A Microeconometric Analysis of Household Consumption Expenditure Determinants in Yam-growing Areas of Nigeria and Ghana

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Summary

This paper provides an analysis of microeconomic factors that explain household consumption expenditure in rural areas using cross-sectional data obtained from 1,400 randomly selected yam-producing households of Nigeria and Ghana. The correlates of consumption expenditure were examined using two techniques: ordinary least squares (OLS) and a quantile regression (QR) approach for a more comprehensive picture at different points of the distribution. Determinants of consumption expenditure are markedly different between the regressions and across the conditional quantiles of the expenditure in both countries. Results further indicate that age, education, and household size were important in explaining consumption expenditure using OLS. However, via conditional QR, the following additional factors became evident: membership of formal and informal institutions, main occupation, family structure, and farm size. Only education was consistently significant in both regressions and across the conditional quantiles, suggesting that responses to investments in education lead to increase in expenditure that will stimulate other sectors of the economy.

Résumé

Analyse micro-économétrique des déterminants des dépenses de consommation des ménages dans les zones de production d'igname au Nigeria et au Ghana

Cet article présente une analyse des facteurs micro-économiques qui expliquent les dépenses de consommation des ménages dans les zones rurales à l'aide de données transversales obtenues à partir d'un échantillon aléatoire de 1.400 producteurs d'igname au Nigeria et au Ghana. Les corrélations entre les dépenses de consommation ont été examinées à l'aide de deux techniques : les moindres carrés ordinaires (MCO) et le modèle de la régression quantile (RQ) dans le but d'obtenir une image plus complète à différents points de la distribution. Les déterminants des dépenses de consommation entre les deux pays sont significativement différents quelle que soit la technique utilisée. En utilisant la technique des MCO, les résultats montrent que l'âge, l'éducation et la taille du ménage influent les dépenses de consommation. Cependant, l'utilisation de la RQ, met en évidence l'importance des facteurs suivants: l'adhésion à des institutions formelles et informelles, l'occupation principale, la structure familiale et la taille des exploitations. Seule l'éducation exerce une influence significative sur les dépenses de consommation des ménages quelle que soit la méthode d'analyse utilisée (analyse des moindres carrés ordinaires ou analyse des différents quantiles; ce qui suggère que les investissements réalisés dans le secteur de l'éducation entraînent une augmentation des dépenses qui va stimuler d'autres secteurs de l'économie.

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Introduction

Rural areas play key roles in the economies of most developing countries in creating jobs, supplying labor and food to a growing population, providing raw materials to other growing sectors of the economy and creating export earnings. In spite of these significant contributions rural areas are the most neglected, characterized by limited healthcare and sanitary services, and a lack of energy provision and education services. Regarding access to potable water, many of the rural areas draw water for drinking, cooking, and washing from puddles and rivulets which become stagnant in the dry season, probable source of health hazard. The main issue in any intervention strategy for rural development revolves around policy propositions that could be pursued to fill the big gap existing between urban and rural areas. Different approaches have been used to address this challenge. Evidence from some of them suggests that rural well-being is maintained through household production and consumption (13). However, rural household production and consumption are functions of an increasing population, economic shifts, and changes in farmers' needs and activities (35). Consumption can basically be defined as buying and/or using things. Household consumption is a force that drives the production of goods and services (25). Various factors affect the purchasing power of the consumer. These include income, price, distribution of income, educational status of the individuals, occupation, age, and socio-cultural factors (32). Besides these factors, personal welfare is enhanced when the consumer maximizes the benefit by giving priority to the purchase of the goods and services that avail the most and putting off the purchase of the least needed goods and services because of limited income. Thus, dissimilarities emerge according to the consumer's behavior and the factors determining that behavior. Consequently, there has been considerable interest in socioeconomic and demographic factors along with the changes in the cultural structure and the development of policy initiatives that might prove effective in reducing the incidence of poverty. Root and tuber crops have been identified as potential crops that could help in alleviating poverty in rural communities in Africa. These crops are widely consumed across Africa, and play a key role in the continent by providing money in pocket for farmers, source of wealth, and mitigating the effect of cereals' shortfall. Yam (Dioscorea spp.) is a source of income of about 300 millions of people in Africa and more than half of them depend on it for their livelihoods. About 48 million tonnes of yam are produced annually in West Africa on 4 million ha. The five major yam-producing countries (Bénin, Côte d'Ivoire, Ghana, Nigeria, and Togo) account for 93% of world production. Nigeria alone accounts for 68% of global production. The average per capita consumption in these countries ranges from 193 kcal/day in Togo to 502 kcal/day in Côte d'Ivoire. It ranks as the most important source of dietary calories in Côte d'Ivoire, Bénin, Ghana, and Nigeria. The crop also makes a substantial contribution to protein in the diet, much greater than cassava and even above sources of animal protein, and ranks as the third most important source of supply. Hence, yam is important for food security and income generation. In Nigeria, 31.8% of the population and in Ghana, 26.2% depend on yam for food and income security; yam is also integral to sociocultural life in this sub region (20). To develop appropriate policies focused on agricultural growth, the determinants of rural household expenditure for the commodities consumed by rural households and the potential for demand-led growth in the local rural economy must be known.

