Factors Affecting Poverty and Nonfarm Diversification among Households in Rural Cameroon

This paper seeks to identify factors that affect poverty status and diversification into nonfarm activities in rural Cameroon. To address this objective, we use the bivariate probit model and the pooled records of the 2007 and 2014 Cameroon household consumption surveys. We find that a percentage point increase in the neighbourhood poverty rate increases the probability of a household falling into poverty and diversifying into nonfarm activities by about 0.32%. We also find that a percentage point increase in the neighbourhood diversification rate increases the probability of a household falling into poverty and diversifying into nonfarm activities by about 0.54%. We further find that, compared to no education, some level of education increases the probability of poverty alleviation by diversification into nonfarm activities –more so for those with higher levels of education. Additionally, we find that distance to the regional headquarters, access to the media, age of household head, household size, access to farmland, and being a female head reduces the probability of a household falling into poverty through diversification into nonfarm activities. The implication of these findings is that improving access to socioeconomic infrastructures/endowments would enable the creation of a window of opportunities for poverty alleviation in rural settings.

Keywords: Cameroon, Nonfarm diversification, Rural poor and Bivariate probit model.

Introduction

Seeking ways to reduce poverty and improve the livelihood of farm households has been a major policy challenge in both developed and developing countries. Recent statistics have shown that more than 820 million people in the world are still hungry today, underscoring the immense challenge of achieving the Zero Hunger target by 2030 (FAO, 2019). Related to the above situation, the Cameroon National Institute of Statistics (CNIS) reveals that, about 54.6% of households practice agriculture to ensure their livelihood. This activity is mostly practiced in the rural areas (81.8%) against 20.6% in the urban areas.

In line with these statistics, in 2014, 56.8% of the rural household were poor compared to 55.0% in 2007, with the most affected regions in Cameroon being; the Far North, North, Adamaoua and the Northwest regions with the poverty rate fluctuating between 40% - 75% in 2014 and between 51.0% - 66.0% in 2007. Despite a drop in the incidence of poverty, the poor in terms of numbers has increased from 7.1 million in 2007 to 8.1 million in 2014. Just as in 2007, out of 10 poor persons 9 of them were rural dwellers (CNIS, 2014). The national poverty rate, which measures the percentage of the population living below the national poverty line dropped from 53.3% in 1996 to 40.2%
in 2001, but remained nearly stagnant from 2007 - falling slowly from 39.9% in 2007 to 37.5% in 2014 (CNIS, 2014).

Given that poverty, under-nutrition and food insecurity is so widespread in SSA, there has been a long-standing concern by national governments, nongovernmental organizations and international development agencies on how to reduce these problems. Among the many policy options that have been suggested, two are particularly prominent. The first is to improve agricultural productivity with the aim of achieving food security through self-sufficiency, while the second is to promote investment in the nonfarm sector in order to provide alternative income earning opportunities for rural households (Davis et al., 2014) who can then buy food.

Despite the different measures taken by governments, the national as well as the rural economy still rely on the agricultural sector, which is characterised by low labour productivity, declining farm sizes, an aging of plantations and planters, subsistence farming, soil degradation, inadequate and variable rainfall, tenure insecurity, weak agricultural research base and extension system, lack of financial services, imperfect agricultural markets, and above all, poor infrastructure (Degefe & Nega, 1999).

In rural areas of developing countries, in general, and Cameroon in particular, labour market participation is the major source of income for many landless and small farm households. In spite of the high potential of the nonfarm sector in generating employment, they are seldom covered by pro-poor government interventions and strategies. Thus, identifying the factors that affect poverty status and nonfarm diversification decisions of rural farm households is important to inform public policy debates that seek to make rural farm households broaden their livelihood strategies.

However, studies on the nonfarm participation decision of developed, less developed and Cameroon farm households, in particular, are still rare. A glimpse in the literature reveals that a good number of studies attempt to address the determinants of the probability of diversification (Abdul Aziz et al., 2017; Agyeman, 2014; Asfaw et al., 2017; Beyene, 2008; Tshabalala, 2020; Weldegebriel et al., 2015). Some of these studies attempt to address the determinants of the probability of diversification focusing on the male and female differences, the degree of income diversification and the nature of diversification. Moreover, the available literature does not consider the economic status of the farm households in the diversification process: a situation which can give more insight to the policy makers to design more appropriate interventions to improve on rural household nonfarm diversification processes to ameliorate their livelihood options.

