"Science Stays True Here"
Journal of Mathematics and Statistical Science, Volume 2016, 675-700 | Science Signpost Publishing

Income and Price Elasticities of Demand for Broad Consumption Items in African Countries

Charles Leyeka Lufumpa[1], Marc Koffi Kouakou[2], Désiré Kouamé Kanga[3]

1. Statistics Department, African Development Bank (AfDB), Abidjan, Cote d'Ivoire
2. Quality Assurance and Results Department, African Development Bank (AfDB), Abidjan, Cote d'Ivoire
3. National Training Centre of Statistics and Applied Economics, Abidjan, Cote d'Ivoire

Abstract

The study looks at the responses of African households of different income levels to changes in their incomes and prices of the commodities they consume. The study utilizes data on prices collected by the African Development Bank through its 2011 international comparison program implemented in 50 African countries. The data was mostly collected on a monthly basis over a period of 15 months ranging from January 2011 to march 2012. The data covered 12 broad consumption item groups and over 1,036 products in 50 African countries that are classified in two groups: (i) the low income group with per capita income levels of under US $3,115 and (ii) the higher income group of countries with per capita income levels above US $3,115.

The 12 broad consumption groups include: food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics; clothing and footwear; housing, water, electricity, gas and other fuels; furnishings, household equipment and routine household maintenance; health; transport; communication; recreation and culture; education; restaurants and hotels; miscellaneous goods and services and net purchases abroad. The food category, which includes staples such as maize, bread and rice, comprises about a third of the items and approximately half of the consumption expenditure by households across Africa.

The study utilizes a two-stage cross-country demand model to estimate the aggregate demand systems for the broad consumption categories as well as the food sub-category. In the first stage of estimation, an aggregate demand system is generated using the Florida preference independence model. In the second stage, the Florida Slutsky model is used to generate a demand system for the food sub-category. The own price and income elasticities were computed using the procedure and formula outlined by Seale et al. (2003).

The study confirms that "food & non-alcoholic beverages" and "clothing and footwear" are necessary consumption items for African households. All other consumption categories, including education, are deemed as luxuries. Overall, the study shows that when total expenditure on all categories of goods and services increases by 1%, African households will tend to decrease their budget share for food by an average of 17.81 basis points in low income countries and 25.65 basis points in higher income countries.

In addition, "bread and cereals", "fish", "oils and fats" and "other food" are expenditure inelastic. In other words, an increase in the prices of these items results in an increase in total expenditure on each of these items. At the same level of income, households reallocate their budgets by reducing the consumption of other consumption categories (including on education and health) in preference for food, non-alcoholic beverages, clothing and footwear. This information on household consumption patterns and how they are affected by changes in household incomes and in the prices of goods and services in the economy can be helpful in informing public policies, especially those aimed at safeguarding the welfare of poor and marginalized households most affected by changes in price and income levels. Ensuring price stability for items that comprise the majority of the poor's consumption baskets could go a long way in enhancing food security and household welfare.

Keywords: *Consumption, two-stage cross-country demand model, food demand, elasticity, International Comparison Program.*

Introduction

Africa's improved economic performance over the past decade or so has resulted in much optimism about the continent's economic outlook and prospects for improving the welfare of its people. In particular, Africa benefited from the commodity booms which were characterized by much improved terms of trade for Africa's key exports of the 2000s - buoyed mostly by increased demand for the key African commodities particularly from China and India. Although the commodity booms have tapered off in recent years, a number of forces have continued to sustain improvements in the African economy, among them better economic management in many African countries coupled with increased investor confidence and a surge in financial flows into the continent, including more robust foreign direct investment, portfolio investments and a surge in remittances.

These positive trends for Africa have helped to increase incomes and the size of the middle class although the growth has been characterized by high inequalities and sustained segments of poverty, especially in the lower income countries. To this end, African countries need to find appropriate policy responses to ensure that growth is more encompassing, benefits the majority of Africans and addresses the needs of the poor and marginalized households. In this regard, it becomes equally important to sustain improvements in household incomes and ensure stability in the prices of essential commodities that comprise a big portion of household consumption baskets in Africa, especially for the poor and marginalized households. Under these circumstances, information on how these households respond to changes in prices of the items they consume and their own income levels is critical for informing policy decisions and ensuring effective targeting of poverty reduction strategies.

This paper attempts to provide some of this critical information to inform policies in this area. It analyzes the demand for a selected number of food and non-food consumption items in 50 African countries using data generated from the 2011 round of the international comparison program for Africa (ICP-Africa) managed by the African development Bank (AfDB). The results of the analysis provide information on household consumption patterns in African households and how they tend to react in response to changes in income and price levels. The information could assist in guiding public policy responses to changes in household incomes and commodity price levels in the economy.

In all, 12 broad consumption groups are analyzed. These include: food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics; clothing and footwear; housing, water, electricity, gas and other fuels; furnishings, household equipment and routine household maintenance; health; transport; communication; recreation and culture; education; restaurants and hotels; miscellaneous goods and services and net purchases abroad. The food category, which includes staples such as maize, bread and rice, comprises about a third of the items and approximately half of the consumption expenditure by households across Africa. The two main consumption categories in low and higher income African countries are food (food and non-alcoholic beverage) and housing (housing, water, electricity, gas and other fuel) which account for 45.01% and 42.95% of the average expenditure share of households in low and high income countries, respectively. For the purposes of this study, low income countries are those with per capita income levels less than US $3,115 as defined by AfDB and high income countries are those with per capita income levels above this threshold.