Agriculture in most developing countries is important in the welfare of the poor. Picturing the economic situation of agricultural households is now recognized as a key element in designing and applying policy for agriculture and the rural areas (30). Understanding the socioeconomic factors affecting the consumption of households in rural yam-growing areas mostly invested in agriculture is therefore of prime importance. Stimulating agriculture can produce strong demand incentives through the increase in consumers' demands as a result of increased incomes (37). Ascertaining the factors that drive consumption expenditure especially in the surveyed areas of Nigeria and Ghana is a prerequisite for effective policy design in the region.

Factors behind household expenditure have been a subject of interest for economists for nearly a millennium. Significant contributions have been made by researchers to comprehend profound variables associated with consumer choice (12). However information on household expenditure and on its determinants in yam rural areas is extremely limited and serious attention has not been paid towards collecting data on household expenditure. There exist other sources dealing with household expenditure. The authors analyzing expenditure consider income (16, 34, 9). Engel (12) focused on the relationship between expenditure on food and income and his original work pointed out the relevance of income and family size in influencing household expenditure. Besides household income the other hypothesized determinants responsible for the household expenditure are age, education, farm size, gender, household size, marital status, membership of formal and informal institution, main occupation, land property status, and agroecology variable (34, 9).

This study is motivated by the need to gain a better understanding of how socioeconomic factors influence household expenditure patterns in yam producing communities, taking into account the abovementioned lack of research conducted on expenditure. Therefore by attempting systematically to fill this gap to some extent, this exploratory analysis intends on revealing the relationships among expenditure and selected variables. The total consumption expenditure is here about the sub-groups constituting the quantiles of total consumption expenditure. As the variation of the dependent variable is very high, quantile regression (QR) is a well-fitting method for analyzing the given problem. This allows us to check whether the connection between expenditure and the factors over the distribution of expenditure is unbroken or not (28). Hence, the present study answers the question whether there is relationship between consumption expenditure and its determinants; and also whether there is difference in potential factors that influence differently households with high, medium and low consumption expenditure in yam growing areas.

The study specifically aims at (i) investigating which of the traditional determinants significantly explain household consumption expenditure using standard regression techniques; and (ii) identifying factors that drive consumption expenditure at particular quantiles. Thus, sound knowledge is necessary for designing development policy options such as poverty reduction programs targeting low, medium and high spending households.

Methodology/ Analytical framework

The present work uses the cross-sectional data provided by the baseline consumption expenditure surveys at household level from the Yam Improvement for Income and Food Security in West Africa project conducted in yam-growing areas of Nigeria and Ghana in the reference year 2012. Relevant data have been collected during surveys on a number of aspects highlighting the total household consumption expenditure and the different factors which determine this expenditure. The total household consumption expenditure here includes expenditure on food and non-food items. The total expenditure on food was obtained by aggregating expenditure on all food groups; the total expenditure on each food group was obtained by aggregating expenditure on all food items falling within a group. Under food expenditure, details were collected on all the food items consumed by the household during one year. Food consumption includes food that the household has grown, purchased, and received from other sources. As for the staple foods, different types consumed in each household were enumerated and the physical quantity was estimated of each food item consumed in a year. Staple foods that were purchased, self-produced, or received as gifts were included in this estimation. The foods were then aggregated to give total staple consumption. Staple foods consumed outside the home were left out of this estimate because of the difficulties associated with accuracy in the conversion of purchased food into physical quantities. As for non-food expenditure, the details of all non-food items and services purchased by the household during the given reference period were also collected.

