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Characterization of Link between Migration and Local non-agricultural Diversification of Rural Households in Folona (Mali)

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Abstract This article deals with the practice of extra-agricultural activities in Folona, Mali. The main objective is to determine the link between migration and local non-agricultural diversification. Based on the estimation of a multivariate tobit model, we characterized the link between the two social phenomena. The estimate shows that there is simultaneity between migration and local non-agricultural diversification. The migration ratio has a negative and significant impact on the ratio of local non-agricultural diversification. The increase in the number of migrants in the household discourages the practice of local non-agricultural diversification in order to support agricultural production.

Keywords: *migration, local non-agricultural diversification, household, Folona*

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1. Introduction

Non-agricultural activities are important in the risk management behavior of rural households. In Mali, at the local level, households practice trade, crafts, transport, wage labor, gardening, picking,.. and migration at the national and/or international level (39.7% of the Sikasso population migrate to Africa and 6.2% outside Africa). Insufficient harvests are reported to be the main reason for the majority of migrants leaving for migration in Sahelian areas. [1] in the study on migration as strategies for adapting to climate variability in Sahelian areas show that the cotton crisis is encouraging new departures in southern Mali. In the Kayes region (first in terms of emigrants from Mali), migration is an act of insurance against income shocks within the household or community [2].

[3] shows that in northern Nigeria, households reallocate resources to off-season market gardening and off-farm activities to smooth their consumption. In the mid-1980s in Burkina Faso, diversification in non-agricultural activities allowed households to mitigate drought shocks [4,5]. According to [6], households in the Sahel zone manage drought shocks through engagement in non-agricultural activities. They find that this commitment is more pronounced in the Sahel zone than in the Sudanese zone. In the same way, [7] also show that poaching is practiced by households in Tanzania as part of responses to agro-climatic shocks. [8], summarize these results by the fact that farm households have to reassign work to other formal non-agricultural activities (hunting), or to informal non-agricultural activities (weaving, brewing,...) in case of poor harvest or loss of livestock.

Diversification of income sources is a strategy adopted by households to manage risks in developing countries [9]. This diversification is oriented towards non-agricultural activities and reduces the overall variability of household incomes. For example, an assessment of the risks to farm household incomes in China and Vietnam indicates that income diversification plays a key role in household income management [10].

Farm households use other sources of income. [11], on Ethiopia, in 2012 finds that non-farm income acted as an insurance or safety net after a shock. These incomes (from paid work or self-employment) increased while those from agricultural activities were significantly negatively affected by agricultural shocks. The increase in non-farm income offset the negative effects of a shock on income. [12] analyze consumption insurance and vulnerability to poverty in Bangladesh, Ethiopia, Mali, Mexico and Russia. They find that households manage income risk by trying to obtain second wage employment (Russia and Mexico), informal economic activity (Russia), receiving remittances (Russia, Mali, Mexico and Bangladesh), obtaining a loan (Mali, Ethiopia, Bangladesh, Mexico and Russia), and selling poultry and livestock (Bangladesh, Mali, Mexico and Russia).

In Mali, in the Kayes region, according to [13,14], because of the moral hazard problem, migration

negatively influences agricultural production. [15] study corroborates this, only 3.3% of remittances are committed to agriculture. Based on data from a survey of 787 farm households in northeast China, [16] estimate an agricultural yield function and show that transfers only partially compensate for the loss of labor as a result of migration. Using the results of their econometric analysis, they estimate that migration leads to a 14% drop in agricultural yields. Still on China, these results are in line with those of [17]. These find a negative effect of migration caused by the loss of labor but which is offset by income transfers. Migrants contribute directly to household incomes and indirectly stimulate their agricultural production.

Household risk management can occur in two stages: *ex ante* and *ex post*. According to [4,18,19] *ex ante*, households can smooth incomes by making production or employment choices and diversifying economic activities, *ex post*, they smooth consumption through borrowing and saving, accumulation of non-financial assets, adjustment through labor supply. To address the cereal food deficit observed during the lean season, Folona households are using internal risk management strategies such as migration and local non-farm diversification. African farmers engage in the practice of diversifying activities, especially non-agricultural activities, as they constitute an important source of income for them, in order to minimize the risks associated with agriculture or agricultural income [20,21].