The remainder of this paper is organized as follows: section 1 describes the methodological framework. Section 2 presents the data. Section 3 discusses the budget shares and volume of aggregate categories and food categories. Section 4 focuses on the findings.

1. Methodological Framework

The study utilizes a two-stage cross country demand model to estimate the aggregate demand systems for the broad consumption categories as well as the food sub-category. In the first stage of estimation, an aggregate demand system is generated using the Florida Preference Independence Model which assumes strong preference separability in that consumption of items in other groups does not affect the order of preference among the items in one other particular broad group. For instance, the consumption of education and health services, transport facilities or recreational facilities is not expected to affect one's preference of maize over rice within the food category. In the second stage, the Florida Slutsky Model is used to generate a demand system for the food sub-category, comprising 397 products under 36 basic headings. The own price and income elasticities are computed using the Working Preference Independence or Florida Model developed by Theil, Chung and Seale (1989) and by means of a procedure described by Seale et al. (2003).

This approach is based on the assumption that consumers spend their incomes in a stepwise manner. In the case of the 12 broad consumption categories which are the subject of this study, consumers are assumed to allocate their incomes into 12 budgetary shares (B_1, ..., B_{12}) for each one of the consumption categories. Following this initial budget allocation among the broad consumption categories, consumers can then independently allocate the budgetary shares within each category, say B_1 for the food budget, among the food sub-categories such as bread, rice, sugar, meat, fish and vegetables.

1.1 First Stage Estimation of the Demand System

The Working-Preference Independence (PI) Model, alternatively known as the Florida PI Model, is used in the first stage of the demand analysis. The PI model, developed by Theil, Chung and Seale some two decades ago, is an extension of the original model developed by Professor Working (1943). The Working Model expresses budget shares as a linear function of total expenditures on the broad range of *n* consumption items, $i = 1, \ldots, n$, as follows,

(1) $$w_i = \alpha_i + \beta_i \log E + \varepsilon_i$$

where $w_i = \frac{P_i E_i}{E}$ is the budget share for good *i*, P_i represents the price of good *i* and E_i represents the expenditure on good *i* and $E = \sum_{i=1}^{n} E_i$ is the total real expenditure on all goods and services, ε_i is the residual term and α_i and β_i are parameters to be estimated. Since the budget shares sum up to 1 across all consumption categories, the α_i and β_i are subject to the following adding up conditions,

(2) $$\sum_{i=1}^{n} \alpha_i = 1 \qquad \text{and} \qquad \sum_{i=1}^{n} \beta_i = 0$$

The marginal budget shares, θ_i is not constant but varies according to the level of affluence and it exceeds the budget shares by β_i, so that,

$$\theta_i = \frac{\partial E_i}{\partial E} = \alpha_i + \beta_i(1 + \log E) = w_i + \beta_i \tag{3}$$

Thus when income changes, w_i and the marginal shares also change. The income elasticity is then given as the ratio of the marginal share to the budget share as follows,

$$\frac{\theta_i}{w_i} = \frac{\partial E_i}{\partial E}\frac{E}{E_i} = \frac{\partial(\log E_i)}{\partial(\log E)} \tag{4}$$

Dividing equation (3) by w_i yields

$$\frac{\theta_i}{w_i} = \frac{\beta_i}{w_i} + 1 \tag{5}$$

Equation (5) therefore shows that for luxury goods, which are characterized by an income elasticity greater than 1, β_i is greater than zero but is less than one for a necessity which is characterized by an income elasticity less than one. If β_i=0, then the good has unitary elasticity, meaning that a change in income will trigger an equal proportionate change in the quantity demanded for that particular item. Equation (5) also shows that, if the good is a luxury or a necessity (whether the β s are less than or greater than zero), the income elasticity of good *i* will decline as income increases. This is due to the fact that the budget shares (w_i) of necessities decline as income increases whereas the budget shares of luxuries increase as income increases. In the case of unitary elasticities, income elasticities remain unchanged with income changes. This is because the budget shares do not change for unitary elastic goods as income levels changes (Theil et al., 1989).

Theil, Chung and Seale (1989) extended the Working Model by adding a separability property first proposed by Barten (1964) and Theil (1965) as outlined in the Rotterdam Model that uses both Marshallian and Hicksian demand functions. The ensuing PI Model developed by Theil et al incorporates prices through the addition of a non-linear substitution term to the basic linear function of the Working Model. This allows for separability in that consumption of items in other consumption categories does not affect the order of preference among the items in a particular individual broad category.

Thus in the PI Model for n goods, $i = 1, \ldots, n$

$$w_{ic} = \alpha_i + \beta_i q_c + (\alpha_i + \beta_i q_{ic})\left[\log\frac{P_{ic}}{\overline{P_i}} - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c)\log\frac{P_{jc}}{\overline{P_j}}\right] + \tag{6}$$

$$\varphi(\alpha_i + \beta_i q_c^*)\left[\log\frac{P_{ic}}{\overline{P_i}} - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c^*)\log\frac{P_{jc}}{\overline{P_j}}\right] + \varepsilon_{ic}$$

where q_c is the natural logarithm of Q_c the measure of total real per capita income, q_c^*= (1+q_c), $\overline{P_i}$ is the geometric mean price of P_i for all the 50 countries, ϕ represents the income flexibility i.e. the

inverse of the income elasticity of the marginal utility of income and it is assumed to be constant in this model, and ε_{ic} is the error term.