The analysis of all the data mentioned above was done using the standard OLS and QR models for total consumption expenditure.

To determine the factors affecting the household consumption expenditure, the models were estimated by means of the Stata software (33). The QR that employs a variant of the Censored Least Absolute Deviations (CLAD) estimator procedure (21) was adapted to incorporate sampling weights. The OLS therefore estimate reflects the mean effect of the explanatory variable on the dependent variable. In contrast, the QR technique produces a multitude of estimates with each estimate describing the relation between the dependent and explanatory variables at a particular point in the conditional distribution of the consumption expenditure. The QR analysis does not force arbitrary criteria of exogenous sample selection to divide the sample, and as many QR can be estimated as is practically possible. Moreover, since QR analysis uses the entire sample to estimate each quantile, there is no problem of bias from sample selection. Quantile regression introduced by Koenker and Basset (22) is a method that analyzes the conditional quantiles of the dependent variable using covariates. The QR analysis estimates the regression function for different quantiles of the conditional expenditure distribution, not just at the conditional mean (5, 6, 11). The 50th QR is the familiar conditional median regression. Quantile regression analysis has several advantages over the typical mean regression estimation method. Since the QR is estimated by minimizing the sum of absolute values of residuals instead of the sum of squared residuals, it is able to deal with heteroskedasticity or a few extreme observations. Moreover, it is likely to examine different conditional quantiles of the distribution, not only the conditional mean of the dependent variable. This regression has the potential to give a clearer picture of the effect of the explanatory variables on the dependent variable. These diverse responses may be interpreted as differences in the response of the dependent variable to changes in the regressors at different points in the conditional distribution of the dependent variable (27).

The QR models assume that the conditional quantile of a random variable Y is linear in the regressors X and the notational expression of the model is given by equation I.

$$Y_i = X_i \alpha_q + E_{qi} \, with \, Quant_q(Y_i / X_i) = X_i \alpha_q \quad \text{(I)}$$

Where:

X_i (i ranges from 1….n) is the vector of explanatory variables and a_q is the vector of parameters.

$Quant_q$ ($Y|X$) is the qth conditional quantile of Y given X. Estimation of the quantile parameters is done as the solution (equation II):

$$\left(min_{(a \in R^k)} \left(\sum_{(i:Y_i > X_{ia})} q \right) | Y_i - (X_i a_q) | + \sum_{(i:Y_i < X_{ia})} (1-q) | Y_i - X_i(a_q) | \right)$$
$$\text{(II)}$$

The QR can provide a more complete description of the underlying conditional distribution than other mean-based estimators, such as OLS. The most appropriate functional form for the relationship must be determined and those most commonly used are linear, logarithmic and semi logarithmic. The estimates are formed with a linear form model in this study. Using QR in line with prior studies (5, 6, 7) this study investigates possible differences in the consumption expenditure of low spending households compared with those that are medium and high spending.

In this study, the data on income and expenditure are cross-sectional without prices variation. In such a condition, household purchasing of goods or services is influenced primarily by income and a range of other factors. The household consumption expenditure function is estimated by taking consumption expenditure as a dependent variable and some important socio-economic factors as independent variables. Such socio-economic factors are individual characteristics (age, gender, level of education, main occupation, marital status), household characteristics (household income, household size), household assets (farm size, land property status), institutional factors (membership of formal and informal institutions), agroecological (agroecological zone (AEZ) to which the household belongs) and also the possible cross-classification among these factors. Observations with missing data for any of the variables described below were dropped from the analysis.

The variables (both independent and dependent) used for the analysis are quantitative in nature; some are qualitative and used as dummy or categorical variables.

The relationships between the explanatory and dependent variables are described as follows.

Household income is important as it determines how much can be spent on various needs of the household. A household's consumption pattern would be expected to correlate positively with income. Total household income is reported in US dollars, as the range ensures reasonable continuity. The age of the household head (in years) profile may also be important. The age is selected as an explanatory variable as both older and younger people are assumed to have differences in both degree and type of needs/requirements. Therefore, the age of the household head is included in the model. Age might increase/decrease spending in the sense that younger farmers may be pushed to spend more while the older farmers with increased farming knowledge might be spending less. The opposite could also be true. Such differences may be due to differences of people at different stages of their life (36).

