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Accounting for Urban-Rural Real Food Expenditure Differentials in Cameroon: A Quantile Regression-Based Decomposition

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Abstract: This paper aims at accounting for the urban-rural household real food expenditure differentials in Cameroon. In particular, the paper: assesses the determinants of household real food consumption expenditure across percentiles; evaluates the direction of change of the elasticity of expenditure and the urban-rural household food expenditure gap between 2001 and 2007across percentiles; and investigates the role of access to endowments and returns to endowments in accounting for the urban-rural household real food expenditure gaps across percentiles. The study uses the 2001 and 2007 Cameroon household consumption surveys, quantile regression analysis and a Quantile-Oaxaca-Blinder based framework to decompose the urban-rural food expenditure gaps across percentiles. Results indicate that the elasticity of expenditure and urban-rural food expenditure gaps declined significantly between 2001 and 2007across the quantiles under consideration. Results also show that real total expenditure predominantly explains real food expenditure and the urban-rural food expenditure gaps and returns to endowments overwhelmingly account for the urban-rural food expenditure gaps for both periods and across the quantiles under review. Some policy implications are derived from the analysis.

Keywords: Household food expenditure; Urban-Rural food expenditure differentials; Quantile-Oaxaca-Blinder based decomposition and Cameroon

JEL Classification: O18; D12; C21

1. Introduction

Empirical research on household food consumption expenditure in developing countries has spiralled in the recent years due to the increasing concern about food security. For example, Moss et al. (2016) examine the distribution budget shares for food in Rwanda and Chikobola and Edriss (2016) estimate the rural-urban food expenditure and elasticities of the food items in Zambia. In the same vain, Dawoud (2014) analyses the changes in food expenditure over time in Egypt laying emphasis on the urban-rural food differences, Ayo et al. (2012) examine food consumption in Uganda and Kane et al. (2015) evaluate the welfare effects of food price volatility on Cameroonian consumers. A strong link between household food spending and household income is well perceived in the consumer demand theory, with the food spending share commonly used as an important index of household welfare and household economic well-being (McDowell et al., 1997). Mahammad et al. (1997) added that household income is the prominent determinant of household food spending. Households living in rural and urban areas make expenditure on different commodities to attain utility and satisfaction. Typically, expenditure on food is

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the most important component in the household spending plan as food is the basic source of nutritional ingredients for every human being (Ahmad et al., 2015).

The first study bearing on food expenditures was done by the statistician Ernst Engel who published a study for the Prussian government in 1895. Engel observed an empirical regularity that the food expenditure share in the household budget falls with a rising income. This regularity is known in the economic literature as Engel's law. According to this law, the poorer a family, the greater the proportion of its total expenditure that must be devoted to the provision of food. An allocation of a high share of household budgets to food can therefore be a sign of poverty; hence a quantitative analysis of food share in the total expenditure is a very important endeavor. In the absence of a universally accepted method of calculating welfare/poverty, household food expenditures can be used to provide an indication of inequality of wealth distribution and serve as an indicator of welfare/poverty (Martins, 2007).

According to the consumer demand theory, household food consumption is an important element of social behaviour, which is perceived to be affected by household income, price level of goods and household preferences and it varies across households, especially in developing countries. In developing countries, household food consumption spending occupies an important fraction of household total spending. In line with this classical consumer theory, the household chooses an optimal food consumption basket to maximize the household utility function within the framework of her budget constraint. The solution to the first order condition is obtained by equalizing the marginal rate of substitution to the price ratio. As postulated by the consumer demand theory that household food consumption spending is determined by factors such as household income, price level and household preferences, household income correlate positively with food consumption spending. This has been demonstrated empirical by Engel in the case of normal goods. According to Engel, poorer households usually have higher income coefficients, while richer households have lower income coefficients, indicating their relative level of income and economic well-being.

The theory equally postulates that the price level has a negative impact on household food spending since food is considered as a normal good. However, in most empirical studies, the hypothesis of a stable price level within the period under consideration is always put in place since it is always difficult to aggregate the prices of the different food components. In addition, the implication of the household preference is not always easy to capture. Nevertheless, a good number of studies indicate that household preferences are determined by socio-economic variables such as education and employment status and demographic variables such as household size, age and area of residence.

Studies on food consumption help to provide a better understanding of how the demand for food responds to changes in household income, socioeconomic variables and demographic variables. Information from such studies is essential in gauging the welfare effects of many types of economic shocks, as well as the welfare implications on policy intervention. Consumer behaviour analysis can be based on either panel data or cross sectional data. Unfortunately, in most of developing countries the availability of reliable panel data is limited. However, many household surveys have been implemented in these countries, which provide comparatively rich and fairly accurate micro data on household consumption expenditure behaviours. Food consumption expenditure analysis based on household surveys has been increasingly used in recent years in developing countries, where large proportions of

household expenditures are devoted to food. Consumption expenditure surveys are of great importance because they can furnish us with information on specific subpopulations of households that are more likely to be affected by changes in household incomes and education.

To better understand household food consumption expenditure in Cameroon, our main objective is to account for urban-rural household food expenditure differentials across percentiles in Cameroon. Specifically, the paper seeks: (1) to assess the determinants of household food expenditure across percentiles; (2) to evaluate the change in the urban-rural food expenditure gap and the elasticity of expenditure at the household level between 2001 and 2007 across percentiles; (3) to investigate the role of access to endowments and returns to endowments in explaining the urban-rural household food expenditure differentials across percentiles. These objectives are motivated by the claims that: total expenditure is the predominant variable explaining both household food consumption expenditure across percentiles; the elasticity of expenditure and urban-rural food expenditure differentials decreased between 2001 and 2007 across percentiles; and access to endowments is more likely to account for the urban-rural household food expenditure gaps than returns to endowments across percentiles for both periods.