In this context, the objective of this article is to investigate the determinants of poverty status and nonfarm diversification in rural Cameroon. This objective is guided by the presumption that nonfarm diversification is a credible poverty reduction channel for rural farm households. The rest of the article is organized as follows: Section two reviews the literature. Section three
describes the modelling strategy. Section four presents and discusses the empirical results and Section five presents the conclusion.

Literature Review

According to Becker (1965), based on the push and pull theory of diversification at the micro-level, farm households are viewed as individual, rational actors, who decide to diversify into nonfarm activities on the basis of a cost-benefit calculation and are expected to be able to make choices to earn the highest returns. Farm households are production units which maximise utility by combining time and other inputs to produce output, subject to price and resource constraints. Diversification is seen as a function of returns to labour from farm activities compared to off-farm - including nonfarm activities (Singh et al., 1986). In keeping with this theory, combinations of push and pull factors therefore determine the type of diversification strategy pursued by a given household. Diversification into nonfarm activities may occur as a deliberate household strategy to improve standards of living or as an involuntary response to crisis/shocks depending on the characteristics of the households (Ellis, 1998).

Following the push-pull theory, dynamic rural households are either pushed or pulled into nonfarm activities. The push factors that typically trigger or force rural farm households to involuntarily seek additional livelihood activities outside farming include - seasonality of agriculture, low farm income, large family size, land constraints driven by population pressure and fragmented land holdings, missing or incomplete factor markets (land, capital, labour), and market access problems due to poor infrastructure and high transaction costs (Barrett, Reardon et al. 2001; Ellis 2000b). These factors are especially operative in high-risk and low-potential agricultural environments, which are subject to drought, flooding and environmental degradation (Haggblade, Hazell & Reardon 2010). They are survival-led type of enablers of diversification, whereby poorer rural farm households are pushed to engage in low-return nonfarm activities to ensure survival, and reduce vulnerability of falling deeper into poverty (Haggblade et al. 2007).

Meanwhile, pull factors are opportunities that motivate rural farm households to deliberately expand their livelihood activities outside farming. Such nonfarm opportunities may include favorable demand for non-agricultural goods, higher returns on non-agricultural activities, improved infrastructure, proximity to an urban area, improvements in market access, growth of rural towns, development of labour markets, and improvements in education and technology (Barrett, Reardon et al. 2001; Woldenhanna & Oskam, 2001; Haggblade et al. 2007; Beyene, 2008; Losch et al. 2012). These factors are associated with opportunity-led type of diversification that occurs when wealthier rural households engage in high-return nonfarm activities, with asset accumulation objectives, in order to increase their incomes and maximize returns from their assets (Haggblade et al. 2007). In this regard, securing better
living standards through diversification is a cumulative process that requires the ability to generate cash, invest in assets and diversify across activities (Freeman et al., 2004).

A review of empirical literature in both developed and developing countries on the determinants of nonfarm diversification reveals that the factors are diverse in nature with no uniqueness in the direction and magnitude on household nonfarm diversification. Nagler and Naudé (2017) based on data from Ethiopia, Malawi, Niger, Nigeria, Tanzania and Uganda, find evidence that both pull and push factors influence households to own nonfarm enterprises. Shehu and Abubakar (2015) establish that the decision to participate in nonfarm enterprises in rural Nigeria is determined by household endowments, community characteristics, household size and household head characteristics. Senadza (2012), applying the poisson regression to examine the pattern and determinants of nonfarm income diversification in rural Ghana using data from Ghana Living Standards Survey (GLSS) conducted in 2005 and 2006 on 8,700 households, notes that household characteristics such as age and education, access to credit, electricity and markets are the main determinants of nonfarm activities and income.

Atamano and Berg (2011) use two national household budget surveys from the Kyrgyz Republic and analysed factors influencing participation and returns from different types of nonfarm activities for 1,800 rural households in 2005 and 2006. They applied probit model for primary participation in nonfarm activities and the double-hurdle model to determine participation and income from nonfarm activities. They find that human capital (education), gender, access to infrastructure and cash resources determine both accesses to nonfarm activities and the size of income from the activities.