The linear term in the model, equation (6a), is the real income term representing the effect of a change in real income, i.e., the volume of total expenditure, on the budget share. Since the quadratic and cubic terms vanish at geometric mean prices, the linear term is also the budget share at geometric mean prices.

(6a) $$(\alpha_i + \beta_i q_c)$$

The quadratic term, equation (6b), is the pure-price term showing how the increase in price results in a higher budget share on good *i*, even if the volume of expenditures goes down or stays the same.

(6b) $$(\alpha_i + \beta_i q_{ic})\left[\log\frac{P_{ic}}{P_i} - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c^*)\log\frac{P_{jc}}{P_j}\right]$$

The cubic term, equation (6c), is the substitution effect term reflecting how higher prices may cause lower budget shares for good *i* due to substitution of good *i* for other goods.

(6c) $$\varphi(\alpha_i + \beta_i q_c^*)\left[\log\frac{P_{ic}}{P_i} - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c^*)\log\frac{P_{jc}}{P_j}\right]$$

The expenditure elasticity for the PI Model is calculated by the ratio of the marginal share to the budget share,

(7) $$\frac{\theta_{ic}}{\overline{w}_{ic}} = \frac{\beta_i}{\overline{w}_{ic}} + 1$$

where, in this case, $\overline{w}_{ic}$ represents the budget share of good *i* at geometric mean prices, *c* represents the country, θ_{ic} is the marginal share of good *i* in *c*, and β_i is the estimated coefficient on q_c in the *i*th good equation. Three types of own-price elasticities can be calculated from the parameter estimates. The first of these is the Frisch-deflated own-price elasticity generated when own-price changes and income is compensated to keep the marginal utility of income constant. It is presented as,

(8) $$F = \phi\frac{\overline{w}_{ic} + \beta_i}{\overline{w}_{ic}}$$

where ϕ is the money flexibility parameter estimated from the model. The Slutsky (compensated) own-price elasticity measures the change in demand for good *i* when the price of *i* changes, while real income remains unchanged. It is calculated as follows,

(9) $$S = \phi\frac{(\overline{w}_{ic} + \beta_i)(1 - \overline{w}_{ic} - \beta_i)}{\overline{w}_{ic}} = F(1 - \overline{w}_{ic} - \beta_i)$$

The Cournot (uncompensated) own-price elasticity refers to the situation when own-price changes while nominal income remains constant but real income changes and is calculated as follows,

(10) $$C = \phi\frac{(\overline{w}_{ic} + \beta_i)(1 - \overline{w}_{ic} - \beta_i)}{\overline{w}_{ic}} - (\overline{w}_{ic} + \beta_i) = S - (\overline{w}_{ic} - \beta_i)$$

1.2 Second Stage Estimation of the Demand System

The second stage estimation of the demand system incorporates a weak separability preference property such that consumption of one item within the food sub-category does affect the order of preference for other food items. The estimation is done using Florida-Slutsky Model, which like the PI Model has three components but in the form of a linear real income term; a quadratic pure price term and a linear substitution term in place of cubic term used in the PI Model:

$$(11) \qquad w_{ic} = (\alpha_i + \beta_i q_c) + (\alpha_i + \beta_i q_{ic})\left[\log\frac{P_{ic}}{P_i} - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c)\log\frac{P_{j_c}}{P_j}\right] + \sum_{j=1}^{n}\pi_{ij}\left[\log\frac{P_{jc}}{P_j}\right]$$

The π_{ij} s represent Slutsky price coefficients, a matrix of compensated price responses. The compensated (Slutsky) price elasticities may be estimated by the ratio π_{ij} / $\overline{w}_{ic}$ while the uncompensated (Cournot) own-price elasticity is given by the difference between the compensated elasticity and the income effect π_{ij} / $\overline{w}_{ic}$ - $(\overline{w}_{ic} + \beta_i)$. Similar to the Florida-PI Model, the expenditure elasticity for the Florida-Slutsky Model can be calculated at geometric mean prices using the formula in equation (7).

Conditional Florida-Slutsky Model

The Florida-Slutsky Model can also be specified in terms of a conditional demand system (Theil et al., 1989). This implies that the demand for a particular consumption item in a given category is conditional on the total expenditure allocated for that particular consumption category. Thus the conditional Florida-Slutsky Model is specified as:

$$(12) \qquad w^*_{ic} = (\alpha^*_i + \beta^*_i q_{gc}) + (\alpha^*_i + \beta^*_i q_{gc})\left[\log\frac{P_{i\in S_g,c}}{\overline{P}_{i\in S_g}} - \sum\nolimits_{j\in S_g}(\alpha^*_i + \beta^*_i q_{gc})\log\frac{P_{j_c}}{P_j}\right]$$

$$+ \sum\nolimits_{j\in S_g}\pi^*_{ij}\log\frac{P_{j_c}}{\overline{P}_j}$$

where $w^*_{ic} = \dfrac{w_{ic}}{w_{gc}}$, w_{ic} is the unconditional budget share of good $i \in S_g$, W_{gc} is the budget share of category S_g in country c, $\overline{P}_i$ is the geometric mean price of good $i \in S_g$, q_{gc} is the log of real expenditures on category S_g and the α^*_i, β^*_i, and π^*_{ij} s are conditional parameters to be estimated. In particular, the π^*_{ij} s are the conditional Slutsky (compensated) price parameters.