The remainder of the paper is structured as follows: Section 2 reviews the literature on food consumption. Section 3 dwells on the methodology and data. Section 4 presents the empirical results and Section 5 submits the concluding remarks.

2. Literature Review

There is a great strand of literature on the empirical investigation of the Engel's curve for expenditures across developed and developing countries. In developed countries, several studies have been conducted on household food expenditures. For example, in Greece, Kostakis (2013) examines the determinants of food consumption expenditure using a cross-sectional data from Athens and Crete. Results of the study reveals that demographic and socioeconomic traits such as income, gender, age, marital status and place of residence have an important impact on household expenditures on food. In Italy, Bagarani et al. (2009) employs the 2000 and 2006 Consumption Expenditure Surveys and the quantile regression to investigate the relationships between socioeconomic characteristics and households' food expenditures. McDowell et al. (1997) examine food expenditure dynamics across different income groups in the United States. The study applies the Tobit model to deal with zero consumption issues. Results of the study corroborate the Engel's law as results show that higher income classes devote a bigger a portion of their income on food expenditure.

Regarding studies on food expenditures in developing countries, a lot has been documented. Ahmad et al. (2015) analyse the rural-urban food consumption patterns with the help of the 1998-99 Pakistani Household Integrated survey. The results of the study indicate that rural and urban households have different consumption patterns. Myrie and Robinson (2013) examine the effect of the 2008/2009 world financial crisis on food expenditure among Jamaican households. They find that income level and area of residence are consistently significant determinants of food consumption in Jamaica. Using the 2001 Jamaican Survey of Living Conditions, Chen and Wallace (2009) explore household food consumption by estimating an Engel curve which reflects the relationship between food consumption and household

income. They find that household income has a significant negative effect that increases with societal income deciles. Tey et al. (2009) use the 2004/05 Household Expenditure Survey and Weighted Least Squares (WLS) to examine the rural-urban vegetable consumption in Malaysia. Results reveal that urban households show a higher quality demand for processed vegetable compared to rural households.

Concerning studies on household food expenditure, Chikobola and Edriss (2016) use the Zambian 2010 Living Conditions Monitoring Survey to estimate the rural-urban food expenditure and elasticities of the food items. Results from the study indicate that the elasticities are higher in rural areas compare to urban areas. In Rwanda, Moss et al. (2016) employ quantile regression and the Rwandan Integrated Living Conditions Survey to examine the distribution budget shares for food. They find that the share of expenditure for food is statistically different in coffee growing and non-coffee growing provinces. Dawoud (2014) analyses the changes in food expenditure patterns over time in Egypt and find that food consumption expenditure patterns have changed over the five consecutive survey periods as a result of economic changes with significant variation between the urban and rural expenditure elasticity for some food commodities. Still in Egypt, Fabiosa and Soliman (2008) examine household expenditure pattern for food and non-food consumption in urban and rural areas of Egypt. It is observe that rural households are more responsive to changes in expenditure for food compared to their urban counterparts.

In Cameroon, empirical literature on household food expenditure with emphasis on the urban-rural differentials is scant. However few studies have been documented. For example, Kane et al. (2015) analyze the welfare effects of food price volatility on Cameroonian consumers. The study uses the third Cameroon household consumption survey and a Quadratic Almost Ideal Demand System model to evaluate the distributional impact of food price changes in terms of compensating variation. They find that poor households are the most affected by food price volatility. Wirba et al. (2013) also investigate the determinants of growth in household real food expenditure in Cameroon using OLS and the 2001 and 2007 Cameroon household consumption surveys and finds that the marginal propensity to consume between 2001 and 2007 declined significantly.

The value added of this study is in three directions. First, in Cameroon there is no published work to the best of our knowledge that has gone beyond the mean in explaining food expenditure in Cameroon. In this paper we explain food expenditure beyond the mean by making use of the quantile regression approach. However, few of such studies have been carried out in other African countries such as Moss et al. (2016) for Rwanda and Meng et al. (2012) for Ghana. Secondly, we use pooled data from the two most recent Cameroon household consumption surveys (CHCS II and CHCS III) and exploit the pooling cross sections overtime econometric technique proposed in Wooldridge(2009) to evaluate the change in expenditure elasticity and the change in the urban-rural food expenditure gaps between the two periods and Thirdly, we equally blend the Oaxaca-Blinder decomposition with the quantile regression to help us assess the urban-rural food expenditure gaps across percentiles for the two periods.

3. Methodology and Data

3.1. Methodology

The study employs Quantile regression, pools two cross sections surveys and uses a Quantile-Oaxaca-Blinder based decomposition framework to explain urban-rural household food expenditure differentials across the distribution of food expenditures in Cameroon.

3.1.1. Modelling Household Food Consumption Expenditure

To assess the determinants of food consumption expenditure and the inter-temporal change in the urban-rural food expenditure gap, we interact the total expenditure and the zone of residence with the year dummy to obtain the following equation.

$$logFE_i = \theta_0 + \alpha_1 D2010 + \theta_1 logTE_i + \alpha_2 D2010 * logTE_i + \theta_2 U_i + \alpha_3 D2010 * U_i + \sum_{k=1}^{m} \gamma_k Z_k + \varepsilon_i$$

Where FE is the household food consumption expenditure per head expressed in CFA francs, D2010 is a year dummy that takes the value 1 if observation is from 2007 and 0 from 2001, TE is total household expenditure per head expressed in CFA francs, $\theta_0$is the intercept for 2001, θ_0+$\alpha_1$the intercept for 2007,$\theta_1$is the expenditure elasticity for 2001, θ_1+$\alpha_2$is the expenditure elasticity for 2007, $\alpha_2$measures the change in the expenditure elasticity between 2001 and 2007, γ is a vector of coefficients of the other household characteristics, $\theta_2$is the urban-rural food expenditure gap for 2001, α_3 captures the change in the urban-rural food expenditure gap between the two periods and Zrepresents a vector of other individual and households characteristics.