In a study in West Bengal, Khatun and Roy (2012) found that the extent to which rural households diversify their livelihoods depends on a variety of factors, some of which include experience, family size, skills, educational attainment level, physical assets and households’ access to credit. The study also revealed that “poor asset base, lack of credit facilities, lack of awareness and training facilities, fear of taking risk, lack of rural infrastructure, and lack of opportunities in nonfarm sector” are key main inhibiting factors to livelihood diversification at the household level.

Mesele (2018) assessed the determinants of rural nonfarm livelihood diversification among farming households across two agro-ecologically distinct rural settings (Weynadega and qola) in South Eastern Tigray using a Cross-sectional survey, and found that push rather than pull factors play a significant role in motivating households to diversify their livelihoods to nonfarm activities. Household size and farm land holding size were among the determinants of diversification. In a study in Western Kenya, Lay et al. (2008) found that declining farm sizes and related declines in soil fertility force land poor households to diversify into nonfarm activities to ensure survival.

In an earlier study, Asmah (2011) found that better access to local community markets and public transport were positive and significant in promoting nonfarm activities and that more diversified households enjoyed
higher welfare as a result. This view is supported by Barrett et al. (2001) and
Oseni and Winters (2009) who found that better access to markets significantly
increased participation in nonfarm activities. In a similar endeavour, Losch et
al. (2012) found that opportunities available for farm households to engage into
higher nonfarm income earning activities that can lead to accumulation seem to
be more available in areas with better endowments in terms of agricultural
potential, market access, proximity to urban centres and better infrastructure
such as roads.

Using three national surveys from rural Peru from 1985-97, Escobal
(2001) examined the determinants of nonfarm income diversification of 2,284
households. The results showed that households with sufficient education,
access to credit, roads and electricity are able to take on nonfarm employment
such as handicrafts making, repairing and renting equipment and trade. In a
similar fashion, Ruben and Berg (2001) use national income and expenditure
surveys from 1993 to 1994 and the Logistic regression framework to analyse
the correlates of nonfarm diversification among 2,727 rural households in
Honduras, and found that education, large household size, and having more
female adults are the main determinants of nonfarm diversification.

From the above reviews, it could be noticed that the available literature
does not consider the economic situation of the farm households, their
neighbourhood poverty rates and the neighbourhood diversification rates in the
diversification process: a situation which can give more insight to the policy
makers to design more suitable interventions to improve on poor rural
household nonfarm diversification processes to improve their livelihood
strategies.

Methodology

Modelling the Determinants of Poverty Status and Nonfarm Diversification

In order to identify the determinants of the probability of engaging into
nonfarm diversification by the poor households in rural Cameroon, this article
employs a bivariate probit model to simultaneously estimate the probability of
engagement into nonfarm activities conditioned on the probability of being
poor. Our choice of the bivariate probit is motivated by the suspicion that the
unobserved variables in the poverty and nonfarm diversification equation are
correlated. Such a possibility cannot be ruled out a priori. As such, this model
permits us to control for the correlation among the two related outcomes (Li et
al. 2016).

To model rural poor households’ nonfarm diversification in this article, the
dependent variables are whether the rural household is poor or not and whether
the rural household engages into nonfarm activities or not. We observe P =
(1/0) and NFD = (1/0) as choices depending on some unobservable continuous
latent variables $P^*$ and $NFD^*$ for status, as well as for the diversified status of
farm households, respectively. These choices can be modelled using the following latent regression framework:

\[ P^* = \phi_0 + \phi_k W_k + \varepsilon_1, \quad P = 1 \text{ if } P^* > 0 \text{ and } P = 0 \text{ if } P^* \leq 0 \]  

(1a)

\[ NFD^* = \beta_0 + \beta_k W_k + \varepsilon_2, \quad NFD = 1 \text{ if } NFD^* > 0 \text{ and } NFD = 0 \text{ if } NFD^* \leq 0 \]  

(1b)

\[ P^* > 0 \text{ when household total expenditure per adult equivalent falls below the poverty line and } P^* \leq 0 \text{ for the nonpoor, while } NFD^* > 0 \text{ when the net utility of diversification into nonfarm employment is positive and } NFD^* \leq 0 \text{ when net utility is negative}; \]  

