Effect of Income Diversification on Household's Income in Rural Oyo State, Nigeria

Adebola Saidat Daud[1], Bola Amoke Awotide[2], Abiodun Olusola Omotayo[3], Abeeb Tunde Omotosho[4], Afees Babatunde Adeniyi[5]

Abstract: Analysis of income diversification conceives of diversification in terms of strategies employed to earn cash income in addition to primary production activities from a variety of sources. It is often argued that this is a strategy primarily intended to offset risk. This study focused on analyzing the effects of diversification on household income in rural farming household in Oyo State, Nigeria. The result presented was based on primary data collected from a random sample of 120 households from two Agricultural zones (Ibadan/Ibarapa and Ogbomoso) of Oyo State. Descriptive statistics was used to describe the socioeconomic characteristics such as age, marital status and primary occupation of the respondents while two-stage least square (2 SLS) was employed to determine effect of diversification of income on per household income and income diversification of rural farming household. Results of descriptive statistics revealed that majority of the farmers were married with mean household size and age of 8 persons and 44 years respectively.2SLS showed that number of income source (NIS), share of off-farm income (OFS), Herfindahl Diversification Index (HDI), years of experience and farm size were positively significant to the per capita household income. Selected human capital variables such as years of education, years of vocational training and extension agent contacts have positive significant effect on income diversification of the farmers in the study area. The study concluded that number of income source and years of education were the major factors affecting per household income and income diversification of rural farming household.

Keywords: Income diversification; Number of income source; Off-farm income; Herfindahl Diversification Index

JEL Classification: I31; D13; D31; O13

[1] Agricultural Extension and Management Department, Oyo state college of Agriculture and Technology, Igboora, Nigeria, Address: Abeokuta-Igboora - Iseyin Rd, Igbo-Ora, Nigeria, Corresponding author: saidatdaud@gmail.com.
[2] Agricultural Economics Department, University of Ibadan, Nigeria, Address: Oduduwa Road, Ibadan, Nigeria/ World Vegetable Centre, Bamako, Mali, E-mail: bolatide2014@gmail.com.
[3] Department of Agricultural Economics and Extension, North West University, South Africa /IRDCE, Mangosuthu University of Technology, South Africa, Address: Private Bag X1290, Potchefstroom, 2520. Tel.: +27 (0)18 299-4900, E-mail: omotayoabiodun777@gmail.com.
[4] Cooperative Economics and Management Department, Oyo state college of Agriculture and Technology, Igboora, Nigeria, E-mail: omotosoabeebtunde@yahoo.com.
[5] Agricultural Technology Department, Oyo state college of Agriculture and Technology, Igboora, Nigeria, Address: Abeokuta - Igboora - Iseyin Rd, Igbo-Ora, Nigeria, E-mail: babatundeadeniyi@gmail.com.

1. Introduction

Income diversification has been defined in different ways. One definition of income diversification refers to an increase in the number of sources of income or the balance among the different source. Thus, a household with two sources of income would be more diversified than a household with just one source, one that accounts for 90 percent of the total. (Joshi et al. 2003; Ersado, 2003) Income diversification is often used to describe expansion in the importance of non-farm income. Non-farm income includes both off-farm wage labor and non-farm self-employment. (Escobal, 2001) Diversification into nonfarm activities usually implies more diversity in income sources, but this is not always the case. For example, if a household increase the share of income from non – farm sources from 30 percent to 75 percent, this represents diversification into non – farm activities but not income diversification in terms of the number and balance of income sources.

The share of income coming from nonfarm activities often correlates with total income, both across households and across countries. In addition, the positive wealth -non-farm correlation may also suggest that those who begin as poor households in land and agricultural enterprise may decide to invest in better productive agricultural technologies or in non-farm activities capable of lifting them from povert. (Adelekan & Omotayo, 2017) This definition of income diversification is linked to the concept of structural transformation at the national level, defined as the long – term decline in the percentage contribution of agriculture sector to gross domestic product (GDP) and employment in growing economies. In the view of United Kingdom's Department of Foreign and International Development (DFID), a livelihood comprises the capabilities, assets (including both material and social resources), and activities required for a means of living and it is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resources base. (Joshi et al. 2003)

Livelihood diversification therefore refers to attempts by individuals and households to find new ways to raise incomes and reduce environmental risk, which differ sharply by the degree of freedom of choice (to diversify or not), and the reversibility of the outcome. Livelihood diversification includes both on – and off – farm activities which are undertaken to generate income additional to that from the main household agricultural activities, via the production of other agricultural and non – agricultural goods and services, the sale of waged Labor, or self-employment in small firm, and other strategies undertaken to spread risk. (Barrett et at., 2000)