To explain the distribution of food expenditure across percentile the Quantile regression technique is employed. The quantile regression technique can be considered an extension of the conditional mean model (Koenker & Basset, 1978). The quantile regression substitutes the mean by the different quantile values and proceeds to minimize the weighted sum of the absolute residuals. We thus model these conditional quantiles by:

$$Q_q\left({}^{logFE}/_{X}\right) = X'\beta(q) \qquad 2$$

Where $Q_q\left({}^{logFE}/_{X}\right)$ for $q \in (0,1)$ denotes the qth quantile distribution of the log food expenditure noted by $logFE$, given a vector X of cavariates, $\beta(q)$ is a vector of parameters of the various quantiles in question. According to Koenker and Basset (1978), for $q \in (0,1)$ the vector of parameters $\beta(q)$ can be estimated by minimizing β in the following objective function:

$$\frac{1}{n}\sum_{i=1}^{n} \rho_q(logFE_i - X_i'\beta) \qquad 3$$

$$\rho_q(z) = \begin{cases} qz & for\ z \geq 0 \\ (q-1)z & for\ z < 0 \end{cases}$$

where $\rho_q(z)$ *is a check function.*

3.1.2. Characterizing the Urban-Rural Household Food Expenditure Differentials

We blend the Quantile regression and the Oaxaca-Blinder decomposition to explain the urban-rural household food consumption expenditure differentials for 2001 and 2007. The Quantile-Oaxaca-Binder based decomposition technique consists of breaking down gap between the two regions into an explained component (accounted for by the zonal differences in household characteristics) and an "unexplained" component (accounted for by the zonal differences in the efficiency by which households are able to convert these characteristics into outcomes). Below is an outline of the decomposition framework.

The first step of this quantile regression based decomposition technique is to specify and estimate the models that relate household food consumption expenditure and household characteristics for both zones.

In matrix form, the food consumption generating functions for urban and rural zone of residences are given as:

$$logFE^{U,t} = X^{U,t}\beta^{U,t}(q) + \mu^{U,t} \quad 4$$

$$logFE^{R,t} = X^{R,t}\beta^{R,t}(q) + \mu^{R,t} \quad 5$$

$for\ t = 2001, 2007$

Where $\log FE^U$ is the log of household food expenditure per head for the urban zone and $\log FE^R$ is the log of household food consumption expenditure for rural zones; $\beta^U(q)$ and $\beta^R(q)$ are vectors of coefficients that determine the effects of factor endowments on household food expenditure for each zone at quantile q; X^U and X^R are the vectors of household endowments for the corresponding zones at quantile q.

The estimated equations for both the urban and rural samples are:

$$\widehat{logFE}^{U,t} = \bar{X}^{U,t}\hat{\beta}^{U,t}(q) \quad 6$$

$$\widehat{logFE}^{R,t} = \bar{X}^{R,t}\hat{\beta}^{R,t}(q) \quad 7$$

The urban-rural differential in food consumption expenditure for each period at each quantile q is thus given by:

$$\Delta\widehat{logFE}^{t}(q) = \widehat{logFE}^{U,t}(q) - \widehat{logFE}^{R,t}(q)$$

Adding and subtracting $\widehat{\log FE}^{CF,t}$

$$\Delta\widehat{logFE}^{t} = \widehat{logFE}^{U,t} - \widehat{logFE}^{CF,t} + \widehat{logFE}^{CF,t} - \widehat{logFE}^{R,t} \qquad 9$$

Where $\widehat{\log FE}^{CF,t}$ is a reference log food consumption structure, which could be assimilated to the base zone (group) food consumption structure in the standard Oaxaca-Blinder decomposition approach. To resolve the critical issue of having to define *a priori* a reference structure in the standard Oaxaca-Blinder framework, we consider both the structure of urban and rural as the reference structures; then take the average. This can be referred to as the Shapley Value-based Oaxaca-Blinder or Shapley-Oaxaca-Blinder gap accounting approach.

Substituting Equations 6 and 7 into 9 applying both reference structures and averaging for all the endowments, the following decomposition of the gap in food expenditure between urban and rural is obtained:

$$\Delta\widehat{logFE}\,(q) = \sum_{z=1}^{Z} 0.5\left(\hat{\beta}^{U,t,z}(q) + \hat{\beta}^{R,t,z}(q)\right)(\bar{X}^{U,t,z} - \bar{X}^{R,t,z}) + \sum_{z=1}^{Z} 0.5(\bar{X}^{U,t,z} + \bar{X}^{R,t,z})\left(\hat{\beta}^{U,t,z}(q) - \hat{\beta}^{R,t,z}(q)\right) \qquad 10$$

Where z=1, 2 Z indicates the number of endowments considered for each household. From Equation 10, the overall gap($\Delta\widehat{logFE}(q)$)at each quantile$q$ is decomposed into two components. One of the portions attributed to the differences in characteristics (first term on the right-hand-side) between urban and rural, while the other portion is attributable to the returns of the characteristics (second term on the right-hand-side). By making the difference between the explained gap effects (gap due to endowments) on the one hand and on the other hand the unexplained gap effect, Equation 10 is thus a solution to the problem of setting the base and the final years of the analysis beforehand (Epo et al. 2013).