All these authors try to highlight the importance of non-agricultural activities in agricultural risk coverage, but they do not specifically address the relationship that may exist between migration and local non-agricultural diversification. Hence, this explains our interest in this problem. Are Folona's households more migrants than practicing extra-agricultural diversification? The objective of this article is to determine the link between migration and local non-agricultural diversification practiced by Folona households. We test the hypothesis that, in practice, migration and local non-agricultural diversification are complementary strategies of diversification.

2. Methodology

2.1. Data Collection Methodology

The data in this article were obtained in 2012 from the farm household surveys as part of the training support of the Training of Trainers Program (TTP) of the Rectorate of the University of Bamako (Mali). A four-module questionnaire was designed. The first module concerns the identification and general information of households, the second concerns cereal production and consumption. The third and fourth modules cover the different activities performed by household members. At this level, two forms are distinguished, local non-agricultural diversification activities and migration. For the survey, six villages in the communes of Kadiolo, Zégoua and Misséni were selected according to a reasoned choice that is to say according to the practice of non-agricultural diversification and their accessibility.

The households to be surveyed are first of all per commune according to the weight of the latter as a whole. In the same way, they are determined by village. Thus, out of a total of 232 households to be surveyed, 53% come from the commune of Kadiolo, 27 from Zégoua and 20 from Misséni. Table 1 provides a breakdown of the number of households to be surveyed by village and commune.

Table 1. Distribution of the number of households surveyed by village

Com.	Kadiolo		Zégoua		Misséni	
Villag	Kambo	Lofiné	Fanidiama	Katèlè	N'goko	Katiélé
Nb. Households	52	71	52	11	25	21
Total	123		63		46	

Source: Survey data author, 2012.

2.2. Data Content

It is recognized that the demographic characteristics of households are decisive in their behavior in meeting cereal food needs. They focus on gender, age of the head of household, number of women, number of children with an education level, level of education of the head of household, number of adults (the number of young and adults are usually the assets of the household) and old persons in the household.

The rural economy is multisectoral, the weight of non-agricultural activities in a rural study can no longer be ignored. The same applies to labor input, the effective allocation of which can contribute to increasing the income of household members. Migration through in-kind or cash transfers has become important and is a significant contribution to households' risk management behavior. It is therefore useful to enter these variables. Thus, as non-agricultural activities we have on the one hand local non-agricultural activities and on the other hand migration.

The data collected on local non-agricultural activities in this study cover the causes of the practice of these activities, the financing of a household member at the beginning of the activity, the types of activities and the number of practitioners, the period (seasonal or permanent work), the place and the income derived from the activity.

In relation to migration, which is the second largest source of non-farm household income, the data refer to the experience of the head of the household in migration, emigrants and migrants within the country, the nature (species or nature) and frequency of remittances (cash or in kind) received, the income of migrants.

3. Econometric Model

To address the joint decision to engage in local non-agricultural diversification and migration, we seek to characterize or establish a link or relationship between the two socio-economic phenomena (migration and local non-agricultural diversification) in the Folona. According to [22], in these models, specification requires the writing of multiple equations linked together through variables that appear in several equations. He argues that single-equation models are sometimes insufficient to study complex economic phenomena.

Indeed, some components of the migration and local non-agricultural diversification ratios are censored at zero. However, since these subgroups of ratios are generated simultaneously, it is unlikely that the perturbations of the respective equations are independent [23]. One way to address these two problems would be to aggregate the components of the two economic phenomena. In this way, the problem of censorship no longer exists and we do not have to worry about the inter-relationship of the different socio-economic phenomena studied [24].

However, aggregation hides important elements that underlie the structure of phenomena and implicitly imposes the restriction that the components of migration and local non-agricultural diversification are perfect substitutes.

Thus, we want to analyze the determinants of the different components of the ratios with censorship problems and the correlation of error terms (simultaneity).

The Tobit model is the classic tool for dealing with censorship of dependent variables. However, the univariate Tobit model cannot take simultaneity into account. Since the error terms of the different ratio components are likely to be correlated, we must model the equations using the multivariate Tobit model, which is a generalization of the tobit model developed by [25] and the bivariate tobit [26]. Referring to [27] and [24], which assumes a variable *yi* the dependent variable; X, the matrix of explanatory variables and θ all the parameters to be estimated. The equation system from *i to M* can therefore be written as follows (by removing the indices at the observation level):

$$y_i = Max(f_i(X;\theta+\varepsilon_i,0), i=1,...,M \qquad (1)$$

Where εi represents a specific equation of error terms. Indeed, the equation system (1) must be understood in two levels of formulation: for *i* such as *yi* = 0, we speak of censored data and for *i* such as *yi*>0, we speak of complete data.