2. Problem Statement

Multiple motives prompt households and individuals to diversify assets, incomes, and activities. The first set of motives comprise what are traditionally termed "push factors': risk reduction, response to diminishing factor returns in any given use, such as family labor supply in the presence of land constraints driven by population pressure and fragmented landholdings, reaction to crisis or liquidity constraints, high transactions costs that induce households to self-provision in several goods and services. The second set of motives comprise "pull factors": realization of strategic complementarities between activities, such as crop-livestock integration or milling and hog production, specialization according to comparative advantage accorded by superior technologies, skills or eendowment. (Barrett et at., 2000) These micro level determinants of diversification are mirrored at more aggregate levels. From the "push factor perspective", diversification is driven by limited risk bearing capacity in the presence of incomplete or weak financial systems that create strong incentives to select a portfolio of activities in order to stabilize income flows and consumption, by constraints in labor and land markets, and by climatic uncertainty.

The consequence of the ubiquitous presence of the above factors in rural Africa is widespread diversification. Despite the persistent image of Africa as a continent of "subsistence farmers", non-farm sources may already account for as much as 40–45% of average household income and seem to be growing in importance. (Little et al., 2001) Perhaps more importantly, non-farm activity is typically positively correlated with income and wealth (in the form of land and livestock) in rural Africa, and thus seems to offer a pathway out of poverty if non-farm opportunities can be seized by the rural. But this key finding is a double-edged sword. (Soderbom & Teal, 2001) The positive wealth–non-farm correlation may also suggest that those who begin poor in land and capital face an uphill battle to overcome entry barriers and steep investment requirements to participation in non-farm activities capable of lifting them from poverty. (Little et al., 2001) Hence the rapid emergence of widespread attention paid these issues by scholars, policymakers and donors.

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Education also facilitates access to a number of different economic activities, either as a formal requirement for wage earning jobs or because it helps setting up and managing own small businesses. (Minot et al., 2006) Therefore makes this study important in Nigeria as it will be useful for the economic policy maker in formulating policy for poverty reduction. Although several studies exist on income diversification in Nigeria, these include Oluwatayo, (2009), Babatunde and Qaim, (2009), Ibekwe et al., (2010), among many others, however there is dearth of study on the effects of diversification on per capital household income, particularly among the crop farmers in Nigeria. Thus, this study is introducing an interesting dimension to the concept of income diversification in rural Oyo State.The objectives of the study were to describe the socioeconomic characteristics of the farmers and to determine the effect of income diversification on per household income.

3. Methodology

Study Area

The study was carried out in Oyo state, Nigeria. The study area has a total land area of 28,454 square kilometers and a population of 5,580,894 people (2006 population census). The landscape consist of old hard rocks and dome shaped hill which rise gently from 500 meters in the southern part and reaching a height of about 1,219 meters above sea level in the northern part.

Sampling size and Procedure

The primary data used for the study were collected through administration structured questionnaire tailored towards realizing the objectives of the study. Multistage sampling technique was employed to select the respondents from the study area. In the first stage, two zones which are Ibadan-Ibarapa and Ogbomoso were randomly selected out of four zones. The second stage involved the random selection of two local government areas from each zone. These are: Ido and Ibarapa Central local government areas from Ibadan-Ibarapa zone and Surulere and Ogo-Oluwa local government areas from Ogbomoso zone. Then two villages were randomly selected from each local government to make a total of eight villages. These are Bakatari and Araro from Ido, Shekere and Aba Alabi from Ibarapa Central, Arolu and Ilajue from Surulere and Ahoro-dada and Tewure from Ogo-Oluwa local government areas respectively. Finally fifteen food crop farmers were randomly selected from each of the villages making a total of 120 respondents.The descriptive statistics and two-stage least square regression were used to analyze the data collected.

4. Model Specification

Income based approach was used which focused on three measures of income diversification:

The number of income sources (NIS);

The share of off – farm income in total income (OFS);

The Herfindahl diversification index (HDI).