The gender, marital status and main occupation of the household head are important to consider as explanatory variables as the head plays a primary role in services and goods purchasing and could influence the consumption patterns of a household. The gender of the household head is a dummy variable (equal to 1 if male, otherwise 0); it is hypothesized to relate positively to spending. The assumption is that the head of the household is the primary decision-maker and men have more access and control over vital production resources than women because of many sociocultural values and norms. Marital status and the presence of children have frequently been used to identify the life cycle stages. The marital status or the family structure (equal to 1 if married, otherwise 0) plays a critical role (2, 17). Once both parents are married and living together in the family home, spending is likely to be less than with other couples living separately. Households living as a couple (coded 1) will be compared with other households.

Education level (in number of years) could measure the household's human capital. The level of education of each household head is included in the model. Formal education of the household head is selected due to its effect on farmers' behavior. Yin et al (38) have found that better-educated people tend to spend more. Household heads with different levels of education may have different knowledge and perception thus a different consumption basket. Education is therefore hypothesized to have a positive effect on consumption expenditure. Moreover, educational needs of the members of rural households could change as the environmental and economic contexts vary. Individuals with various levels of education may have different knowledge and perceptions about agricultural practices and management thus may have a different consumption basket. Also better access to education can improve the ability of farmers to use natural resources more productively and to diversify their income sources away from dependence upon ordinary resources alone (26).

In regions experiencing demographic change and environmental degradation, educational needs could expand to include so many things like information, skills, and machineries in environmental management and rehabilitation, resource conservation, waste and pollution management, energy provision, and other relevant areas (13). Household size (number) is included in the model to account for the effects of household composition on consumption expenditure. Increasing consumption is likely to be associated to the growing number of household members. In other words, a smaller household tends to spend less than a larger household. Thus, household size is hypothesized to have a positive relationship with household expenditure. Also household size is important since there is a trade-off between the quantity and quality of children in the household (3). Children are assumed to compete for scarce resources (parental time, financial and other resources). This is corroborated by Becker's theory on the quantity and quality of children (4, 3) which suggests that the time parents allocate to each child decreases with the increasing number of siblings.

Farm size (in ha) may affect spending. Large farms may require more investment. As a result, a positive relationship was hypothesized between farm size and consumption expenditure.

Farmland ownership is dealt in terms of a proxy to the property status of the household. For this reason, a dummy variable is defined as a tenant and a positive relationship with the dependent variable is hypothesized (Land property status is equivalent to 1 if tenant, others 0.)

Another important factor that controls for a household's region of residence is the AEZ. Several indices show that the adaptability of yam to relatively marginal soils and erratic rainfall conditions and, consequently, its high productivity/unit of land could depend on where the household is living. The 70% of the yam-producing villages in Nigeria and Ghana are in the derived savanna (DS), 20% in the humid forest (HF), and 10% in the southern Guinea savanna (SGS). Both direction relations and spending on goods/services are hypothesized between each zone (AEZ_1 is equal to 1 if SGS, others 0; AEZ_2 is equal to 1 if DS, others 0; AEZ_3 is equal to 1 if HF, others 0). Estimation of coefficients standard errors are based on bootstrapping (31, 8). In order to check for multicollinearity in the model, variance inflation factors (VIF) for categorical variables were estimated (14). According to Maddala (24), VIF can be defined by equation III.

$$VIF(X_i) = 1/(1-R_i^2) \, with \, (1-R_i^2) = TOL(X_i) \quad \text{(III)}$$

Where:

R_i^2 as the squared multiple correlation coefficient between X_i and the other explanatory variables;

TOL is Tolerance. The larger the value of VIF, the more troublesome it is.

To avoid the problem of multicollinearity, it was essential to exclude the variables with the TOL of less than 0.20 or a VIF of 5 and above (29). Similarly, there might also be an association between dummy variables. In order to test multicollinearity problem between discrete variables, contingency coefficient (CC) which is χ^2, chi-square based measure of the relation between two categorical variables (proposed by Pearson, the originator of the Chi-square test) was computed. The values of contingency coefficient range between 0 and 1, with zero indicating no association between the variables and values close to 1 indicating a high degree of association. The contingency coefficient is collinear if its value is greater than 0.75. The contingency coefficient can be defined by equation IV:

$$CC = [\chi^2/(n+\chi^2)]^{(1/2)} \quad \text{(IV)}$$

Where:

CC= Contingency coefficient, n= sample size, χ^2= Chi-square value.

