-Guinean	Sample
Non-farm income	8,385.78	8,102.44	11,514.52	18,044.68	11,349.73
Share in the total income	25.9	25.0	35.8	23.9	25.2
Observations	320	320	320	320	1280

Source: Survey data.

Table 9. Make-up of the non-farm income according to source and by agro-ecological zone (%).

Source of income	Sahelian	Sudanese	North-Guinean	South-Guinean	Sample
Local activities	63.8	88.1	99.3	100.0	87.8
Non-local activities	36.2	11.9	0.7	0.0	12.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Observations	320	320	320	320	1280

Source: Survey data.

Sudanese zones (Table 8). Overall, non-farm activities were found to contribute about 25% of the total household income. Disparities were observed between zones, with the average household from the north-Guinean zone deriving more than 35% of its income from off-farm activities. More generally, the non-farm income was found to be more significant in the zones with a high farming potential. This finding corroborates with those from earlier studies (Reardon, 1988, 1992).

From the analysis of the non-farm income according to the origin of activities emerge two patterns: in the Guinean zones the non-farm income basically comes from local activities while in the Sahelian and Sudanese zones the distribution of the non-farm income is more diversified between local and non-local activities. It thus transpires that the non-farm income derived from non-local activities is more significant in the zones with a low potential for farming while the local non-farm income is more substantial in the zones with a high farming potential (Table 9). In the disadvantaged farming areas, diversification tends to be done on a basis external to the area while in the areas suitable for farming the diversification of the sources of income is done locally.

These findings have implications for economic policies. Decisions made in the neighbouring areas and in towns in particular are likely to affect the rural households'

Table 10. Annual average rainfall by study zone from 1998 to 2004.

Year	South-Guinean zone (Banfora)	North-Guinean zone (Boromo)	Sudanese zone (Yako)	Sahelian zone (Djibo)
1998	1170.5	1035.4	808.8	678.6
1999	994.9	1006.8	879.2	636.0
2000	1258.4	696.2	614.1	326.4
2001	817.1	840.1	769.2	572.7
2002	869.7	647.4	500.8	447.5
2003	1226.0	1040.4	867.3	620.7
2004	961.9	874.0	598.8	389.2

Source: Data from Burkina Faso's meteorological department, Burkina Faso.

incomes. Reardon et al. (1988) have demonstrated how a policy decision like free housing that was instituted in Burkina Faso in 1985 considerably affected the income of the households in the Sahelian zone who get substantial incomes from building activities in towns like Ouagadougou. It is therefore, important to take into account such possible effects on rural populations while designing and implementing activities that first of all target urban areas. That is why it is necessary to devise a coherent policy that takes into account this type of interaction.

Trends in rainfall

The analysis of the trends in rainfall points to a very high level of fluctuations in rainfall coupled with underlying shortages of rain. The south-Guinean zone is the area that gets the most rain in the country, it can get up to 1200 mm of rainfall per year. On the other hand, the Sahelian zone is the most arid area of the country, it often gets less than 200 mm of rainfall per year. This insufficient rainfall is very often coupled with a bad distribution of rains in time. Such a situation shows how it is necessary for households to put in place an anti-risk strategy by diversifying their sources of income (Table 10).

Econometric results

The results of the model of the diversification of the sources of income for households in Burkina Faso are summarised in Table 11. For practical purposes, the Sahelian and Sudanese zones have been grouped into a Sahelo-Sudanese zone, while the north-Guinean and south Guinean zones have been grouped into a Guinean zone.

Non farm activities participation in the Sahelo-Sudanese zone

In this zone, the number of working people in the

household, farm income, the age of the head of the household, his/her level of education, production technology and rainfall are the factors that were found to have a significant effect on the households' participation in non farm activities. The farm income was found to have a negative and significant impact on the probability of factor and non-factor diversification of income. A decline in the farm income brings the households in this zone to resort to these two types of diversification. Thus, in case they get insufficient farm income, the households try to compensate for the deficit by selling their labour force or by engaging in trade.

Rainfall was found to have a mixed effect, it had a negative and significant effect on the factor diversification but a positive effect on diversification in farming. When there is insufficient rainfall, the households in this zone sell their labour force in order to counter the effects of income fluctuations. But when there is enough rainfall, they tend to diversify their sources of income through diversification in farming.

The age of the head of the household was found to have a positive and significant effect on the probability of non-factor diversification of sources of income. This means that the older the head of the household gets, the more he/she tends to engage in non-factor diversification of his/her income. However, this effect was not found to be constant in time, the sign of the quadratic term of age indicates that the diversification probability rises up to a certain age, and then declines. From a certain age the probability of non-factor diversification tends to decline, but this effect was not found to be significant.