Because of endogeneity of the measures of diversification, two-stage least squares technique was employed for the model estimation, using household education, household productive assets and access to credit as instrumental variables.The most general structural form of the income functions of household i can be expressed as (Ersado 2003): $Y_i = D\beta_i + Xi\,\beta_2 + \mu_i$

Where**:** Y_i = per capita household income

D = Measures of income diversification (NIS, OFS and HDI)

X_i = Vector of explanatory variables as mentioned above

β = Vector of respective parameters

μ_i = Error term

The 2SLS was then applied to replace the actual problematic D variable in the equation by a counterpart variable that is purged of its stochastic or random component to ensure that the ordinary least squares procedure could be applied. In order to do this, a reduced form equation was specified as a function of all the exogenous variables in equation (7) and a set of instrumental variable as:

$Di = X_1\delta_1 + Z_1\,\delta_2 + \varepsilon_1$

Where Z_1 is a vector of instrumental variables which exert impacts on income diversification but not on household expenditures. The predicted values from this OLS-estimated reduced form equation (8) defined as D_i, is then inserted into the structural equation to replace the problematic D_i. As a result, the equation can be reduced to the following reduced-form equation that can be estimated by using the OLS: $Yi = D_1\delta_1 + X_1\delta_2 + \omega_1$

The explanatory variables X_i are as earlier defined, while the vector of instruments Z_i, include education, access to credit and productive access cost

5. Result and Discussion

Socioeconomic Characteristics of Food Crop Farmers

The result of socioeconomics distribution of the respondents was presented in Table 1. The result revealed that about 27.0% of the farmers were female while about 83.0% of them were male in the sample population. This implies that more males engage in farming activities than female which implies that male households dominated the captured respondents in the study area and this is in line with the finding of. (Omotayo, 2016) Majority (92.5%) were married with mean household size of 8, therefore they have the possibility of making use of family labour and will result to reduced cost of production. Also, this was in conformity with Ibekwe et al., (2010), who reported that farmers with large household size has a positive implication on income diversification because farmers with large household size need additional income to meet family needs. The mean of the entire age distribution of farmers in the study area was 44 years with majority (70.5%) having 5 – 10 years of formal education. This inferred that most of the interviewed farmers were still in their productive age and this could have positive effect on income diversification. Distribution of respondents based on number of adults above 60 years of age and children below 14 years of age in their household revealed majority (70.0%) have no adult over 60 years of age living with them while about 20.0% of them have about 6 – 10 children living with them. This suggests that the dependency ratio with in the family is very low and this could have positive effect on household income.

Table 1. Socioeconomic Characteristics of the Respondents

Variables	Frequency	Percentage
Age		
<30	17	14.17
31-40	24	20.01
41-50	45	37.49
51-60	34	28.33
Gender Distribution		
female	20	16.67
male	100	83.33
Marital Status		
married	111	92.50
not married	9	7.50
Household size		
1-5	36	30
6-10	53	44.17
11-15	21	17.50
16-20	9	7.50
>20	1	0.83
Number of Adult		
0	84	70.0

1	14	11.67
2	22	18.33
Distribution no of Child <14		
<5	99	82.50
6-10	18	15.0
>10	33	2.5
Year of Education		
0	5	4.17
5-10	71	59.17
11-15	32	26.67
16-20	12	10.0
Year of Training		
0	37	30.83
1	9	7.
2	68	56.67
3	6	5.0
Contact with Extension		
0	14	11.67
1-3	87	72.50
4-6	19	15.84
Farm size		
<5	74	61.47
6-10.5	44	36.67
above 10.5	2	1.67
Farming Experience		
<10	39	32.50
11-20	28	23.33
21-30	36	30.0
31-40	16	13.33
>40	1	0.83
Average Income		
farming income	350,966	32,23
commerce income	106,791.00	9.81
livestock income	66,875,00	6.14
processing income	46,666.00	4.29
labour income	10,416	0.96
fishing	73,333	6.73
salary	112,916	10.37
hunting	19,583	1.80
Land Ownership		
own land	67	55.83
otherwise	53	44.17
Land Cost		
0	68	56.67
11000-30000	24	20.0
31000-50000	17	14.17
51000-70000	10	8.33
71000-90000	1	0.83

Cost of Product Asset		
<10500	68	56.67
706000-205000	35	29.17
20600-30500	10	8.33
30600-400000	4	3.33
40600-50500	1	0.83
Distance		
0	1	0.83
3	28	23.33
4	46	38.33
5	15	12.50
5.5	15	12.50
6	15	12.50
Membership of Organization		
belonging	65	54.17
not belong	55	45.83
Access to Credit		
have access	65	54.17
otherwise	55	45.85
Source of Credit		
formal	65	54.17
informal	55	45.83
Credit Obtained		
0	55	45.83
60,000-200,000	22	18.33
201,000-400000	14	11.67
301,000-400000	5	4.17
401,000-500000	4	11.67
>500,000	10	8.33
Total	**120**	**100**