\( W \) is the vector of exogenous variables that explain poverty and rural households’ engagement in nonfarm activities. These variables include- education captured by different levels of schooling, age of the household heads captured in years, household size measured in numbers, gender captured as a dummy variable (female =1, and 0 otherwise), farmland (access to farmland =1, and 0 otherwise), marital status (married =1 and 0 otherwise), radio (radio access=1, and 0 otherwise) and the time or year-dummy which takes the value one for 2014 and zero for 2007 records. Other included variables captured as continuous variables are neighbourhood proportion of poverty rates, neighbourhood proportion of nonfarm diversification rates, and distance between the 58 divisional and ten regional headquarters in Cameroon. The vector \( \phi \) and \( \beta \) are parameters to be estimated and \( \varepsilon_1 \) and \( \varepsilon_2 \) are the error terms.

If \( \varepsilon_1 \) and \( \varepsilon_2 \) are assumed to be normally distributed, then equations (1a) and (1b), can be represented in a probability format as the probit model in equations (2a) and (2b):

\[ \text{Prob } (P = 1 \mid X) = \Phi (\phi_0 + \phi_k W_k) \]  

(2a)

\[ \text{Prob } (NFD =1 \mid X) = \Phi (\beta_0 + \beta_k W_k) \]  

(2b)

where \( \text{Prob} \) refers to probability; \( X \) and \( \Phi \) refer to the vector of all explanatory variables, and cumulative normal density function, respectively. The rest as defined previously.

The random error terms, \( \varepsilon_1 \) and \( \varepsilon_2 \), are dependent and normally distributed, such that \( E[\varepsilon_1] = E[\varepsilon_2] = 0, \) \( \text{var}[\varepsilon_1] = \text{var}[\varepsilon_2] = 1 \) and \( \text{cov}[\varepsilon_1, \varepsilon_2] = \rho. \) If a Wald Test shows that \( \rho \) is insignificant then the two equations are independent and can be estimated separately as simple probits. If, however \( \rho \) is significant, then indeed Pi and NFDi are endogenous processes (Bertaut, 1998). The probability of a rural household \( i \) engaging in to nonfarm activities given that it is poor is given by:

\[ \text{Prob } (P_i=1, NFD_i=1; X) = \text{prob}(P^* >0, NFD^* >0) = \Phi_2 (X_i \phi, X_i \beta, \rho) \]  

(3)

where \( \Phi_2 \) is the cumulative distribution function for the bivariate standard normal law. Consistent with the definition of conditional probability, the probability of a poor rural household nonfarm diversifying is given by:
\[
\text{Prob}(P_i=1|\text{NFD}_i=1;X) = \frac{\text{Prob}(P_i=1,\text{NFD}_i=1)}{\text{Prob}(P_i=1)} = \frac{\Phi_2(X_i\phi, X_i\beta; \rho)}{\Phi_2(X_i\phi)}
\] (4)

The parameters in the above model were estimated using the maximum likelihood estimator (MLE).

Data Presentation and Descriptive Analysis

Data Presentation

The study made use of secondary data, obtained from the 2007 and 2014 Cameroon Household Consumption Survey. The 2007 survey comprises of 11,391 households was aimed to upgrade knowledge on poverty and welfare status in Cameroon by providing indicators that capture the living standards of the local population in order to be able to follow up efforts made towards the implementation of the poverty reduction strategy paper (PRSP) and the realization of the Millennium Development Goals objectives (CNIS, 2007; 2008b).

On the other hand, the 2014 Cameroon Household Consumption Survey (CHCS) comprises of 10,303 households with the main objectives being to update knowledge about living conditions, carry out the midway evaluation of the implementation of the country’s growth, employment, and sectoral policies, and progress made towards attaining the MDGs. In the two surveys, the principal cities; Yaoundé and Douala were considered as separate urban strata and each of the ten regions was divided into three strata (urban, semi-urban, and rural). Both surveys performed two types of sampling designs depending on the zone of residence. In the main cities of Yaoundé and Douala, a two-stage sampling frame was adopted. For other areas, a three-stage sampling frame was adopted following the sequence city-primary sampling unit-household. Overall, 742 and 1024 primary sampling units were identified in 2007 and 2014 comprising 11,931 and 10,303 households, respectively.