Income and price elasticities estimated from the conditional Florida-Slutsky Model are conditional on given food expenditures. The unconditional demand elasticities can then be obtained using the parameters estimated in the first stage of the analysis. For example, the unconditional expenditure elasticity $\left(\eta^U_{ic}\right)$ is simply the conditional expenditure elasticity $\left(\eta^*_{ic} = 1 + \beta^*_i / w^*_{ic}\right)$ where $\overline{w}^*_{ic} = \alpha^*_i + \beta^*_i q_{gc}$ multiplied by the income elasticity of demand for food as a group $\left(\eta_{FC}\right)$ obtained from the Florida-PI Model (equation 7), or

(13) $$\eta_{ic}^{U} = \eta_{FC}\eta_{ic}^{*} \qquad i \in S_g$$

The unconditional Frisch own-price elasticity is given by:

(14) $$F_i^u = \frac{\phi\Theta_{gc}}{\overline{W}_{gc}}\frac{\theta_{ic}^{*}}{w_{ic}^{*}} = \phi\eta_{gc}\eta_i^{*}$$

where Θ_{gc} is the marginal share for group S_g in country *c*, $\theta_{ic}^{*} = \frac{\theta_i}{\Theta_g}$ is the conditional marginal share of good $i \in S_g$, θ_i is the unconditional marginal share of good *i*, and ϕ is the income flexibility parameter estimated in stage one by the Florida PI Model.

The unconditional Slutsky price elasticity is given by:

(15) $$\varepsilon_{ijc} = \frac{\pi_{ij}}{\overline{w}_{ic}} = \varepsilon_{ijc}^{*} + \Phi_{gc}\eta_{ic}^{*}\eta_{jc}^{*}\overline{w}_{jc}^{*}(1 - \overline{W}_{gc}\eta_{gc})$$

where $\varepsilon_{ijc}^{*} = \frac{\pi_{ij}^{*}}{\overline{w}_{ic}^{*}}$ is the conditional Slutsky price elasticity in country *c* for good *i* with respect to good *j*, π_{ij}^{*} is the conditional Slutsky price parameter, $\overline{w}_{ic}^{*}$ is the conditional fitted budget share of $i \in S_g$ in country *c*, $\Phi_{gc} = \frac{\phi\Theta_{gc}}{\overline{W}_{gc}}$, Θ_{gc} is the marginal share of group S_g in country *c* at geometric mean (group) prices, η_{ic}^{*}, η_{ij}^{*} are conditional expenditure elasticities of *i* and *j*, respectively, in country *c* and η_{gc} is the unconditional expenditure elasticity of group *g* (food in our case) in country *c*. The unconditional Cournot price elasticity can be estimated using the unconditional Slutsky elasticity as given by equation (15)

(16) $$C_{ijc} = \varepsilon_{ijc} - \eta_{ic}^{*}\overline{w}_{ic}^{*}\eta_{gc}\overline{W}_{gc}$$

2. Data for the Estimation Models: Survey Data from the International Comparison Program for Africa (ICP-Africa)

Data used for the models are obtained from price survey data collected by the Statistics Department of the African Development Bank under its International Comparison Program for Africa (ICP-Africa) conducted monthly in 50 African countries over the period January 2011 to March 2012. The ICP-Africa price collections were conducted monthly in parallel with existing consumer price index (CPI) collection activities regularly conducted by African countries as part of their macroeconomic management systems. The ICP coverage in terms of products and outlets was larger than the CPI coverage to reflect the specific requirements of the ICP program. In total, about 1,400 data collection centers across Africa, ranging from about seven centers in Liberia to 120 in Zimbabwe, were used for the price data collection exercises. Approximately 60 percent of the centers were located in urban areas and 40 percent in rural areas.

The main surveys conducted included the principal household consumption items: food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics; clothing and footwear; housing,

water, electricity, gas and other fuels; furnishings, household equipment and routine household maintenance; health; transport; communication; recreation and culture; education; restaurants and hotels; miscellaneous goods and services and net purchases abroad. The surveys were designed to provide national coverage and included both urban and rural areas. Most countries used a stratification based on administrative areas. Outlets were selected through a two-stage sampling approach. First, the administrative center of an administrative area and – when feasible – one or more adjacent rural areas were chosen as primary sampling units. Second, outlets were selected within each primary sampling unit on the basis of a pre-survey.

The quality of ICP comparisons depended on the quality of the prices of individual items collected. Price data had to be collected for identical goods from all participating countries, a process that involved intensive preparatory work at both the AfDB and country levels.