Source: Field Survey Data

2SLS Regression for the Effects of Diversification (NIS) on Household Income

The result of the 2sls regression for the effects of diversification (NIS) on per capital household income is presented in table 2. The result shows that the following variables are statistically significant and have positive influence on per capital Household Income: Number of Income Sources (NIS), Number of contacts with Extension Agents and years of experience. This implies that an increase in these variables would lead to an increase in Per capita Income of the household. This result was in line with Schwarze and Zeller (2005), who identified extension programmes as a way of developing human resources. The higher the number of extension agent contacts, the more the productive innovations the farmers have, hence the higher the per capital income of the household. Years of experience are also statistically significant. This is not surprising as accumulated experience contributes to skills needed to diversify income generating activities, thereby

increases the per capital income of the household. Other variables that significantly influence the per capital income of the household are dependency ratio and household size. Contrary to expectations, these two variables are negatively related to the per capital income of the household. This means the more the households that are dependent, the lower the per capital income of the household head. Also ordinarily a surplus rural labour force should have a positive and significant effect on per capital income of the household. But in this study the coefficient of household size is negatively significant which contradicts the apriori expectations.

Table 2. Parameter Estimates of 2SLS Regression

Per capita Income	Coefficient	Standard Error	Z	P> /Z/
NIS	82609.18	10784.81	7.66***	0.000
Age	1102.042	12231.74	0.14	0.886
Age^2	-61.61281	93.1535	-0.66	0.508
Sex	20368.55	32729.13	0.62	0.534
Marital Status	-45654.63	30628.48	-1.49	0.136
Dependency Ratio	-198194.3	57967.6	-3.42***	0.001
Household Size	-13337.66	2963.359	-4.50***	0.000
Years of Vocational training	-9923.554	9037.215	-1.10	0.272
Extension Agent contacts	24467.19	9810.448	2.49**	0.013
Farm Size	7493.61	7254.387	1.03	0.302
Years of farming experience	3448.963	1495.816	2.31**	0.021
Land Ownership	-33855.65	44216.42	-0.77	0.444
Distance to market	7657.751	8173.896	0.94	0.349
Access to electricity	5049.346	25459.77	0.20	0.843
Land Cost	-956.8192	1003.694	-0.95	0.340
Constant	42570.45	162253.3	0.26	0.793
Number of Observation	120			
Prob > Chi^2	0.0000			
Wald $Chi^2(15)$	506.59			
Root MSE	81859			
Adjusted R^2	0.8084			

Legend: *, **, *** Coefficients are significant at 10%, 5% and 1% respectively

Instrumental variables: Years of education of the household head, household productive assets and access to credit.

2SLS Regression for the Effects of Diversification (OFS) on Household Income

The result of the estimates of the effects of diversification (OFS) on per capital household income is presented in table 2. It shows that off-farm share income, gender of household head and farm size have significant and positive influence on per capital household income. This implies that an increase in these variables

would lead to an increase in the per capital household income. For instance, an increase in the off-farm income share increases the per capital household income by 735,081 naira. It is obvious that off-farm activities are more lucrative than farming alone. Thus, diversification is pursued as a strategy to increase per capital household income. Also the coefficient of farm size is also positively significant to the per capital household income. This implies that, while off-farm activities can increase the household income, farming still remains important for household livelihoods in rural Nigeria. (Babatunde & Qaim, 2009) Other variables that significantly influence per capital household income include dependency ratio, household size and years of vocational training. Contrary to expectations the household size and years of vocational training are negatively related to the household income.

Table 3. 2.SLS Regression for the Effects of Diversification (OFS) on Household Income

Per Capita Income	**Coefficient**	**Standard Error**	**Z**	**P>/Z/**
OFS	735081.3	152994.4	4.80***	**0.000**
Age	3070.567	11358.66	0.27	**0.787**
Age^2	-49.66164	138.8691	-0.36	**0.721**
Sex	119916.2	53068.87	2.26**	**0.024**
Marital status	-48376.24	45815.68	-1.06	**0.291**
Dependency Ratio	-170018.7	86322.14	-1.97**	**0.049**
Household Size	-16629.99	4411.813	-3.77***	**0.000**
Years of Vocational training	-51860.52	18704.39	-2.77**	**0.006**
Extension Agent contacts	9779.131	17397.55	0.56	**0.574**
Farm Size	19888.73	11003.35	1.81*	**0.071**
Years of farming experience	2866.82	2200.791	1.30	**0.193**
Land Ownership	-3391.096	67757.91	-0.50	**0.960**
Distance to market	4295.656	12011.47	0.36	**0.721**
Access to electricity	7897.672	38404.23	0.21	**0.837**
Land Cost	452.741	1520.877	0.30	**0.766**
Constant	-204057.8	247848.7	-0.82	**0.410**
Number of Observations	120			
Wald Chi^2 (15)	0.0000			
R – Squared	0.5771			
Root MSE	**1.2e + 05**			