3.2. Presentation of Data and Variables

The study makes use of the 2001 and 2007 household consumption surveys. The 2001 household consumption survey covered all ten provinces of Cameroon, and was conducted in both urban and rural areas using a sample of 12,000 households, of which 10,992 were actually visited. In addition, (1) it was conducted to propose an adequate methodology for calculating poverty lines and profiles acceptable to major development partners, and which serves as a reference for further analysis; (2) to analyse monetary poverty, poverty in terms of living conditions of most households and potential poverty, while establishing the correlation between them; (3) consolidate past analysis at a national and regional level, while isolating the two large towns (Douala and Yaoundé) and also distinguishing area of residence (urban or rural).

The 2007 household consumption survey was undertaken between May and July 2007; and comprised of 11,391 households. Its aim was to upgrade knowledge on poverty and welfare status in Cameroon by providing indicators that capture the living standards of the local population as a follow up of efforts made towards the implementation of the Poverty Reduction Strategy Paper (PRSP) and the realization

of the millennium development goals (MDGs). The third household consumption survey (CHCS, 2007) was conducted with objectives as to: (1) ameliorate the poverty profile both at the national and regional levels and establish a correlation between the different poverty dimensions (monetary poverty, poverty in terms of potentials and subjectivity); (2) study poverty dynamic between 2001 and 2007, with the aim of evaluating the incidence of macro-economic policies on households welfare; (3) evaluate the demand for human capital and their principal determinants; (4) investigate household consumption patterns; and (5) evaluate internal tourism and provide data on child labour in Cameroon.

The following variables were selected for the study. The dependent variable is household food consumption expenditure per head derived by dividing the household total food consumption by the number of individuals within the household. We assume the absence of economies of scale in the household consumption pattern. This justifies the use of household food expenditure rather than the adult equivalence measure. The independent variables considered include: household total expenditure per head (proxy for income) and it constitutes all the expenses of the household; household size, represented by the number of individuals living in a particular household at a given point in time; gender of household head, which indicates the sex of the head of the household (male or female); age indicates the age of household head at the time of the survey; educational status measured by the number of years of schooling. The geographical variable considered is the residential area with modalities urban and rural. To account for temporal price variation in this paper, we use real values of food and total expenditures instead of nominal values.

The two data sets were harmonised using consumer price index (CPI) to convert the 2001 total expenditures in terms of 2007 prices while the food price index was used to express the 2001food prices in terms of the 2007 food prices. These CPIs for 2001 and 2007 are 174.8 and 196.2 respectively while the food price Indexes are 195.9 and 218.1 for 2001 and 2007 respectively. Both the CPIs and the food price indexes were computed by the national institute of statistics with the base year 1993.

4. Presentation of Results and Discussion

4.1. Descriptive Statistics

Table 1 hoists the descriptive statistics for 2001 and 2007 by location. Descriptive statistics reveal that the average log of food expenditure per head is higher for urban households compared to rural households for both 2001 and 2007. The share of log of real food expenditure in log of total expenditure is at 0.949 for rural area against 0.920 for urban areas in 2001 and in 2007 the food share is 0.943 for rural households and 0.909 for urban households. The results depict that rural households have a higher food expenditure share in total expenditure compared to their urban counterparts. Based on this, we say urban households are better-off in terms of well-being compared to their rural counterparts. Household average log of total expenditure per head for 2001 is 12.038 log points and 12.694 log points respectively for rural and urban households. In 2007, the total expenditure for rural and urban households is 12.047 log points and 12.795 log points respectively.

Statistics equally show that urban households have higher years of schooling with respect to rural households thus depicting that urban households are highly endowed with human capital compared to

rural households. Averagely, urban households have 10 years of schooling against 5 years for rural households. In 2001, the average age of household head for urban households is 43.689 years against 46.757 years for rural households while in 2007 is 42.730years for urban households against 45.304 years for rural households. In 2001, the average number of persons per household is approximately 8persons for both rural and urban households while in 2007 the average number persons per household reduced to approximately 7persons for both rural and urban households. In 2001 among the total number of household surveyed, 83% of the rural households were male headed while 78.9% of the urban households were male headed. In 2007 we found that 80.5% of the rural households were male headed while 76.5% of the urban households were male headed. 13.7% of the rural households were found to work in the formal sector while 50.4% of the urban household heads are employed in the formal sector. In 2007, the percentage dropped to 8.1% for rural households and to 31.5% for urban households. The percentage of households that own a household is higher for rural areas compared to urban areas. This is obvious since in rural areas it is very easy to own a house though of low quality.