Formally we will have:

$$\begin{aligned} y_i &= d_i[f_i(X;\theta)+\varepsilon_i], \qquad i=1,.....,M \\ d_i &= 1[f_i(X;\theta)+\varepsilon_i \succ 0], \qquad i=1,.....,M \end{aligned} \qquad (2)$$

Where the expression

$$1[f_i(X;\theta)+\varepsilon_i \succ 0]$$

is an indicator function taking the value 1 if

$$f_i(X;\theta)+\varepsilon_i \succ 0$$

and 0 if not. The error term vector defined by

$$\varepsilon=[\varepsilon_{11},.....,\varepsilon_M]$$

will allow a parametric estimate, assuming zero mean and covariance Σ multivariate normal errors (Yen and *al.*, 2003). In the case of our study, *yi* corresponds to the ratio of non-farming activity practiced by the household that we note by $Ratio_i$. The functions *fi* are flexible forms [27].

We choose to correct heteroscedasticity using the robust standard deviation (HCSE) method. This choice is justified by the fact that White's variance matrix gives consistent (or convergent) and unbiased estimates of the "true" values of the variances-covariances of the parameters, with a sufficiently large N.

The endogenous variables are, on the one hand, the ratio of the number of adults engaged in non-agricultural diversification activities to the total number of adult household members (RATIO_DIV), and on the other hand, the ratio of the number of migrants to the number of potential men subject to migration (RATIO_MIG).

We estimate the model below using the maximum likelihood method:

$$\begin{cases} RATIO\_DIV = \alpha 1 + \alpha 2 Age\_inf50 + \alpha 3 Age\_5060 \\ \qquad\qquad + \alpha 4 Nb\_fem + \alpha 5 Niv\_fond\_fr \\ \qquad\qquad + \alpha 6 Tosuc + \alpha 7 Inc\_agri\ \alpha 8 Inc\_mig \\ \qquad\qquad + \alpha 9 Ratio\_mig + u1 \\ \\ RATIO\_MIG = \beta 1 + \beta 2 Age\_inf50 + \beta 3 Age\_5060 \\ \qquad\qquad + \beta 4 Nb\_fem + \beta 5 Niv\_fond\_fr \\ \qquad\qquad + \beta 6 Mig\_CM + \beta 7 Dur\_1020 \\ \qquad\qquad + \beta 8 Dur\_sup20 + u2 \end{cases}$$

Where αi and βi are the vectors of the coefficients that we will try to determine, and *ui* the error terms with i =1or 2.

The problem with simultaneous equation models is usually identification. The conditions and criteria for identification are well defined in [22]. Referring to it, and to paraphrase it, an equation *i* is said to be identified if $\mu_i = n' + n'' - 1$; μ being the number of effective restrictions, n' the number of identities and n'' the number of equations of the model. The equations of our system verify these conditions.

We define the age of the head of household according to three categories: leaders under 50 years of age (Age_inf50), between 50 and 60 years of age (Age_5060) and over 60 years of age (Age_sup60). We choose the third category as a reference and assume that both forms of diversification - local and migration - are positively correlated with the age of the household head.

In addition, the number of women (Female) is expected to have a positive impact on the migration ratio. Indeed, in Folona, all resident members must contribute to the collective agricultural production of the common field, as happens in Senegal in the groundnut basin [28]. Thus, we believe that a high number of women in the household increases the potential family labor force, thus allowing some men to free themselves from agricultural work to engage in migration. However, we hypothesize a negative relationship between the number of women and the ratio of local diversification, as women spend more time on agricultural and domestic work.