Main household consumption item survey

The first task was to define an all-Africa list of products that was comparable across countries and representative of national expenditure patterns. To that end, country visits and various workshops were organized to bring countries together to prepare and agree on a common list of goods and services. The product list was defined with the input of all 50 participating countries using the Structured Product Description (SPD) method that was also used for the 2005 global ICP round. In total, as indicated in Table 1, over a thousand products were grouped into 110 basic headings and defined for subsequent pricing. Given the diversity of the continent, there was some variation in the geographic representativity of individual products, but, taken as a whole, the selection was deemed to adequately represent the consumption patterns of all 50 participating countries.

The SPD approach consisted of developing a product list through an iterative and participatory process. An SPD defines a family of products and is composed of price determining characteristics (type of outlets, package type, labeling, unit of measure, and the like). Each characteristic has several mutually exclusive specifications, and a product is specified by a combination of those specifications. SPDs follow common structures across broad groups of products, thus ensuring a comprehensive and systematic approach to the definition of products. The SPD approach ensures comparability and facilitates a common understanding - across languages, cultures, institutions and individuals - of the products to be priced.

Following the preparation of the SPDs, AfDB statisticians made country visits to review the specifications with national statisticians, collect information on the nature of products and ensure that all price determining characteristics and related specifications had been considered. Upon completion of the country visits, the African Development Bank's regional coordination team finalized the SPDs. The final SPDs were used to derive product specifications in the form of pre-filled SPDs that were submitted to countries for review. For each product, countries were requested to make specification changes when necessary. The revised specifications were collated to derive the draft regional product list and specifications, which was sent to countries to examine and ensure that their representative products were included. Countries met to finalize the regional list, which was used for price collection.

Table 1: Number of Basic Headings and Products for the 2011 ICP-Africa Update

Category	Number of Basic Headings	Number of Products
Food and non-alcoholic beverages	29	356
Alcoholic beverages, tobacco and narcotics	5	41
Clothing and footwear	5	128
Housing, water, electricity, gas and other fuels	7	12
Furnishings, household equipment and maintenance	13	124
Health	7	158
Transport	13	55
Communication	3	19
Recreation and culture	13	49
Education	1	9
Restaurants and hotels	2	51
Miscellaneous goods & services & net purchases abroad	12	34
Total Household Final Consumption Expenditure	110	1,036

Source: AfDB, 2011

The two criteria that were used in the selection of products and that have been pursued in the development of the regional product list with the SPD approach are comparability and representativity of the products. Both are important but may sometimes conflict.

A representative product is one preferred by consumers and may account for a significant proportion of the expenditures within a basic heading. However, since basic headings are generally large, no single product ordinarily accounts for a large proportion of the total expenditures. The composition of any given basic heading in terms of product varied from country to country. The selection sought products that were the most representative among the participating countries.

Comparability is a relationship between two products or among products in different countries. Products are said to be comparable if (i) their physical and economic characteristics are identical or (ii) they are sufficiently similar that consumers are indifferent among them. In practice, the characteristics of products may differ, and slight differences may be tolerated, provided that they are not important to the consumers. One way to achieve comparability is to make the descriptions of the products as precise as possible so that the price collectors in different countries price virtually identical and sufficiently similar products.

To prepare for price collections, a series of regional and sub-regional workshops and training programs were conducted to enhance staff skills and to ensure that countries were properly equipped. Funding was provided to purchase necessary equipment and hire temporary staff. National price statisticians were trained in new data validation techniques that ensured consistency of data across countries.

3. Budget Shares and Volumes of Aggregate Categories and Food Categories

3.1. Budget Shares for Broad Consumption Categories

For this study, the 50 African countries that participated in the 2011 ICP round are divided into two groups: (i) the low and middle income countries with per capita income levels below US $3,115

that are classified as “low income countries” (LICs) or “ADF countries” for the purposes of this study; and (ii) the other group of higher income countries or “ADB countries” (HICs) with per capita income levels above US $3,115. The average budget shares for the aggregate consumption categories and each of the two country groups are presented in Table 2. The two main consumption categories of the two country groups are food (food and non-alcoholic beverage) and housing (housing, water, electricity, gas and other fuel). These two categories account for 45.01% and 42.95% of the average expenditure share of LICs and HICs, respectively. Overall, HICs spend less on food and housing than LICs. The lower income countries spend almost a third (32.52%) of their budget on food and non-alcoholic beverages while the higher income countries spend less than a quarter (25%). The budget share for health expenditure in HICs is almost double the size of that of LICs. This is also true for household expenditure on communication services whose budget shares vary from 1.3 in LICs to 2.52 percent for HICs. Similarly, budget shares for recreation activities, transportation and other luxury goods are much higher in HICs while the LICs allocate much higher budget shares to clothing and furnishing. On the other hand, budget allocations for education are almost the same in both country categories.