Presentation of Variables

In this contribution, our dependent variables are household poverty status and diversification status. Other exogenous variables include: education of the household head, gender, marital status, farmland access, age of the household head, household size, household size squared, and the year-dummy which takes the value one for 2014 and zero for 2007 records. Additional exogenous variables include distance between divisional and regional headquarters, neighbourhood poverty and diversification rates, and access to media.

Empirical Results

Descriptive Statistics
This sub-section presents the descriptive statistics of the rural households. To be more precise, it presents the descriptive statistics of the pooled data and by diversification status. Table 1 show that approximately 37% of rural households diversified into nonfarm work. Rural dwellers averaged about 7 persons per household. The average age of headships was about 46 years. Female headship represented about 21% and about 72% of rural heads are married. About 53% of the pooled data were recorded in 2014; meanwhile, about 53% of the rural households had access to farmland.

Table 1. Descriptive statistics of the 2007 and 2014 CHCS pooled records

<table>
<thead>
<tr>
<th>Variables</th>
<th>Observations</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonfarm Diversification</td>
<td>8982</td>
<td>0.365</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Poor</td>
<td>9865</td>
<td>0.559</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Age of the household head</td>
<td>9865</td>
<td>46.371</td>
<td>11</td>
<td>99</td>
</tr>
<tr>
<td>Household size</td>
<td>9865</td>
<td>6.891</td>
<td>1</td>
<td>41</td>
</tr>
<tr>
<td>Household size square</td>
<td>9865</td>
<td>64.751</td>
<td>1</td>
<td>1681</td>
</tr>
<tr>
<td>Gender (1 = female &amp; 0 otherwise)</td>
<td>9865</td>
<td>0.205</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>9861</td>
<td>0.717</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Access to Farmland</td>
<td>9865</td>
<td>0.526</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>No level of education</td>
<td>9865</td>
<td>0.385</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Primary education</td>
<td>9865</td>
<td>0.369</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Secondary education</td>
<td>9865</td>
<td>0.216</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Higher education</td>
<td>9865</td>
<td>0.028</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Distance to regional headquarter</td>
<td>9865</td>
<td>94.643</td>
<td>0</td>
<td>396</td>
</tr>
<tr>
<td>Radio Access</td>
<td>9865</td>
<td>0.692</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Year dummy (1 ==2014 and 0==2007)</td>
<td>9865</td>
<td>0.527</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Nonself-cluster proportion diversifiers</td>
<td>8,982</td>
<td>0.321</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Nonself-cluster proportion of the poor</td>
<td>9,865</td>
<td>0.461</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Computed by the author using pooled 2007 and 2014 Cameroon household consumption surveys and Stata 15.1. The values in parentheses are the standard deviations.

In terms of education, which is a vital enabler of nonfarm diversification, the descriptive statistics reveal that approximately 39% of the rural households had no education, about 37% of them had primary education, and about 22% had secondary education, while only about 3% had higher education.
Concerning access to public infrastructure at the regional headquarters captured by distances from the divisional headquarters to the regional headquarters, the descriptive statistics disclose that the average distance from the divisional headquarters to the regional headquarters is about 95km ranging from a minimum of zero to a maximum of 396km. Intuitively, the above statistics could indicate high cost of transportation of the rural households to the city. For radio, which is a medium of transmission of information, the statistics reveal that 69% of the rural households had access to a radio post. Average neighbourhood nonfarm diversification rate was 32%, while the neighbourhood poverty was about 46%.

Table 2 presents the descriptive statistics of the rural household characteristics by nonfarm diversification status. Regarding rural nonfarm diversifiers versus non-diversifiers, in term of the socioeconomic situation of the diversified and non-diversified rural households, the statistics made known that, non-diversified rural households dominate diversified households in terms of poverty with a significant difference of about 9%. This significant difference of about 9% indicates that there is a premium in diversification in terms of overall wellbeing. On average, diversified rural household heads are younger than their counterparts who did not diversify in to nonfarm work. The significant difference of about 4 years could be a pointer to the view that diversifiers have more scope for exploiting labour market opportunities. Large household size remains an issue among rural households with approximately 5 persons per household for both diversified and non-diversified rural households. Base on diversification status, lower proportion of female household heads diversified compared to the non-diversifiers. Marital status does not appear to matter in the choice to diversify.