Finally, to assess the effect of human capital investment, we include the variable: number of household members with a basic level of education in French (Educ). Education increases the likelihood of engaging in non-agricultural activities, particularly those that are the most highly paid [8,29,30]. Empirical studies in West African countries have found a positive relationship between educational attainment and the probability of engaging in non-agricultural activities [31,32,33]. However, [28], shows a negative correlation between the migration ratio and education level in the case of the groundnut basin of Senegal. Indeed, an individual who has attended a French-type school will be able to acquire knowledge and

develop it in different sectors. We hypothesize a positive correlation between the level of education and migration and local diversification ratios.

We introduce into the econometric specification the annual income obtained at the local level, from agricultural and non-agricultural activities.

Two hypotheses can be made about the effect of farm income (Inc_agri) on the ratio of local non-farm diversification. On the one hand, non-agricultural activities at the local level can be financed from agricultural income, because compared to migration, these activities require a fairly large capital investment: hence a positive effect of agricultural income on the ratio of local non-agricultural diversification. On the other hand, high agricultural income can discourage the practice of non-farm activities, which has a negative effect on the diversification ratio.

In addition, farm income is expected to have a negative effect on the migration ratio. The particularity of migrants in the Folona area compared to others such as those in the Kayes region, in the far west of Mali, is that more than ¾ of them are oriented towards Côte d'Ivoire and Burkina Faso. However, the Folona does have a border with these two countries. It is becoming clear that transport costs are much lower than those of migrants from Kayes who are forced to migrate by air (their destination being the European continent). A high agricultural income would discourage potential candidates for migration. A negative correlation is expected between the two.

Also, we introduce transfer income, which is the sum of all transfers resulting from migration. Studies have shown that different family members act collectively to maximize family utility, but also to minimize risk and ease financial constraints through transfers [34,35]. As a result, residents can engage in riskier, but potentially more profitable, activities through transfers. A positive effect is expected if these incomes are used to finance local non-agricultural activities and a negative effect if migrant remittances are low.

As for physical capital, we take it into account across the earth. Land (Tosuc) corresponds to the total area in hectares that is cultivated by the head of household. Indeed, it should be noted that land is perfectly exogenous in the study environment, since it is generally obtained by inheritance and market transactions on land are extremely rare.

In the development economics literature, social capital appears as a relevant variable for migration analysis. Some studies clearly show the major role of social capital, with the importance of networks in the decision to migrate and the choice of emigration location [36]. These networks concern the intra-family level, through kinship, but also the extra-family level through friends and other acquaintances. In this regard, [37] points out that "the concentration of immigrants in some destinations creates a 'family and friends' effect that then channels migratory flows to the same places and facilitates their arrival and integration" (p. 306).

In the case of Mali in particular, the importance of these networks was highlighted by [27]. He shows the importance of the family network, with the presence of close relatives, in the decision to engage in international migration. The family network also reduces the adaptation costs of new migrants.

With regard to the various empirical studies that highlight the importance of networks in the migration process, we integrate two types of variables. A first dichotomous variable (Mig_CM) which takes the value 1 if the headc of household already has a migration experience and 0 if not. And a second polytomial variable (Dur) to see the effect of the practice of migration by the household on the migration ratio.

For the variable (Mig_CM), the choice of the head of the household is justified by his or her social position within the household, as it is expected that his past migration experience will facilitate the departure of other members. We consider migration as a collective decision resulting from an agreement between the future migrant and the leader, and therefore it requires the latter's consent. A leader who therefore has experience of migration in the past can facilitate access to information for the future migrant through his contacts at the place of emigration.

In relation to the variable (Dur), it corresponds to the average number of years spent by migrants in the household during migration. We introduced this variable into the estimate by distinguishing three modalities: a first one where this number is less than 10 years (Dur_inf10). Then, a second, where this number is between 10 and 20 years (Dur_1020) and a third modality, where it is more than 20 years old (Dur_sup20). We take the first category as a reference and assume a positive correlation between migration and the average duration of migrants in migration.

The multivariate tobit therefore provides a robust estimate of the effect of the different explanatory variables on the migration ratio and the local non-agricultural diversification ratio. In order to identify the model [38], some variables must be specific to the analysis of the ratio of local non-farm diversification, while others only explain the ratio of migration. Thus, we have introduced as variables specific to the local non-agricultural diversification equation the migration income that can be used to finance local non-agricultural activities, agricultural income, and total cultivated land. At the same time, in the migration ratio equation, we took into account the experience of the household head in migration and the average duration of migration practice in the household.