Legend: *, **, *** Coefficients are significant at 10%, 5% and 1% respectively

4.2.6. 2SLS Regression for the Effects of Diversification (HDI) on household income.

The result of the 2sls regression for the effect of HDI on household income is presented in table 3. It shows that HDI, gender of the household head and extension agent contacts are significantly and positively related to per capital household income. The results revealed that diversification (HDI) has a positive and significant effect on household per capital income. For instance HDI increases the household per capital income by 704,025 naira. Similarly gender of the household head and extension agent contacts also have positive and significant effect on household per capital income. For instance, per capital household income of the male-headed household is 99,419 higher than their female counterpart. Also the households with higher number of extension agent contacts will have better productive innovations that will assist in diversifying his economic activities. And hence increase his per capital income.

Table 4. 2SLS Regression for the Effects of Diversification (HDI) on Household Income

Per capita Income	Coefficient	Standard Error	Z	P>/Z/
HDI	704025	190807.2	3.69***	0.000
Age	8872.058	118718.01	0.75	0.455
Age^2	-138.2183	145.3326	-0.95	0.342
Sex	99419.65	55947.11	1.78*	0.076
Marital status	-43478.13	48804.11	-0.89	0.373
Dependency Ratio	-259321.4	92542.46	-2.80**	0.005
Household size	-16510.81	4668.397	-3.54***	0.000
Years of Vocational training	-47846.74	21541.93	-2.22**	0.026
Extension Agent contacts	32289.93	16316.11	1.98**	0.048
Farm Size	8247.736	11388.46	0.72	0.469
Years of farming experience	3714.758	2538.032	1.46	0.143
Land Ownership	-33624.49	70754.29	-0.48	0.635
Distance to market	2810.92	12948.09	0.22	0.828
Access to electricity	-13555.37	39795.62	-0.34	0.733
Land Cost	412.2373	1620.605	0.25	0.799
Constant	-231487.9	267797.2	-0.86	0.387
Number of observation	120			
Prob > Chi^2	0.0000			
Wald $Chi^2(15)$	195.28			
R – Squared	0.5277			
Poof MSE	1.3e+05			

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

6. Conclusion and Recommendation

This study examined human capital and income diversification in rural Oyo State. The study reveals that most of the households in the study area have fairly diversified income sources with farming remains the dominant income source for those with lower level of human capital, (poorer households), off-farm activities are the main sources for the ones with higher level of human capital (richer household). They tend to be more diversified which was showed by using different measures of income diversification. Econometric analysis confirmed years of education, years of vocational training, extension agent contacts, access to credit and productive asset increase the level of household diversification. In other words resource/poor households in the study area are constrained in diversifying their income sources. Hence human capital plays an important role in income diversification.

Therefore government should intensify its effort at enhancing human capital development through formal education, vocational training and extension programmes for the farmers so as to enlighten them about the benefit of income diversification to improve their welfare. Having established from the study that respondents with high level of human capital were able to diversify their income sources more than those with low level, another key determinant for income diversification is access to credit. Credit enables households to change their stock in physical capital within a short time to take advantage of income opportunities outside agriculture. Therefore, a possible policy measure is to improve the participation of poor households in formal credit, with low interest rates.

Also, the findings also highlighted the influence of physical infrastructure on income diversification. Poorer households are constrained in terms of this infrastructure (good road, network, electricity and pipe-bone water). Therefore policy on rural development could improve access of rural households to these infrastructures. Finally, the fact that richer household are more diversified in rural Nigeria suggest that other mechanism which could not be captured in these study are at work. Babatunde (2009), suggest that, markets that are small and poorly integrated which is a function of infrastructural weakness may be one of them. Therefore income diversification should be considered as just a policy objective, rather, it should be understood as a household response to various market imperfections. Hence policy objective should be to reduce these imperfections and make markets work better. While this would facilitate income diversification both among the poorest and the richer, it would also impact positively on their income.

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