Results and discussion

The summary descriptive statistics in Table 1 indicate that the total household expenditure in Nigeria is more than double of that in Ghana. Half of the people in Nigeria and Ghana spend less than $2369 and $936 respectively. Mean expenditure are higher than median expenditure and most people are earning less than the average. Households in the bottom quartile represent low spenders, middle fifty percent are middle spenders, and top quartile are high spenders of the total spending distribution. Empirical results from Table 2 reveal that household heads surveyed were still in the active age bracket as their average age was about 50 years in Nigeria and Ghana. Households studied were highly populated with an average of 11 individuals in Nigeria and 9 in Ghana, representing a potential labor force. The education system in both countries is similar and in average the number of years of schooling is low. The majority of household heads completed only primary education, attainable in six years in Nigeria while in Ghana; they barely completed half of it. Lack of basic literacy for most of the households increases the vulnerable position of farmers subject to the problem of superstitions and ritual practices in yam production. The ritual materials entail expenditure of resources including cash. More importantly, poor and declining crop yields are blamed on the rival next door; ways out from pest and diseases problems are sought in ritualism. Farmers who engage in superstitious and ritual practices are unlikely to be open to new technologies which they view with suspicion.

The households are mainly smallholder entities owning on the average about 2 ha of land.

Table 1

Summary statistics of total expenditure by country (in dollars), as dependent variable.

Country	Bottom Quartile	Middle 50%	Top Quartile	Mean	Std. Dev
Nigeria	1262	2369	4390	3559	3688
Ghana	593	936	1491	1258	1120

Table 2

Summary statistics of independent variables.

Variable/Symbol	Nature	Nigeria (N= 724)		Ghana (N= 515)	
		Mean	SD	Mean	SD
Individual variables					
Gender (*GEN*)	Dummy	0.97	0.17	0.90	0.30
Age (*AGE*)	Continuous	50.75	13.97	48.70	15.46
Education level (*EDU*)	Continuous	6.22	5.36	2.65	4.50
Marital status (*MS*)	Dummy	0.06	0.24	0.05	0.21
Main occupation (*MO*)	Dummy	0.96	0.20	0.99	0.10
Household variables Total household income (*TINC*)	Continuous	4254	7820	4592	9035
Household size (*HS*)	Continuous	10.59	5.57	9.26	5.59
Household assets variables Land property status (*LPS*)	Dummy	0.08	0.28	0.23	0.42
Farm size (*FS*)	Continuous	2.38	1.17	2.68	1.11
Institutional variable Membership of formal and informal institutions (*MEM*)	Dummy	0.42	0.49	0.24	0.43
Agroecology variables					
SGS (*AEZ1*)	Dummy	0.60	0.49	0.73	0.45
DS (*AEZ2*)	Dummy	0.12	0.32	0.25	0.43

Note: The monetary unit used in this study is the US dollar at an exchange rate of N157 for Nigeria and GH¢1.85 for Ghana for US$1.

The per capita household income corresponded to about US$ 1.10/day for Nigeria and US$ 1.36/day for Ghana. This average daily income compared with the threshold of $1.25/day indicates how far the average poor farmer is from escaping extreme poverty.

The coefficients in Table 3 are the weighted CLAD coefficients at the 25th, 50th, and 75th quantile of the conditional expenditure distribution denoted by Q25, Q50 and Q75. Table 3 also reports the pseudo R2 of between approximately 0.02 and 0.10, a quantile measure of goodness of fit.

The pseudo R2 increases from the lower to the higher quantiles in both countries, which indicates that the model explains consumption expenditure for households whose spending is in the higher quantiles better than for households whose spending is in the lower quantiles. The study shows two types of significant coefficients: those that are significantly different from zero and the quantile coefficients that are significantly different from the OLS coefficients (outside of the OLS confidence interval). With respect to the effect of individual factors on household expenditure, several findings are worth noting. According to the OLS estimates, age, education, and household size are positive and significant determinants of household expenditure in

Nigeria while only education is positive and significant in Ghana.

The QR results are similar to those of OLS and suggest important differences at different points in the conditional distribution of expenditure. At some points of the expenditure distribution in Nigeria, age, education, main occupation and household size are not only significantly different from zero but also significantly different from the OLS coefficients. As for Ghana, both education and household size are significantly different from zero and from the OLS coefficients. The age of the household head, marital status, and the presence of a child younger than 6 years of age have been investigated alone or in some combinations to represent the family life cycle (19, 23).