Table 2. Descriptive statistics of variables

Variables	Obs	Average	Standard deviation	Min	Max
Ratio_div	232	0,236	0,161	0	0,75
Ratio_mig	232	0,322	0,277	0	0,85
Age_inf50	232	0,228	0,421	0	1
Age_5060	232	0,220	0,415	0	1
Female	232	5,909	3,780	1	25
Educ	232	1,181	1,891	0	15
Tosuc	232	15,065	9,913	1	60
Inc_agri	232	7,232	1,060	1,79	9,24
Inc_mig	232	2,661	2,513	0	8,51
Mig_CM	232	0,487	0,501	0	1
Dur_1020	232	0,211	0,409	0	1
Dur_sup20	232	0,129	0,336	0	1

Source: Our survey data, December 2012.

3. Results and Discussions

3.1. Descriptive Analysis of the Results

3.1.1. The Average Annual Total Transfer of Migrants Received Per Household Involved in Migration and per Village

Figure 1 records the average income transfers received per household and per village. Thus, reading the figure shows that households in the village of Lofiné, in the commune of Kadiolo and those in the village of Fanidiama in the commune of Zégoua receive the highest average annual income transfers (nearly 140,000 FCFA). This is explained by the occurrence of events (marriage, funeral, baptism,...) within the family. The analysis showed that occasional transfers are important in these two municipalities. In addition, the lowest average transfer is observed in the village of Katiélé in the commune of Misséni (nearly 60,000 FCFA).

3.1.2. Amount of Migration Income Transferred Per Emigrant / Internal Migrant and Per Village

Figure 2 shows the average annual transfer per emigrant and internal migrant per village.

An intra-village analysis indicates that the emigrant in Kambo village sends an average of nearly 49,000 FCFA annually to his family, while an inland migrant sends only 23,873.74 FCFA. This may be explained by the fact that the emigrant is engaged in a much more remunerative activity than his domestic counterpart on the one hand and, on the other hand, it may be linked to the financial capacity of each migrant. It should be noted that between the migrant and his family of departure there is no pre-established amount that is transferred. In contrast, in the villages of Lofiné and Fanidiama, the average annual transfers of emigrants and inland migrants are almost equal. In the villages of N'goko and Katélé in the commune of Misséni, the average sending of an emigrant takes precedence over that of his internal counterpart. It is important to note that, of the entire sample, the highest average annual remittance is made by the emigrant from the village of N'goko (66,312.5 FCFA per emigrant) and that it is in the village of Katiélé that the lowest average annual remittance per internal migrant is found (11,111.11 FCFA). The two extreme annual average amounts are recorded in the municipality of Misséni. The weakness of these amounts is explained by the fact that the transfers from this village are occasional and that the households have experienced fewer events. There is also the importance of agricultural income that influences migrants' demand for income transfers in these villages.

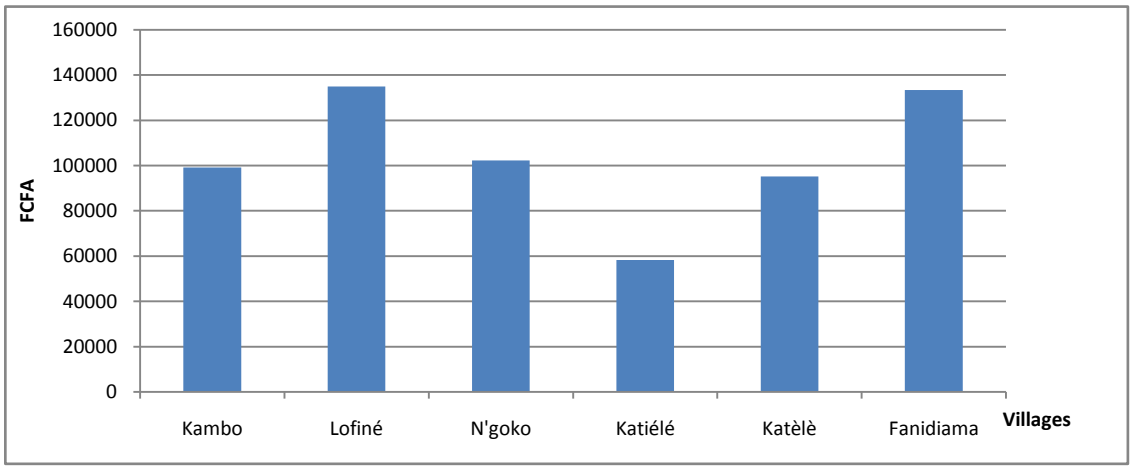

Figure 1. Average annual total income transfer received per migrant household and per village (FCFA)