Table 1. Descriptive statistics by location

	2001 Survey		2007 Survey	
Variables	Rural Sample	Urban Sample	Rural sample	Urban Sample
Log food expenditure per head	11.426 (0.676)	11.671 (0.645)	11.354 (0.563)	11.625 (0.623)
Food share	0.949 (0.027)	0.920 (0.032)	0.943 (0.028)	0.909 (0.036)
Log total expenditure per head	12.038 (0.608)	12.694 (0.694)	12.047 (0.566)	12.795 (0.636)
Years of education of head	4.982 (4.895)	9.552 (5.375)	5.084 (4.877)	9.914 (5.147)
Age of head	46.757 (14.800)	43.689 (12.513)	45.304 (14.944)	42.730 (12.809)
Household size	7.277 (4.144)	7.308 (4.266)	6.666 (4.194)	6.128 (3.550)
Male	0.830 (0.375)	0.789 (0.407)	0.805 (0.396)	0.765 (0.423)
Formal	0.137 (0.344)	0.504 (0.500)	0.081 (0.273)	0.315 (0.464)
Ownership	0.821 (0.384)	0.514 (0.500)	0.809 (0.393)	0.477 (0.500)

Source: Computed by authors using CHCS II and CHCS III. The values in parenthesis are the standard errors

4.2. Determinants of Household Food Expenditure: Ordinary least Squares versus Quantile Regression.

The OLS pooled regression results, indicates that the pooled model is significant with an R^2 of 0.649. Estimates reveal that the year effect is significant. Results show that the interaction variable – yeardummy multiplied by the log of total expenditure correlates negatively with food consumption expenditure. Thus, showing that the inter-temporal effect between 2001 and 2007 is negative which indicates a decrease in the expenditure elasticity between the two periods. The findings indicate that the

urban-location dummy has a negative and significant effect on household food consumption per head thus, indicating the existence of urban-rural food expenditure differentials for 2001. As urban households are perceived to be richer than rural households, they spend more on non-food items. This might also be due to the expectation that rural households do have more food requirements as they do more physical activities. The results equally show that the interaction variable -year dummy multiplied by urban is significant thus indicating a change in urban-rural food expenditure differentials between the two periods. In addition, the OLS pooled estimates reveal that variables such as log of total expenditure per head, gender and ownership associate positively with food expenditure per head, while education, age, region and formal sector correlate negatively with the dependent variable log food expenditure per head.

The variable total expenditure appears to be the predominant variable explaining food consumption expenditure. Its coefficient indicates the expenditure elasticity. The results show decrease between the two period periods under review. This result is similar to findings by Dawoud (2014) for Egypt, who found that the expenditure elasticity decreased over time. We find that the variable education was significant and negatively affects per capita food consumption expenditure. This can be supported by the idea that year of schooling of increases household income. This increase in income encourages household to spend more on luxuries and less on necessities such as food. The results corroborate those obtained by Kostakis (2013) in Greece indicating that food consumption decreases as the level of education increases.

The quantile regression results corroborate the idea that the level of food expenditure per head of the different food expenditure quantiles are explain by different variables. The coefficient of Log of total expenditure per head which is the expenditure elasticity is found to significantly increase from the 5th quantile to the 95th quantile. These results are in line with Bagarani et al. (2009) who found that the expenditure elasticity of increases from the lower percentiles to higher percentiles. The year dummy is significant across all the seven quantiles considered with a decreasing effect from the 5th to 90th quantile.This finding indicates an inter-temporal change in the food expenditure. Equally, the quantile regression results show that the interaction variable -year dummy x log total expenditure per head which measures the inter-temporal change in expenditure elasticity is negative and significant across all the quantiles considered with a decreasing impact from the 5th to 95th quantile. It is also found that the variable urban is also negatively significant across set the quantiles under review. This confirms the existence of the urban-rural food expenditure differentials across the quantiles considered. The magnitude of the urban-rural food expenditure differentials decreases from the 10th quantile to 95th. The interaction variable -year dummy x urban which measures the inter-temporal change in the urban-rural food expenditure differentials is significant across the quantiles with decreasing effect from the 25th to 95th quantile. The years of schooling of household head is negatively significant at the 10th, 25th, 50th, 75th, 90th and 95th quantile while house-ownership positively correlates with food expenditure per head across all the quantiles under consideration. The gender of household head is found to correlates negatively with food expenditure per head at the 5th, 10th, and 25th quantiles and positively at the 90th and 95th quantiles. The age of household head correlates at the 5th, 10th and 25th quantiles positively with food expenditure per head and negatively for all the other quantiles considered. The variable formal sector on her part correlates positively at the 5th, 10th and 25th quantiles and negatively at the 75th, 90th

and 95th quantiles. The pseudo-R-Squared of the quantile regression are found to lie between 0.1520 and 0.5920 which is not bad for a cross section.

Table2. Pooled Regression Results: Determinants of Food Expenditure across Percentiles