Diversifiers appear to have lesser access to land than non-diversifiers. This finding is consistent with the observation by Barrett et al. (2001) that limited landholding, will push farm households to work off-farm. Meanwhile, Lanjouw (1999) identified declining farm incomes and the need to mitigate production risks as factors leading to the rise in nonfarm activity among farm households. In addition, Cunguara et al. (2011) also found that as a result of drought, households in Mozambique resorted to off-farm work as a coping strategy.
Table 2. Differences in means of rural households’ characteristics by nonfarm diversification

<table>
<thead>
<tr>
<th>Variables</th>
<th>Non-diversified households Column (1)</th>
<th>Diversified households Column (2)</th>
<th>Difference in means Column (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor households</td>
<td>0.422</td>
<td>0.329</td>
<td>-0.093***</td>
</tr>
<tr>
<td>Age of the household head</td>
<td>46.723</td>
<td>42.460</td>
<td>-4.264***</td>
</tr>
<tr>
<td>Household size</td>
<td>4.673</td>
<td>4.762</td>
<td>0.089</td>
</tr>
<tr>
<td>Household size square</td>
<td>33.730</td>
<td>31.892</td>
<td>-1.838</td>
</tr>
<tr>
<td>Gender (1 = female &amp; 0 otherwise)</td>
<td>0.296</td>
<td>0.239</td>
<td>-0.057***</td>
</tr>
<tr>
<td>Married</td>
<td>0.613</td>
<td>0.623</td>
<td>0.009</td>
</tr>
<tr>
<td>Access to Farmland</td>
<td>0.646</td>
<td>0.348</td>
<td>-0.298***</td>
</tr>
<tr>
<td>No level of education</td>
<td>0.367</td>
<td>0.265</td>
<td>-0.103***</td>
</tr>
<tr>
<td>Primary education</td>
<td>0.404</td>
<td>0.364</td>
<td>-0.040***</td>
</tr>
<tr>
<td>Secondary education</td>
<td>0.205</td>
<td>0.318</td>
<td>0.113***</td>
</tr>
<tr>
<td>Higher education</td>
<td>0.022</td>
<td>0.053</td>
<td>0.031***</td>
</tr>
<tr>
<td>Distance to regional-headquarter</td>
<td>97.114</td>
<td>103.300</td>
<td>6.187***</td>
</tr>
<tr>
<td>Radio Access</td>
<td>0.605</td>
<td>0.740</td>
<td>0.135***</td>
</tr>
<tr>
<td>Nonself-cluster proportion</td>
<td>0.223</td>
<td>0.516</td>
<td>0.293***</td>
</tr>
<tr>
<td>Nonself-cluster proportion of the poor</td>
<td>0.408</td>
<td>0.355</td>
<td>-0.053***</td>
</tr>
<tr>
<td>Number of observations</td>
<td>3387</td>
<td>5595</td>
<td></td>
</tr>
</tbody>
</table>

Source: Computed by the authors using pooled 2007 and 2014 Cameroon household consumption surveys and Stata 15.1. Notes: The values in parentheses are the standard errors.

*** p<0.01; ** p<0.05; * p<0.1 are the 1%, 5% and 10% levels of significant.

Concerning the levels of education, descriptive statistics reveal significant disparities among the diversifiers and non-diversifiers. In essence, diversifiers are typically more schooled than the non-diversified counterparts. Diversifiers appear to be leaving farther away from the regional headquarters than their counterparts who do not diversify, and they also have more access to the radio that their peers who do not diversify. This signals the importance of the radio as a medium for informing household on available nonfarm opportunities. Diversifies register a lower neighbourhood poverty rate that non-diversifiers.
This indicates that diversification is likely to be a well-being enhancing strategy.

**Determinants of poverty and nonfarm diversification status in rural Cameroon**

Table 3 presents the marginal effects of drivers of poverty and nonfarm diversification status in rural Cameroon. Columns (1), (2), (3) and (4) present the marginal effects of being a non-poor and non-diversified household, marginal effects of being a non-poor and diversified household, marginal effects of being a poor and non-diversified household, and marginal effects of being a poor and diversified household, respectively. The results of the Wald test for $\rho = 0$ imply that the bivariate probit model is appropriate for our analysis. This manifestation is an indication that poverty and nonfarm diversification are jointly determined processes that should be estimated simultaneously using the bivariate probit model.