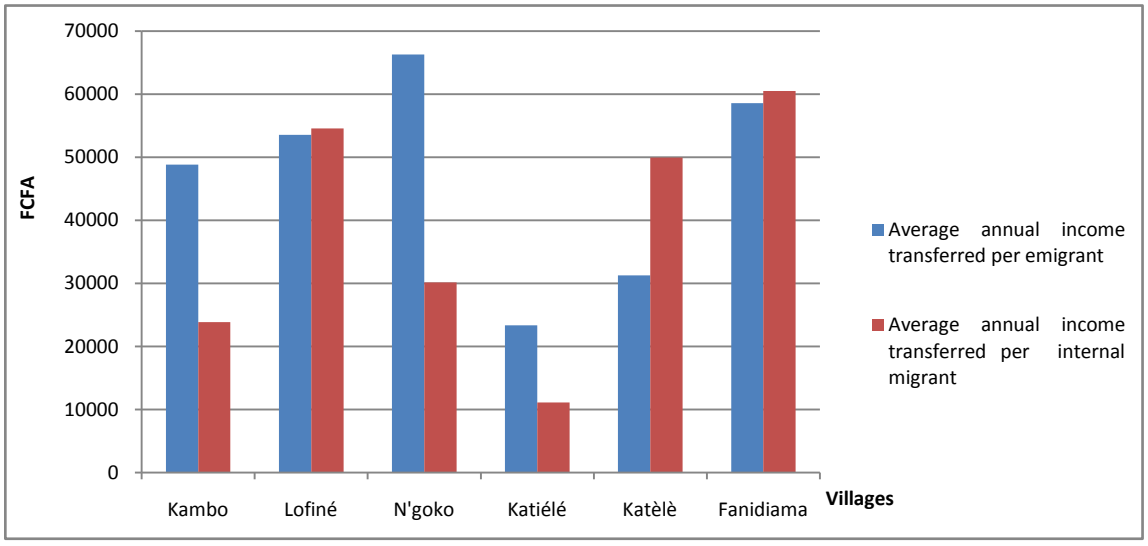

Figure 2. Average annual income transferred per emigrant / internal migrant and per village (FCFA)

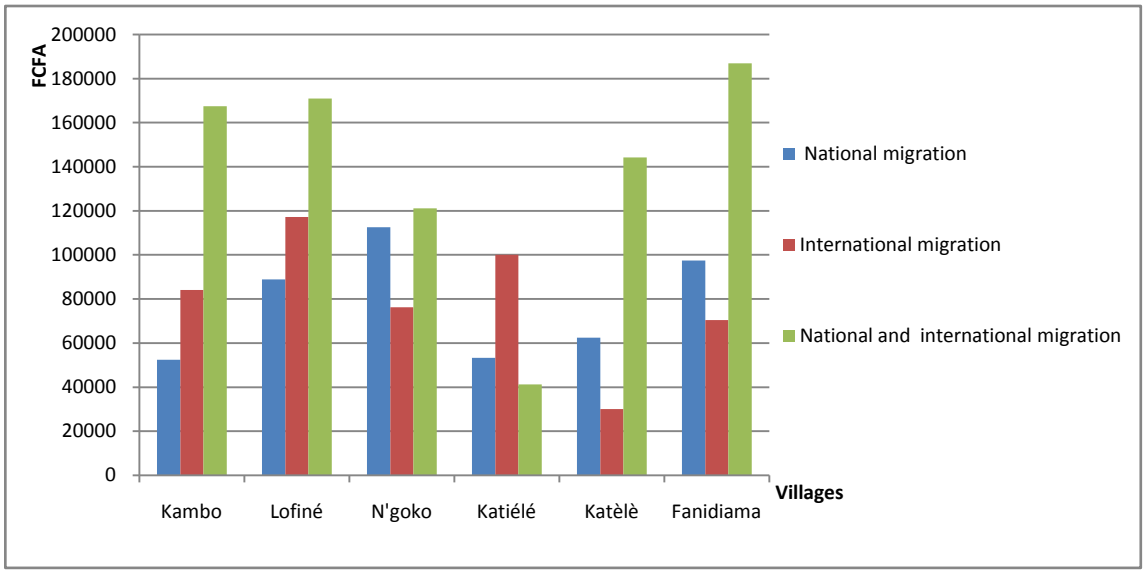

Figure 3. Average annual total transfer per household and per village by migration type (FCFA)