Table 2: ICP-Africa Average Expenditure Shares for Broad Consumption Categories (%)

	ADB Countries	ADF Countries*
Food & Non Alcoholic Beverages	24.10	32.52
Alcoholic Beverages & Tobacco	2.79	2.19
Clothing & Footwear	4.56	10.05
Housing, Water, Electricity, Gas & other Fuels	18.85	12,49
Furnishings Household Equipment and Operation	4.92	8.14
Health	10.86	6.15
Transport	9.83	6.54
Communication	2.52	1.30
Recreation & Culture	3.30	1.85
Education	11.60	11.39
Others**	11.76	7.43

* includes Nigeria in this category
** includes restaurants & hotels, miscellaneous goods & services, net purchases abroad

Source: AfDB & Authors’ calculations

3.2 Budget Shares for the Food Sub Categories

Table 3 presents the conditional budget shares for the seven food subcategories. Bread and cereals, meat and fruit, vegetables & potatoes account for almost three quarter (73.79%) of the total food budget in low income African countries and about two thirds (67.31%) of the total food budget in higher income countries. The consumption of "bread and cereals" and "fish" is almost two times (1.72) higher in the LICs than in HICs. However, the budget shares for "milk, cheese and eggs" in HICs is about three times higher (2.53) than in the LICs. The budget shares for "oils and fats", "meat" and "other food" are highest in HICs.

Table 3: ICP-Africa Expenditure Shares for Food, Beverages and Tobacco Consumption sub-categories (2011 ICP-Africa data)

	Bread and cereals	Meat	Fish	Milk, cheese and eggs	Oils and fats	Fruits, vegetables, potatoes	Other food*	Total Food Expenditure	Non-Alcoholic Beverages	Alcoholic Beverages & Tobacco	Actual Household Consumption Country Shares** (Africa = 100)
	% of total Food							% of Actual Household Consumption			
Algeria	14.30	16.74	0.76	14.65	6.20	38.04	12.99	21.47	1.17	1.09	8.34
Angola	32.05	18.19	20.95	3.61	5.98	18.49	4.74	31.33	2.55	6.95	3.00
Benin	31.37	10.21	8.51	3.44	3.82	42.55	4.98	36.27	1.11	3.22	0.47
Botswana	33.47	20.57	1.06	9.88	3.04	12.57	19.95	13.41	2.66	5.85	0.49
Burkina Faso	37.14	25.47	0.71	6.67	2.02	26.84	4.02	35.28	2.58	6.44	0.57
Burundi	18.41	4.41	2.58	2.23	0.16	76.86	11.35	31.66	0.64	8.57	0.20
Cameroon	14.36	13.87	10.40	1.37	4.70	56.72	7.55	37.47	0.97	2.48	1.63
Cabo Verde	23.84	16.55	10.97	13.96	11.07	20.33	5.69	25.12	4.87	4.33	0.08
Central Afr. Rep.	19.11	28.05	8.20	4.17	6.67	27.07	9.67	37.75	2.00	8.63	0.14
Chad	21.95	47.83	14.81	1.77	5.73	11.92	3.51	36.77	1.22	4.11	0.60
Comoros	59.89	13.96	5.84	3.87	1.28	13.82	2.75	38.78	1.42	0.18	0.02
Congo	14.00	15.61	11.17	3.67	5.86	26.04	24.44	23.97	2.11	4.44	0.22
Congo, DRC	38.86	12.61	10.91	0.99	7.78	28.13	4.86	36.83	0.60	2.40	1.07
Côte d'Ivoire	13.96	10.66	8.69	2.69	3.20	71.11	2.40	32.66	1.00	3.04	1.40
Djibouti	22.88	14.90	5.52	6.48	5.81	35.58	11.40	24.96	0.61	7.58	0.05
Egypt	13.12	20.15	6.67	12.98	5.89	38.99	6.63	26.04	1.47	1.97	23.57
Equatorial Guinea	20.85	14.95	22.76	5.68	5.33	20.69	12.83	25.34	2.29	3.14	0.12
Ethiopia	61.32	7.31	0.00	2.37	0.02	27.64	3.15	26.60	2.31	2.05	2.92
Gabon	14.88	11.99	25.52	5.38	5.00	30.66	12.45	19.37	2.26	8.84	0.32
Gambia, The	35.33	4.71	25.62	1.39	10.02	22.15	6.40	28.34	0.97	2.73	0.08
Ghana	18.18	9.85	23.03	3.15	4.86	30.17	13.51	22.12	1.52	1.23	1.97
Guinea	54.91	6.52	13.15	1.80	3.33	19.04	2.72	33.30	1.46	1.38	0.28
Guinea-Bissau	27.18	17.61	30.82	2.16	12.42	4.31	11.72	38.00	1.05	1.55	0.05
Kenya	27.22	12.66	2.22	12.77	2.14	30.15	13.77	25.63	2.26	3.73	2.83
Lesotho	45.20	16.79	0.96	6.64	4.21	16.58	8.62	21.15	0.74	2.16	0.20
Liberia	30.25	16.27	27.02	2.45	7.94	20.10	3.88	18.68	1.45	2.96	0.09
Madagascar	35.12	13.29	9.50	2.64	3.59	26.49	9.76	31.61	2.38	2.65	1.00