Although all the columns of Table 3 convey useful information on the pair-wise configuration of poverty and nonfarm diversification status, of key importance in our endeavour is Column 4 - the probability of a poor household engaging into nonfarm diversification in rural Cameroon. Results show that a percentage point increase in the neighbourhood poverty rate increases the probability of a poor household engaging in nonfarm diversification in the order of 0.32%. Similarly, a percentage point increase in the neighbourhood diversification rate increases the probability of a poor household diversifying into nonfarm activities by about 0.54%. The above results could be explained by the emulation, diffusion or socio-interaction theories which indicate that people are most likely to adopt behavioural patterns consistent with environmental events in the world around them, and the associated outcomes (Bandura, 1986). The ability to bring anticipated outcomes to bear on current activities promotes foresightful behaviour. It enables people to transcend the dictates of their immediate environment and to shape and regulate the present to fit a desired future. Monitoring one’s pattern of behaviour and the cognitive and environmental conditions under which it occurs is the first step towards doing something to affect it.
Table 3. Marginal effects of determinants of poverty and nonfarm diversification status in rural Cameroon

<table>
<thead>
<tr>
<th>Variables</th>
<th>Marginal Effects</th>
<th>[Poor=0 &amp; Diversifier=0]</th>
<th>[Poor=0&amp;Diversifier=1]</th>
<th>[Poor=1&amp;Diversifier=0]</th>
<th>[Poor=1&amp;Diversifier=1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighbourhood poverty rate</td>
<td>-0.630***</td>
<td>-0.323***</td>
<td>0.629***</td>
<td>0.324***</td>
<td></td>
</tr>
<tr>
<td>Neighbourhood diversification rate</td>
<td>-0.378***</td>
<td>0.455***</td>
<td>-0.621***</td>
<td>0.543***</td>
<td></td>
</tr>
<tr>
<td>Distance to regional headquarters</td>
<td>0.0002***</td>
<td>0.0001**</td>
<td>-0.0002***</td>
<td>-0.0001</td>
<td></td>
</tr>
<tr>
<td>Access to radio (yes=1 and 0= otherwise)</td>
<td>0.051***</td>
<td>0.048***</td>
<td>-0.086***</td>
<td>-0.012</td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td>0.017</td>
<td>0.019*</td>
<td>-0.032*</td>
<td>-0.004</td>
<td></td>
</tr>
<tr>
<td>Secondary education</td>
<td>0.058***</td>
<td>0.118***</td>
<td>-0.170***</td>
<td>-0.007</td>
<td></td>
</tr>
<tr>
<td>Higher education</td>
<td>0.120***</td>
<td>0.258***</td>
<td>-0.292***</td>
<td>-0.085***</td>
<td></td>
</tr>
<tr>
<td>Age of the household head in years</td>
<td>-0.001*</td>
<td>-0.001***</td>
<td>0.001***</td>
<td>-0.0002</td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td>-0.059***</td>
<td>-0.027***</td>
<td>0.054***</td>
<td>-0.032***</td>
<td></td>
</tr>
<tr>
<td>Household size square</td>
<td>0.001***</td>
<td>0.001***</td>
<td>-0.001***</td>
<td>0.001***</td>
<td></td>
</tr>
<tr>
<td>Gender (1= female and 0 = otherwise)</td>
<td>-0.012</td>
<td>-0.018*</td>
<td>0.031*</td>
<td>-0.001</td>
<td></td>
</tr>
<tr>
<td>Married (yes =1 and 0 = otherwise)</td>
<td>-0.017</td>
<td>0.014</td>
<td>-0.019</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>Access to farmland</td>
<td>0.066***</td>
<td>-0.031***</td>
<td>0.034*</td>
<td>-0.070***</td>
<td></td>
</tr>
<tr>
<td>Year dummy (1=2014 and 0 = 2007)</td>
<td>-0.023</td>
<td>0.022*</td>
<td>-0.029</td>
<td>0.030**</td>
<td></td>
</tr>
</tbody>
</table>

Computed by the authors using pooled 2007 and 2014 Cameroon household consumption surveys and Stata 15.1. Notes: The values in parentheses are the standard errors. *** p<0.01; ** p<0.05; * p<0.1 are the 1%, 5% and 10% levels of significant.