Expenditure for farm households increases with age in Nigeria while a reverse situation exists in Ghana with age. Low spending is positively related to rural young farmers with respect to their propensity to save since for them future income is governed by today's consumption under the assumption that if all is rational the more you consume today, the less you will consume in the future. As a person ages, need requirements may change and possibly, the individual may spend more. The opposite has been revealed in Ghana though this has been insignificant.

Farming as the main occupation is significant and negative determinant of household expenditure at all points in the conditional distribution of expenditure in Ghana while in Nigeria this is the situation occurs with households in the bottom quartile. Farm households in yam growing areas spent less most probably for the fact that a share of their own consumption come from their farms. Also for inter-generational transfers in order to help their children in starting a farm, households do choose to save rather than spend.

With reference to the household variables, large families spent more in both countries except at the lower end in Ghana. Household size is significant at the upper quantiles in both Nigeria and Ghana. Food expenditure for farm households may vary with household size due to reasons like: advantage of economies of size for larger households; existence

of different age mix within households with different market basket of goods. Also, smaller households may be limited in choices of good unit sizes that meet their needs.

Regarding the household assets, farm size and expenditure are positively related in both countries and such a relation is significant at the mean in both countries and at the lower end in Nigeria. This implies that as the farm increases in size, there is the increased need for the farm inputs, hence increase in expenditure. This is in conformity with the findings of Akinola and Young (1) that the larger the farm, the more quantities of inputs that would be needed in the farm, hence greater investment expenditure.

Concerning the institutional variable, membership of informal or formal institutions is important only at the lower end of expenditure. The variable has a reverse relationship between Nigeria and Ghana. Households who have one more member in formal or informal institutions spend $307 more in Nigeria and $140 less in Ghana in total expenditure for low consumption expenditure households (at the 25% quantile).

The results showed that farm households expenditure increases with education at all points examined on the conditional distribution for both countries (Table 3). This suggests that the more educated household heads are, the higher their household expenditure compared to their less educated counterparts. This result corroborates the empirical findings of Frisbee (15); Çağlayan and Astar (9) that increase in local production would result in the creation of employment opportunities and enterprises, thus mobilizing underutilized resources will invariably lead to increased expenditure and engender economic growth (10). In addition, increases in rural spending on non-tradable goods and services would mobilize underused resources (10, 18).

Only education was consistently significant in both regressions and across the conditional quantiles of the consumption expenditure in Nigeria and Ghana. Household expenditure reflects equities in the system with the non-poor and poor households spending on education. Household expenditure in yam rural areas interfere with demand for education

Table 3

Results of OLS and QR.