Malawi	37.70	1.45	2.99	2.10	2.02	45.73	10.30	33.07	2.88	4.59	0.54
Mali	50.22	19.32	7.27	2.56	3.38	13.75	6.39	37.26	1.42	1.51	0.58
Mauritania	19.15	50.72	6.06	14.35	2.67	6.21	5.41	43.54	3.01	0.87	0.26
Mauritius	25.25	15.56	11.11	14.29	6.88	23.41	5.04	22.40	3.03	5.44	0.55
Morocco	17.71	21.79	7.01	11.25	11.32	22.44	9.74	25.08	2.22	1.62	4.91
Mozambique	39.35	10.77	13.15	3.96	3.15	24.19	8.06	39.13	1.55	4.34	0.75
Namibia	24.23	16.44	4.49	3.82	1.93	12.87	39.52	15.56	0.91	4.16	0.48
Niger	48.68	14.10	1.64	8.19	4.41	13.91	8.20	29.09	1.04	1.98	0.41
Nigeria	20.75	9.85	22.12	3.06	3.82	25.85	15.70	24.13	2.03	1.55	11.87
Rwanda	23.21	7.09	0.99	1.92	2.63	75.68	2.61	38.14	1.30	2.57	0.50
São Tomé & Príncipe	31.27	20.26	19.79	8.30	3.18	14.81	5.74	38.44	1.97	4.21	0.02
Senegal	28.32	17.59	17.07	5.36	8.22	16.06	8.35	35.46	3.34	1.17	0.86
Seychelles	36.63	16.74	13.69	9.75	4.98	15.11	6.74	30.01	1.91	1.25	0.04
Sierra Leone	31.12	6.82	15.27	1.45	9.62	32.95	6.33	25.37	1.17	3.28	0.25
South Africa	17.76	26.11	3.22	9.79	3.59	13.01	26.53	16.57	1.16	4.39	14.75
Sudan	22.36	22.92	1.77	10.17	4.52	24.81	14.31	35.81	4.59	0.40	3.48
Swaziland	33.67	27.40	1.59	8.39	2.28	14.60	13.14	38.73	1.89	0.74	0.25
Tanzania	33.41	14.27	7.94	2.41	2.87	34.21	8.47	50.25	1.68	0.49	1.67
Togo	27.29	12.50	7.05	1.95	8.25	20.49	20.07	30.09	1.23	2.35	0.26
Tunisia	13.08	13.52	4.15	15.80	11.85	38.26	12.94	16.33	1.84	2.11	2.73
Uganda	15.18	11.87	3.90	6.01	1.85	68.87	5.67	26.43	2.08	4.57	1.69
Zambia	28.39	30.12	13.94	8.93	4.59	4.94	9.03	47.12	0.98	0.62	0.84
Zimbabwe	41.89	12.90	7.61	4.33	3.02	22.60	9.63	44.66	1.53	3.92	0.61
Africa	21.96	17.57	8.48	8.36	5.00	30.88	11.03	25.79	1.74	2.55	100.00
ADF Countries ***	28.10	14.35	10.86	4.64	3.73	31.34	10.23	30.52	2.07	2.19	40.36
ADB Countries	16.34	20.50	6.31	11.76	6.17	30.46	11.76	22.59	1.51	2.79	59.64

* include Sugar; Jams, marmalades and honey; Confectionery, chocolate and ice cream; Food products n.e.c.

** For the consumption category (share in Consumption category)

Eritrea, Libya and Somalia did not participate to the 2011 ICP-Africa round

*** include Nigeria in this category. The figures represent the average for all RMCs in this category

Source: AfDB & Authors' calculations

4. Results

The two models were estimated by the Maximum Likelihood (ML) method using a procedure described by Seale et al. (2003).

4.1 Aggregate Model Estimates and Elasticities

Table 4 below presents the estimated parameters for the first stage (aggregate categories). The negative beta (β) estimated for "food & non-alcoholic beverages" and "clothing and footwear" indicate that these consumption categories are necessities for African households. All other consumption categories, including expenditure on health and education, are shown as luxuries. "Alcoholic Beverages & Tobacco" and "others" have near-zero β estimates which means that the income elasticity for these categories is close to unity i.e. reflecting unitary elasticity. The β estimate for food and non-alcoholic beverages is the largest in absolute value at -0.064.

Table 4: Estimation of the Aggregate Model, 50 Countries

		Parameter	Standard error
Income flexibility		-1.5556	0.0919
Beta			
	Food & Non Alcoholic Beverages	-0.064	0.0013
	Alcoholic Beverages & Tobacco	0.002	0.0004
	Clothing & Footwear	-0.007	0.0006
	Housing, Water, Electricity, Gas & other Fuels	0.004	0.0010
	Furnishings, Household Equipment & Routine Household	0.004	0.0004
	Health	0.013	0.0007
	Transport	0.016	0.0005
	Communication	0.004	0.0002
	Recreation & Culture	0.004	0.0002
	Education	0.024	0.0007
	Others	0.002	0.0006
Alpha			
	Food & Non Alcoholic Beverages	0.3492	0.0126
	Alcoholic Beverages & Tobacco	0.0326	0.0031
	Clothing & Footwear	0.0643	0.0051
	Housing, Water, Electricity, Gas & other Fuels	0.1496	0.0089
	Furnishings, Household Equipment & Routine Household	0.0613	0.0040
	Health	0.0701	0.0062
	Transport	0.0643	0.0044
	Communication	0.0149	0.0015
	Recreation & Culture	0.0226	0.0019
	Education	0.0911	0.0064
	Others	0.0801	0.0070