Results also show that distance to the regional headquarters and access to the media correlate negatively with the probability of falling into poverty and diversifying into nonfarm activities. As also shown in Column 4 of Table 3; some level of education correlates negatively and incrementally with the probability of a household falling into poverty and diversifying into nonfarm activities, but more compelling only among higher education holders.

Meanwhile, as shown in Column 2, compared to the noeducation, some education monotonically increases the probability of getting out of poverty by
diversifying into nonfarm activities. In particular, household heads with primary, secondary and higher levels of education are more likely to deliver their households from poverty by engaging into nonfarm diversification in the order of 1.9%, 11.8% and 25.8%, respectively, compared to their counterparts with no education. Education is therefore poverty alleviating and nonfarm diversification enhancing. These findings corroborate those by Ruben and Berg (2001) for the Northern regions of Honduras and those by Escobar (2001) for rural Peru.

Our findings on the influence of education are also consistent with those by Lanjouw and Shariff (2004); de Janvry, Sadoulet, and Zhu (2005); Akaakohol and Aye (2014). This is plausible because education can help farm households better adjust to nonfarm labour market requirements. In general, better educated farmers are likely to be more innovative and entrepreneurial compared to their uneducated counterparts (Rao and Qaim, 2011) and, thus, more likely to be active in generating income not only from farming activities, but also from nonfarm activities.

Column 4 of Table 3 also reveals a quadratic effect of household size on the joint probability of falling into poverty and diversifying into nonfarm activities. In particular, an additional person in a household reduces the probability of falling into poverty by engaging into nonfarm activities by 0.032 percentage points. However, above a threshold of about 16 household members, the likelihood of a household falling into poverty and diversifying into nonfarm activities increases just to some extent. This can be explained by the view that when a household becomes poor, it is forced to adopt coping strategies to sustain a living. No doubt it is often said that obstacles initiate thinking or put simply in the words of Boserup ‘necessity is the mother of invention’ (Boserup, 1965). Moreover, Liu and Shumway (2007) posit that when farmers are faced with obstacles they are bound to innovate by moving up the value chain or diversifying into other nonfarm activities.

In addition, access to farmland reduces the joint probability of a poor household diversifying into nonfarm activities. This finding is in line with expectations, especially in the context of a large household – with a huge potential of redundant farm workers because of the low opportunity cost of their time. Indeed, compared to landless households, those with access to land are 7% less likely to fall into poverty when they diversify into nonfarm activities.

Rural households drawn from the 2014 survey are 3% more likely to fall into poverty and diversify into nonfarm activities than their counterparts drawn from the 2007 survey. This is consistent with the observation by ECA (2009) that Cameroon, Congo and Gabon suffered severely from the global financial crisis that started in 2007. This crisis affected the rural poor as it cut across all the rural livelihoods causing unemployment, and as a result, diversification opportunities could have been compromised (Sandouly and Labey, 2009).
Conclusion

This article empirically examined the effect of enabling factors on the probability of rural households falling into poverty and engaging in nonfarm diversification using pooled records from the 2007 and 2014 Cameroon household consumption surveys. Use was also made of a bivariate probit model, which assumes dependency of two related binary outcomes.

Results showed that a percentage point increase in the neighbourhood poverty rate increases the likelihood of a rural household falling into poverty and diversifying into nonfarm activities by 0.32 percentage points. Findings also showed that a percentage point increase in the neighbourhood diversification rate increases the probability that a household falls into poverty and diversifies into nonfarm employment by about 0.54 percentage points. In addition, results further showed that, compared to no education, some education monotonically increases the probability of poverty alleviation by diversifying into nonfarm activities. Access to farmland also reduced the joint probability of falling into poverty by diversifying into nonfarm activities - especially in the context of a large household – with a huge potential of farm labourers with low productivity at the farm level. Indeed, compared to landless households, those with access to land were 7% more likely to experience poverty reduction by diversifying into nonfarm activities. Results also show that distance to regional headquarters and access to media reduces the probability of falling into poverty by diversifying into nonfarm activities.

These findings have important implications for public interventions that foster nonfarm diversification in favour of poor rural households. In this regard, our findings indicate that improving access to socioeconomic infrastructures and endowments would enable the creation of a window of opportunities for poverty alleviation via nonfarm activities in rural settings.

References