3.1.3. Average Annual Income Transfers of Migrants by Type of Migration

In the Folona, households are involved in three types of migration: national migration (type 1 households) (41 households), international migration (type 2 households) (46 households), and those who practice both types simultaneously (type 3 households) (66 households).

Figure 3 shows the amount of transfers received per household and per village by type of migration or whether the household is involved in either form of migration.

The overall trend, in the entire sample, shows that in the Folona, type 3 households are those who receive on average more transfers 186,911.8 FCFA annually compared to 117,272.7 FCFA for those engaged in national migration and type 2 households come in third place (112,500 FCFA). We say that households that are simultaneously engaged in both forms of migration increase their possibilities of income eligibility.

Intra-village analysis indicates that in the villages of Kambo, Lofiné, N'goko, Katèlè and Fanidiama, type 3 households (those engaged in both forms of migration simultaneously) receive a higher average annual transfer amount than their counterparts who exclusively practice other forms of migration (type 1 and 2 households). In these villages, the difference between transfers is clearly significant in terms of the figure. It is therefore more profitable for a household to multiply or diversify migration locations. We can say that the income transfers received by households increase with the diversification of migration locations in the Folona (see Figure 3).

It is only in the village of Katiélé that households which practice exclusive international migration receive more average annual income.

The results are mixed in terms of comparing national and international migration. In the villages of Kambo and Lofiné, households engaged in the practice of international migration come in second place, while in the villages of N'goko, Katélé and Fanidiama, households are the ones who practice national migration.

3.2. Migration and Local Non-agricultural Diversification: Econometric Results

The multivariate tobit model is estimated using the simulated maximum likelihood technique [27,38,39,40]. Table 3 shows the results of the link between migration and local non-agricultural diversification.

Table 3. Results of the Tobit multivariate model of migration and local non-agricultural diversification ratios

VARIABLE	Ratio_mig	Ratio_div
Age_inf50	0,007 (0,039)	0,107*** (0,038)
Age_5060	-0,021 (0,043)	-0,031 (0,034)
Female	-0,009** (0,007)	-0,001* (0,004)
Educ	0,003 (0,007)	-0,005 (0,007)
Tosuc		-0,002** (0,015)
Inc_agri		0,012 (0,012)
Inc_mig		0,002** (0,005)
Ratio_mig		-0,320*** (0,123)
Mig_CM	0,130*** (0,032)	
Dur_1020	0,234*** (0,034)	
Dur_sup20	0,258*** (0,044)	
Const.	-0,007 (0,038)	0,080 (0,095)
Rho12 = 0.222* (0.119)		
Nb. of obs 232 Wald chi2 (15) = 141,27 Prob >chi2 = 0.0000 Log pseudo likelihood = -44,29 Likelihood ratio test of rho = 0 ; chi2 (1) = 2,895 ; prob >chi2 = 0,088 Standards errors robust in parentheses ***** significant at 1%; ** significant 5%; * significant at 10%**		

Source: Our survey data, December 2012.

The estimation of the multivariate tobit model of migration and local non-agricultural diversification ratios gives the above results. The correlation of the error terms ***(Rho12)*** between the two equations is significant. This confirms our choice of the estimation model that jointly analyses the equations of migration and local non-agricultural diversification. The application of multivariate estimation models is therefore necessary to obtain robust estimates. From this result, we can conclude that in Folona, there is simultaneity between

local non-agricultural diversification and migration. In other words, there is interdependence between the two phenomena.

3.2.1. Migration of Household Members

We propose to discuss below the results concerning the family's migration decision, through the proportion of migrants in the male population of the household.