TEX	Nigeria				Ghana			
	OLS	Q25	Q50	Q75	OLS	Q25	Q50	Q75
TINC	0.0123 (0.75)	0.0101 (1.82)	0.0049 (0.39)	0.0119 (0.42)	0.0060 (1.06)	0.0024 (0.94)	0.0087 (2.51)	0.0045 (0.59)
GEN	425.2 (0.58)	272.8 (1.03)	824.4 (1.52)	366.1 (0.34)	54.01 (0.31)	-9.54 (-0.12)	70.07 (0.65)	139.7 (0.54)
AGE	31.04** (3.10)	11.26**+ (3.14)	23.09** (3.04)	37.13* (2.29)	-2.282 (-0.68)	-0.993 (-0.69)	-0.106 (-0.05)	-4.410 (-0.83)
EDU	162.1*** (6.10)	74.90***+ (7.61)	122.8*** (6.08)	228.5*** (5.34)	29.52* (2.50)	15.71**+ (2.96)	23.95*** (3.34)	24.67* (1.36)
MS	269.2 (0.49)	-63.25 (-0.30)	318.0 (0.77)	43.60 (0.05)	218.5 (0.89)	-15.24+ (-0.14)	437.0** (2.94)	291.0 (0.76)
MEM	477.0 (1.85)	306.7** (3.13)	237.3 (1.21)	606.4 (1.49)	-114.1 (-0.95)	-140.4** (-2.67)	-64.14 (-0.88)	-204.2 (-1.08)
MO	539.4 (0.88)	-512.5*+ (-2.32)	97.86 (0.21)	200.2 (0.21)	-806.9 (-1.67)	-670.5*** (-3.54)	-925.3*** (-3.36)	-1457.8* (-2.24)
LPS	-252.6 (-0.52)	-312.9 (-1.70)	-314.9 (-0.87)	-185.1 (-0.25)	58.34 (0.51)	36.38 (0.72)	-14.13 (-0.20)	-47.21 (-0.26)
HS	50.56* (2.10)	23.15*+ (2.57)	10.00+ (0.55)	97.29** (2.98)	13.94 (1.42)	-0.0123+ (-0.00)	10.68 (1.78)	48.40***+ (3.70)
FS	170.1 (1.50)	138.7** (3.05)	227.1** (2.66)	148.9 (0.87)	58.44 (1.18)	21.80 (0.95)	59.84* (1.98)	95.82 (1.33)
AEZ_1	137.0 (0.43)	24.44 (0.21)	255.4 (1.06)	635.9 (1.27)	29.81 (0.08)	-253.9+ (-1.75)	85.61 (0.41)	520.1 (1.04)
AEZ_2	-479.5 (-1.03)	-48.44+ (-0.28)	-133.7 (-0.38)	-235.7 (-0.31)	366.1 (1.01)	-165.2+ (-1.11)	263.8 (1.23)	903.8 (1.76)
Cons	-1239.5 (-1.15)	-115.1+ (-0.30)	_1227.6 (-1.51)	-1407.8 (-0.83)	1644.8* (2.46)	1489.9** (5.41)	1348.2** (3.44)	1780.9 (1.88)
Pseudo R²		0.0439	0.0561	0.0746		0.0233	0.0431	0.0530

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Chi²(1) = 418.65	Chi²(1) = 285.17
Prob > chi² = 0.0000	Prob > chi² = 0.0000

Notes: t-statistics in parentheses.

* p<0.05, ** p<0.01, *** p<0.001; + Significantly different QR coefficients from OLS coefficients at 5% significance level, when the OLS coefficient is outside the confidence interval estimate of the quantile.

and education in rural areas is considered as a commodity to be bought lowering school attainment.

The focus on human capital development as a driver for economic growth should be pursued vigorously. This result is in agreement with the dictates of the Millennium Development Goals established in 2000. Therefore, an important issue about the level of investments in developing countries should revolve around the development of primary education for all with considerable progress to be made in rural areas in order to close the gap with urban areas in terms of literacy attainment. More importantly, governments and developmental institutions are encouraged to focus more efficiently on human

capital development policies as en-route of economic growth that will raise the levels of incomes in rural areas.

This is expected to stimulate the realization of incomes redistribution for long run solutions to poverty.

Conclusion

This study like previous ones used the conventional OLS method to produce only a point estimate for the relationship between the dependent and explanatory variables. In addition, the QR method is used to generate a multitude of estimates with each describing the relationship between the dependent and explanatory variable at a particular point in the

conditional distribution of the household consumption expenditure. The results show that the covariates are not constant across the conditional distribution of household expenditure, and hence QR is an appropriate method.

Information gaps were identified when the OLS was applied. However, this deficiency was corrected when QR was employed. In particular, in Nigeria, we found age, education, and household size as significant determinants of household consumption expenditure with OLS, while more additional variables, such as membership of formal and informal institutions, main occupation, and farm size, were found associated across the conditional quantiles of the expenditure. In Ghana, only education affects the expenditure using OLS while family structure, membership of formal and informal institutions, main occupation, household size, and farm size vary across the conditional quantiles of the expenditure.

Only education showed a uniform trend between the two models used and across the different points of the conditional distributions of household expenditure in both countries.

The study revealed that potential for demand-led growth exists in the study region. Providing smallholder farmers with basic education will reduce their vulnerability to superstitious and ritual practices that will engender increased yam production thereby increasing expenditure. Increased expenditure could mobilize underused resources and stimulate the production of locally produced goods, thus creating further enterprise and employment opportunities. Policy should focus on investment in education attainment imbedded in human capital so as to reduce transaction costs and risk in all markets. This would lower constraints to production, encourage greater participation from local yam producers, extend the economic base, and maintain the attractiveness of living in rural areas. Formulation of the regional consumption policy should consider also other important drivers and local conditions for the purpose of pushing coordinated increases of local economic growth.

Acknowledgements

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