Variables	OLS	Q_5th	Q_10th	Q_25th	Q_50th	Q_75th	Q_90th	Q_95th
Log of total expenditure per head	0.913*** (152.62)	0.777*** (44.87)	0.801*** (83.03)	0.854*** (106.47)	0.914*** (111.12)	0.972*** (124.41)	1.009*** (129.98)	1.035*** (103.13)
Year dummy (1=2007 & 0 for 2001)	0.968*** (11.41)	4.491*** (14.72)	3.041*** (12.27)	1.714*** (11.39)	1.085*** (9.44)	0.642*** (7.19)	0.337*** (3.61)	0.366*** (3.29)
Year dummy x log total expenditure per head	-0.103*** (-14.63)	-0.388*** (-15.38)	-0.267*** (-13.30)	-0.160*** (-13.10)	-0.110*** (-11.62)	-0.075*** (-10.51)	-0.051*** (-6.66)	-0.053*** (-5.77)
Urban	-0.397 *** (-45.52)	-0.379*** (-21.12)	-0.380*** (-21.75)	-0.355*** (-30.82)	-0.310*** (-34.36)	-0.284*** (-38.75)	-0.247*** (-30.93)	-0.237*** (-26.91)
Year dummy x Urban	0.157*** (15.20)	0.114*** (3.25)	0.103*** (3.37)	0.149*** (11.07)	0.133*** (12.34)	0.113*** (12.80)	0.093*** (9.28)	0.086*** (7.88)
Years of education	-0.015*** (-31.18)	-0.001 (-0.70)	-0.004*** (-2.88)	-0.012*** (-16.13)	-0.017*** (-37.95)	-0.018*** (-30.05)	-0.018*** (-48.87)	-0.016*** (-28.82)
Male	0.009** (1.70)	-0.151*** (-10.29)	-0.120*** (-15.52)	-0.048*** (-8.14)	-0.009 (-1.46)	-0.0001 (-0.02)	0.018*** (3.98)	0.023*** (4.06)
Age of head	-0.001*** (-4.17)	0.001** (2.10)	0.002*** (4.55)	0.001*** (3.19)	-0.0004*** (-2.85)	-0.001*** (-7.37)	-0.001*** (5.72)	-0.001*** (-4.82)
Formal	-0.015** (-2.42)	0.121*** (5.59)	0.059*** (3.67)	0.026*** (2.96)	-0.002 (-0.33)	-0.030*** (-5.04)	-0.037*** (-6.42)	-0.046*** (-7.25)
Household size	0.002*** (2.70)	0.015*** (6.42)	0.009*** (5.45)	-0.0003 (-0.25)	-0.003*** (-3.14)	-0.0001 (-0.11)	0.001* (1.93)	0.003*** (4.30)
House Ownership	0.057 *** (10.90)	0.162*** (8.22)	0.116*** (9.15)	0.074*** (12.50)	0.061*** (9.59)	0.050*** (7.74)	0.043*** (6.33)	0.040*** (4.89)
Constant	0.675*** (9.24)	1.441*** (6.18)	1.388** (10.59)	1.170*** (11.88)	0.720*** (7.12)	0.203** (2.08)	-0.146 (-1.53)	-0.411*** (-3.29)
R-Squared	0.649	0.1520	0.2069	0.3231	0.4295	0.5103	0.5671	0.5920

Source: Computed by authors using CHCS II, CHCS III and Stata 13. The values in parenthesis are the Student statistics.

4.3. Decomposition Results: The Quantile-Oaxaca-Blinder Based Decomposition

4.3.1. Urban-Rural Decomposition of Food Expenditure for 2001 across Percentiles

Table 3 shows that in 2001 Cameroon registered urban-rural food expenditure gap of -2.744 based on the mean decomposition. This indicates that the proportion of total expenditure devoted to food is lesser for urban households compared to rural households. The endowments component contributed in narrowing this negative gap, while the returns to endowments component rather contributed in deepening the negative urban-rural food consumption expenditure gap. Variables that contributed in deepening this gap in food consumption expenditure were; log of total expenditure per head, years of schooling of household head, household size, house-ownership and gender. Among these variables that registered negative values, the log of total expenditure per head overwhelmingly accounted for the urban-rural gap in food consumption expenditure. This was followed by the variables household size, ownership of a house, gender and years of schooling of household head. Variables that helped in reducing this negative gap were formal sector employment and age of household head.

Regarding the behaviour of endowments, the endowment component (explained component) registered a positive urban-rural food consumption expenditure gap of 0.483. The log of total expenditure per head was predominant in accounting for the overall access to endowments. Age squared and ownership of a house marginally accounted in fuelling the endowment effect. All the other variables contributed in registering negative endowment effects. The returns to endowments are globally responsible for the negative gap in food consumption expenditure of -3.227. The variables, education and formal sector help in mitigating the negative returns to endowment in food consumption expenditure. Variables that rather registered negative returns to endowments s were gender, household size, ownership of a house and log of total expenditure per head.

Concerning the quantile-based decomposition, in 2001 results show that urban-rural food expenditure differentials were registered across all the percentiles considered. The negative sign depicts that rural households have higher food shares across the percentiles under review. The results confirms the Engel's law since in Cameroon rural household are poor and are expected to have higher food shares compared to urban households. Across from the 5th to the 95th percentiles quantile decomposition results further indicate that access to endowments help in reducing these differentials while returns to endowments helps the differentials. With respect to other variables, the log food expenditure per head appears to have the predominantly accounts for urban-rural food expenditure differentials. The log food expenditure per head helps in augmenting the urban-rural food expenditure differentials with decreasing effect from the 5th to 95th percentiles.

Table 3. Urban-Rural Decomposition of Food Expenditure for 2001 across Percentiles