The age of the head of the household is not significant in the decision to migrate household members. On the other hand, the migration ratio decreases significantly at 5% when the number of women increases. This result is contrary to that obtained by [28], in the groundnut basin of Senegal. We can explain this by the fact that, on the one hand, in the rural areas of Senegal and more particularly in the Folona area, marriage is considered to be a barrier to the massive migration of young people. It is becoming more and more difficult for a man to migrate if he is already married. On the other hand, theoretically in rural areas where all members are involved in agricultural work, a household with more women in it should rely on female labor. However, we note that, at present, women allocate more time to domestic and individual work than to work in the collective field. The fact that women are not constant in collective fields discourages men in the household from migrating, as their departure could create a crucial labor shortage that could have serious consequences on agricultural production, by increasing a food deficit more than the income generated by their migration will be able to compensate.

In addition, the number of household members with a basic level of education in French is positively correlated with the migration ratio, but the effect is not significant.

The importance of social capital is evident in migration. We note that the hypothesis of a positive effect of the average number of years of the migrant has been validated. The proportion of migrants increases significantly (to 1%) for household members who have migration experience for several years. This positive impact, which has been suggested by other authors [for example, [28,36,41] highlights the development of intra-family networks, allowing the migrant to settle more easily in the place of emigration when one of his brothers has been there for years. On the other hand, the migration experience of the head of household in the past is positively correlated with the migration ratio. In the groundnut basin of Senegal, [28] found a negative correlation. This positive correlation can be explained by the fact that the head of the household who has not encountered any difficulties during his migration experience for his integration can better advise new candidates. Through his experience, he can also encourage young people to migrate. Given the collective nature of the migration decision and that candidates do indeed need the consent of the head of the household to migrate, we believe that the head of the household can approve the request for migration on the basis of his or her past experience by providing them with good advice.

3.2.2. Diversification of Local Non-farm Activities of Household Members

The age of the household head influences the ratio of local non-farm diversification. This effect is significant (at 1%) for households whose head is under 50 years of age. The age of the head of household under 50 years is positively correlated with the ratio of local non-farm diversification. This result is explained by the fact that the younger a head of household is, the more suitable he is for agricultural work. It is itself a potential workforce, so members can practice local non-agricultural diversification.

We find that there is a negative correlation between the number of women in the household and the diversification ratio. The effect is significant at 10%. Indeed, the more women in a household, the lower the ratio of local non-agricultural diversification will be. The reason is quite simple, because women spend more time on domestic and personal activities than on agricultural work. This prevents some household members from engaging in local non-farm diversification to better focus on agricultural activities.

We note a negative but not significant effect of the number of household members with a basic level of education in French.

The land allocation has a negative impact on the ratio of local non-agricultural diversification. The significance of this effect shows that there is no speculation around land to support investment by local non-agricultural activities. Beyond that, it shows that the increase in the number of hectares cultivated discourages local non-agricultural activities through the amount of agricultural work.

Farm income is positively correlated with the ratio of local non-farm diversification. But the effect is not significant.

In addition, migrant remittance income and the ratio of local non-agricultural diversification are positively and significantly correlated. Migration income promotes the engagement of household members in local non-farm activities. Migrants' remittances are used to finance local non-agricultural activities.

We introduce the migration ratio to take into account the interaction between local non-agricultural diversification and migration.

The migration ratio has a negative impact on the ratio of local non-agricultural diversification. The effect is significant at 1%. These results confirm those of [28] and invalidate those of [42]. The increase in the number of migrants in the household would significantly reduce the number of candidates for local non-agricultural diversification hence, the reflection of the arbitration between the two phenomena. In other words, when the household has more candidates for migration, there will be fewer members engaged in local non-agricultural diversification. Therefore, there is substitutability between the two phenomena. Hence the reversal of the hypothesis that migration and diversification are complementary strategies in the behavior of Folona households.

4. Conclusion

This article, which uses 2012 survey data, funded by the Bamako Rectorate, on a sample of 232 households, characterized the link between migration and local non-agricultural diversification in the Folona. Estimating the multivariate tobit model of migration and local non-agricultural diversification ratios reveals a simultaneity

or interdependence between the two phenomena. It also shows that migration and local non-agricultural diversification are substitutable strategies. This invalidates the basic assumption. This reversal is explained by the fact that when there are more people leaving for migration, the number practicing local non-agricultural diversification must decrease to enable the household to cope with agricultural work.

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