The number of working people in the household was found to have a positive and significant effect on the factor diversification strategy, while production technology was found to have a positive effect on diversification in farming.

Non farm activities participation in the Guinean zone

In this zone, the variables that were found to have a significant impact on non farm participation decisions are production technology, farm income, rainfall, the number

Table 11. Results of the multinomial Logit model of diversification strategies by zone.

Variables	Sahelo-Sudanese zone			Guinean zone		
	Factor diversification	Non-factor diversification	Diversification in farming	Factor diversification	Non-factor diversification	Diversification in farming
Constant	0.751	0.943	0.114	0.435	0.136	0.034
Age	0.021	0.061**	0.034	0.067	0.059	0.041
Age square	-0.003	-0.005	-0.017	-0.051	0.032*	-0.045
Working individual	0.026**	0.035	0.009	0.027	0.012	0.008***
Traction	0.101	0.151	0.037**	0.087**	0.052	0.011**
Farm income	-0.011***	-0.013*	-0.004	-0.014**	0.015***	-0.007**
Education level	0.003	0.001*	0.034	0.028	0.008*	0.019
Rainfall in the past year	-0.187*	-0.012	0.035**	0.214	0.0.216**	0.024***
Observations	640			640		
Log likelihood function	-2894.402			-532.811		
Restricted Log likelihood	-3233.574			-637.615		
Chi-squared	678.300			209.608		
Signifiance level	0.000			0.000		

Source: Survey data. ***Coefficients significant at the 1% level, ** coefficients significant at the 5% level, *coefficients significant at the 10% level.

of working people in the household, the level of education of the head of the household and his/her age.

Production technology was found to have a positive and significant effect on the factor diversification strategy and that of diversification in farming, but no significant effect on non-factor diversification. The use of animal traction was found to increase the probability of factor diversification and diversification in farming. This suggests that the use of animal traction enables households to free their workforce for lucrative employment, or to rent their farm equipment, or to better manage the time they allocate to farming, which in turn enables a wider range of types of speculation in farm products.

Farm income was found to have a negative effect on the probability of factor diversification and diversification in farming. This means that when the household is about to reach the frontier in farming, it tends to engage in a different activity, which can lead to non-factor diversification.

Rainfall was found to have a positive effect on the non-factor diversification and the diversification in farming. In other words, sufficient rainfall was found to increase the probability of diversification in farming and non-factor diversification. Indeed, since lack of water is a constraint on production in Burkina Faso, sufficient rainfall in the past year is usually synonymous with a good harvest and the availability of farm produce. This can be traded or used in other processing activities and thus foster a non-factor diversification of sources of income. Moreover, sufficient rainfall can cause farmers to opt for diversification in farming. Since the trends in rainfall in Burkina Faso are irregular, sufficient rainfall in the past year could be followed by insufficient rainfall. In such a case, the

households that anticipate insufficient rainfall could choose to diversify their speculation strategies in order to reduce the farming hazards.

The number of working people in the household was found to have a positive and significant effect on the probability of diversification in farming. In other words, the bigger the number of working people in the household, the more chances this household has of diversifying in farming.

The age of the head of the household was found to have a positive effect on the non-factor strategy of diversifying the sources of income. In other words, the older heads of households tend to diversify their income by doing other things than selling their labour force and engaging in farm activities.

CONCLUSIONS AND IMPLICATIONS

Focusing on the analysis of non-farm activities, this paper has enabled us to demonstrate that the non-farm income was a non-negligible component of household total income irrespective of which agro-ecological zone was studied. But this type of income was found to be an even more significant component in zones with a strong potential for farming. It thus seems that the development of non-farm activities is correlated with the farming potential of the zones concerned. By analysing the structure of the non-farm income, one realises that the diversification of sources of income in the Guinean zone has a local base, while in the Sudano-Sahelian zone households tend to carry out diversification outside the zone itself.

The analysis of non farm activities participation, decisions has brought to the fore the important role played by the farm income, production technology, the size of the household, the level of education of the head of the household, his/her level of education, and rainfall in the non farm activities participation in the rural area of Burkina Faso.

In the Sahelo-Sudanese zone, the number of working people in the household, the farm income, the age of the head of the household, his/her level of education, production technology and rainfall are the factors that have a significant effect non farm activities participation. In the Guinean zone, the variables that have a significant effect on these strategies are production technology, the farm income, rainfall, the number of working people in the household, the level of education and age of the head of the household. These findings suggest that economic policies that are aimed at improving the farm income, the farmers' production equipment, the level of education and of health can have secondary effects on non farm activities participation. Furthermore, the fact that participation strategies vary with zones suggests that the geographical factor must be taken into account in the implementation of policies aimed at diversifying sources of income in the rural area. National overall policies must give way to targeted policies by zone.

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