Quantiles		Log of total expenditure per head	Years of education	Male	Age of household head	Formal sector	Household size	House Ownership	Food expenditure Differentials
mean (OLS)	Access to endowments	0.587	-0.093	-0.003	0.009	-0.018	0.000	0.001	0.483 (- 17.60%)
	Returns to endowments	-3.203	0.080	-0.016	0.000	0.033	-0.066	-0.041	-3.227 (117.60%)
	Total contribution	-2.616 (95.34%)	-0.013 (0.47%)	-0.019 (0.69%)	0.009 (-0.33%)	0.015 (-0.55%)	-0.066 (2.41%)	-0.04 (1.97%)	-2.744
Q_5	Access to endowments	0.465	-0.049	-0.001	0.004	-0.002	-0.005	0.001	0.412 (-14.83%)
	Returns to endowments	-2.974	0.018	0.004	0.047	0.024	-0.158	-0.153	-3.191 (114.83%)
	Total contribution	-2.509 (90.3%)	-0.031 (1.12%)	0.003 (-0.1%)	0.052 (-1.86%)	0.022 (-0.77%)	-0.163 (5.87%)	-0.152 (5.46%)	-2.779
Q_10	Access to endowments	0.500	-0.074	-0.005	0.004	-0.009	-0.001	-0.004	0.411 (-17.80%)
	Returns to endowments	-2.474	0.038	-0.034	-0.047	0.032	-0.130	-0.103	-2.720 (117.80%)
	Total contribution	-1.974 (85.52%)	-0.036 (1.55%)	-0.039 (1.71%)	-0.043 (1.87%)	0.023 (-.98%)	-0.131 (5.68%)	-0.107 (4.65%)	-2.309
Q_25	Access to endowments	0.521	-0.099	-0.001	0.009	-0.007	-0.001	-0.005	0.418 (-20.60%)
	Returns to endowments	-2.286	0.020	-0.017	-0.048	0.020	-0.048	-0.089	-2.447 (120.60%)
	Total contribution	-1.765 (86.97%)	-0.079 (3.88%)	-0.018 (0.87%)	-0.039 (1.90%)	0.012(-0.61%)	-0.049 (2.40%)	-0.093 (4.59%)	-2.029
Q_50	Access to endowments	0.491	-0.001	-0.002	0.004	-0.014	-0.003	-0.008	0.468 (-32.48%)
	Returns to endowments	-2.049	0.306	-0.009	-0.087	0.023	-0.014	-0.080	-1.909 (132.48%)
	Total contribution	-1.558 (108.14%)	0.305 (-21.17%)	-0.011 (0.74%)	-0.083 (5.77%)	0.010(-0.68%)	-0.016 (1.14%)	-0.087 (6.07%)	-1.441
Q_75	Access to endowments	0.554	-0.112	0.000	0.002	-0.022	-0.006	-0.001	0.416 (-26.82%)
	Returns to endowments	-1.949	0.004	-0.005	0.043	0.026	-0.028	-0.058	-1.967 (126.82%)
	Total contribution	-1.394 (89.90%)	-0.108 (6.97%)	-0.005 (0.35%)	0.045 (-2.92%)	0.004 (-0.29%)	-0.034 (2.22%)	-0.059 (3.78%)	-1.551

Q_90	Access to endowments	0.633	-0.105	-0.001	0.006	-0.024	-0.0002	-0.006	0.503 (-55.33%)
	Returns to endowments	-1.367	0.032	-0.034	-0.009	0.015	-0.019	-0.030	-1.412 (155.33%)
	Total contribution	-0.734 (80.76%)	-0.073 (8.02%)	-0.035 (3.85%)	-0.002 (0.27%)	-0.009 (0.99%)	-0.019 (2.13%)	-0.036 (3.98%)	-0.909
Q_95	Access to endowments	0.633	-0.121	0.00006	0.010	-0.021	0.001	-0.008	0.495 (-37.61%)
	Returns to endowments	-1.805	0.034	-0.024	0.042	0.008	-0.036	-0.030	-1.811
	Total contribution	-1.172 (89.06%)	-0.087 (6.60%)	-0.024 (1.80%)	0.052 (-3.96%)	-0.013 (0.97%)	-0.035 (2.63%)	-0.038 (2.91%)	-1.316

Source: Computed by authors using CHCS II and CHCS III

4.3.2. Urban-Rural Decomposition of Food Expenditure for 2007 across Percentiles

Table 4 harbors the results derived from the Oaxaca-Blinder Mean decomposition and the Quantile-Oaxaca-Blinder based decomposition. Concerning the mean decomposition results, the urban-rural food expenditure gap predicted from the 2007 sample is 0.818. The returns to endowments overwhelmingly accounted in fueling the urban-rural food expenditure gap by 1.336 points meanwhile access to endowments contributed in mitigating the urban-rural food expenditure gap by 0.518 points. The most contributing variable to the food expenditure gap is the log of household total expenditure by 54.5%. The variables log of household total expenditure, years of schooling and ownership of a house contributed in fuelling the overall gap whereas age of household head, formal sector employment status and household size contribute in reducing the overall gap.

Log of total expenditure per head and gender of household head contribute in fuelling the endowments gap, while years of schooling, age of household head, formal sector employment status, household size and ownership of a house helps in reducing this endowments gap. For the returns to endowments components, the variables at work in fuelling the unexplained gap are log of household total expenditure, years of schooling, gender and house ownership, while age of household head, formal sector engagement and household size act in reducing the unexplained gap.

Based on the Quantile decomposition the overall urban-rural food expenditure gaps are negative for the quantiles under consideration except the 95th quantile that registered a positive gap. The highest food expenditure gap of 1.575 is depicted at the 10th quantile, while the least urban-rural food expenditure gap of 0.160 is at the 90th quantile. The quantile decomposition results depict that access to endowments helps in mitigating the urban-rural food expenditure differentials across the percentiles considered while the returns to endowments instead helps in augmenting the urban-rural food expenditure differentials across percentiles. Across the percentiles the contribution of the returns to endowments to the overall gap is higher than that of access to endowments component except at the 95th quantile. The variable log of total expenditure per head is found to contribute in augmenting the differentials for the quantiles considered except at the 95th quantile that total expenditure has a reducing effect.

Table 4. Urban-Rural Decomposition of Food Expenditure for 2007 across Percentiles

Quantiles		Log total expenditure per head	Years of education of household head	Male	Age of household head	Formal sector	Household size	House Ownership	Food expenditure differentials
At the mean (OLS)	Access to endowments	0.598	-0.053	0.001	-0.001	-0.001	-0.004	-0.021	0.518 (-63.33%)
	Returns to endowments	-1.3791	-0.03	-0.005	0.044	0.021	0.083	-0.071	-1.336 (163.33%)
	Total contribution	-0.782 (54.51%)	-0.083 (5.80%)	-0.004 (0.26%)	0.043 (-3.01%)	0.020 (-1.41%)	0.079 (-5.52%)	-0.092 (-6.43%)	-0.818
Q_5	Access to endowments	0.394	0.054	0.041	-0.014	0.013	-0.061	-0.082	0.346 (-24.15%)
	Returns to endowments	-1.852	-0.011	-0.081	0.178	0.014	0.278	-0.306	-1.779 (124.15%)
	Total contribution	-1.4585 (101.72%)	0.0428 (-2.99%)	-0.0396 (2.76%)	0.1648 (-11.50%)	0.0271 (-1.89%)	0.2176 (-15.18%)	-0.3881 (27.06%)	-1.433
Q_10	Access to endowments	0.434	0.021	0.006	-0.013	0.010	-0.073	-0.064	0.321 (-20.38%)
	Returns to endowments	-2.148	0.048	-0.076	0.132	0.018	0.301	-0.171	-1.897 (120.38%)
	Total contribution	-1.714 (108.80%)	0.069 (-4.37%)	-0.071 (4.50%)	0.119 (-7.54%)	0.028 (-1.75%)	0.229 (-14.50%)	-0.234 (14.87%)	-1.575
Q_25	Access to endowments	0.421	-0.032	0.005	-0.004	0.004	0.003	-0.026	0.372 (-26%)
	Returns to endowments	-1.984	0.007	-0.065	0.133	0.025	0.184	-0.104	-1.803 (126%)
	Total contribution	-1.431 (109.25%)	-0.025 (1.76%)	-0.060 (4.16%)	0.130 (-9.06%)	0.030 (-2.07%)	0.187 (-13.06%)	-0.129 (9.04%)	-1.431
Q_50	Access to endowments	0.345	-0.047	0.001	-0.002	-0.001	0.002	-0.025	0.273 (-21.82%)
	Returns to endowments	-1.535	-0.064	-0.039	0.057	0.030	0.087	-0.059	-1.524 (121.82%)
Q_75	Access to endowments	0.428	-0.066	-0.001	0.00004	-0.004	0.003	-0.017	0.344 (-76.44%)
	Returns to endowments	-0.766	-0.059	-0.028	0.031	0.018	0.038	-0.028	-0.794 (176.44%)
	Total contribution	-0.338 (75.04%)	-0.126 (27.93%)	-0.028 (6.31%)	0.031 (-6.90%)	0.014 (-3.10%)	0.041 (-9.12%)	-0.044 (9.84%)	-0.450
Q_90	Access to endowments	0.416	-0.0986	-0.0001	0.0018	-0.0102	0.0019	-0.0137	0.2970 (-406.85%)
	Returns to endowments	-0.3458	-0.077	-0.009	0.026	0.024	0.010	0.002	-0.370 (506.85%)
	Total contribution	0.070 (-95.89%)	-0.175 (239.77%)	-0.009 (12.83%)	0.027 (-37.36%)	0.013 (-18.36%)	0.012 (-16.53%)	-0.011 (15.57)	-0.073
Q_95	Access to endowments	0.404	-0.087	0.0002	0.002	-0.022	0.007	-0.014	0.291 (181.88%)
	Returns to endowments	-0.122	-0.056	-0.023	0.013	0.020	0.021	0.016	-0.131 (81.88%)
	Total contribution	0.283 (-176.43%)	-0.143 (-89.27%)	-0.023 (-14.4%)	0.015 (-9.27%)	-0.002 (-1.25%)	0.029 (18.02%)	0.002 (1.20%)	0.160

Source: Computed by authors using CHCS II and CHCS III

5. Conclusion and Policy Implications

This paper explored the determinants of household food expenditure across percentiles, evaluated the change in the urban-rural food expenditure gap and the change in the elasticity of household expenditure between 2001 and 2007 across percentiles, and investigated the role of access to endowments and returns to endowments in accounting for urban-rural household food expenditure differentials across percentiles in the period 2001-2007. The study made use of quantile regression and pooled cross sections econometric technique to explore the determinants of food consumption expenditure. A Quantile-Oaxaca-Blinder based decomposition was used to account for the urban-rural food expenditure differentials across percentiles.

Empirical results revealed that the elasticity of expenditure dwindled between 2001 and 2007 across the selected percentiles. Some degree of shared prosperity can be perceived from the falling elasticity of expenditure witnessed across the quantiles under consideration. Results also showed that education was negative and significant at the mean and across the selected quantiles. This implies that the higher the years of schooling the lesser the share of total expenditures devoted to food, thus, depicting improvements in household well-being. Results further confirmed the existence of urban-rural food expenditure differentials at the mean and across the considered quantiles. The magnitudes of the urban-rural food expenditure differentials diminished progressively from the 10th quantile to 95th. The Oaxaca-Blinder decomposition results at the mean showed that Cameroon witnessed an urban-rural household food expenditure gap of 2.744 log points in 2001 and 0.818 log points in 2007. The effect of returns to endowments over-accounted for the urban-rural food expenditure differentials both at the mean and across quantiles. In addition, the study revealed that total expenditure per head was the main source of gaps in household food consumption expenditure across the quantiles under review. The results of this study can inform public policy discussions on food security between the government of Cameroon, civil society organizations and other development partners. Since urban households typically enjoyed higher well-being than their rural counterparts, the government of Cameroon could design the type of literacy programmes that would enable rural households to generate economic activities that would augment their incomes, and subsequently their food consumption expenditures and food security statuses.

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