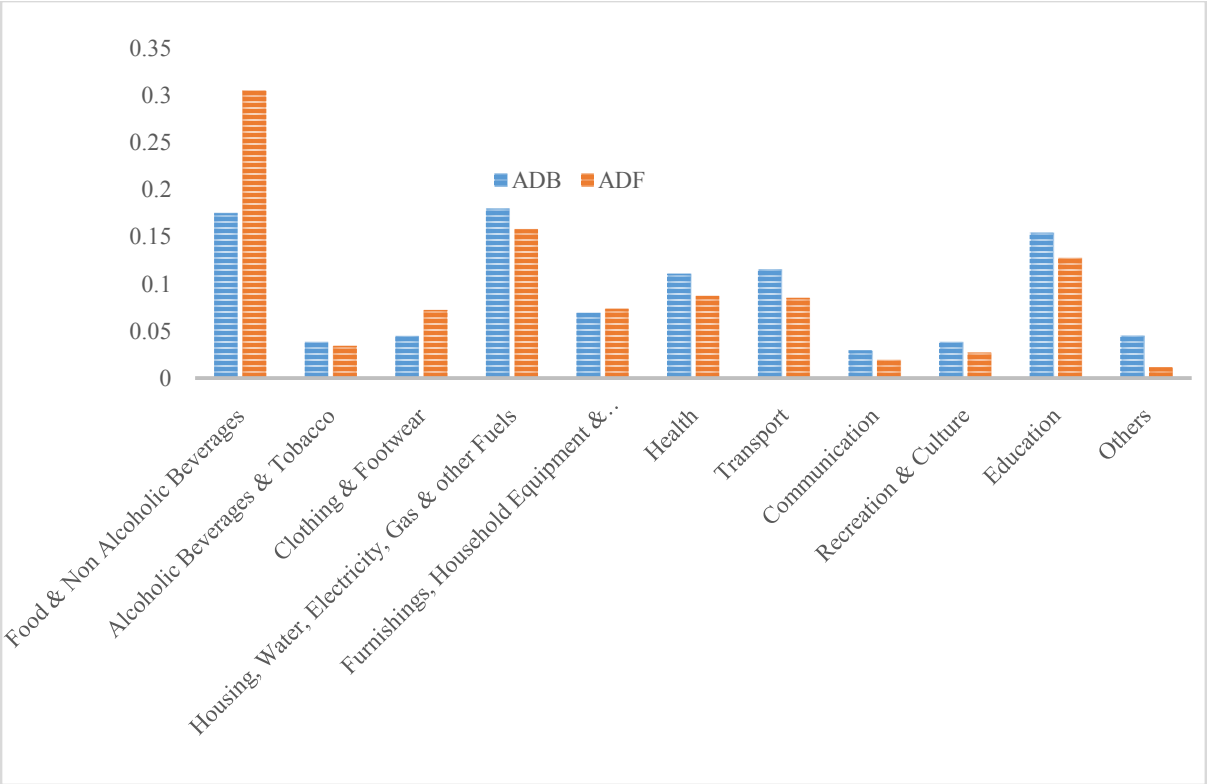
Source: Authors' estimates using 2011 ICP data.

4.1.1.Marginal shares

The computed marginal shares (Figure 1 & Table 6) show that the two groups of countries analyzed in this study display almost the same household behaviors. They allocate a greater portion of an additional unit of income to food but the proportion is much higher in low income countries than in higher income countries. For instance, the results show that a dollar increase in household income would result in an increase in expenditure on food by 36.65 cents in the Democratic Republic of Congo but by only 13.98 cents in Seychelles (see Appendix Table 6). Besides expenditure on food,

households in both country categories tend to allocate the rest of the additional income to "Housing, Water, Electricity, Gas & other Fuels", "Education" and "Others" in that order. Expenditure on communications shows the least increase in both groups of countries in response to an increase in income levels.

Figure 1: Estimated marginal shares



Source: Authors' estimates using 2011 ICP data.

4.1.2. Income and Price Elasticities

Income and own-price elasticities are used for income and price sensitivity analysis. They are used here to measure changes in the quantities consumed by households in response to changes in household incomes and prices of consumer goods and services. In line with equations (7) to (10), they should vary with different levels of affluence and are therefore not constant. The elasticities (expenditure, own-price) derived from the aggregate Florida-PI model are reported in Appendix Table 7 to Table 10.

Income elasticities: Table 7 presents estimated income elasticities for the broad consumption categories in 50 African countries. It shows estimated percentage changes in demand for a particular consumption category when income (reflected by total expenditures on all categories) increases by 1 percent. From equation (7), we note that luxury goods are associated with income elasticity greater than one, while a necessity is associated with income elasticity less than 1 but greater than 0. In this study, only the two categories of "food and non-alcoholic beverages" and "clothing and footwear" with income elasticities of less than one, are necessities in both low and higher income countries. The rest of the consumer goods and services are deemed luxuries with income elasticities greater than one.

The income elasticities vary across African countries and are highest in LICs for both necessities and luxury goods and services.

The income elasticity for the "food and non-alcoholic beverages" category is the lowest among all consumer goods and services implying that when incomes increase, households will make marginal increase in budgetary shares for food items, preferring to allocate greater portions of their budgets to other categories of goods and services, such as housing, communication and recreation. The elasticities vary from 0.8510 for Democratic Republic of Congo among the low income categories to 0.6855 in Seychelles among the HICs. Whereas both categories of countries show an increase in demand for food items arising from an increase in household income, the magnitude is higher in low income countries. For example, the results show that a one percent increase in incomes in the Democratic Republic of Congo (and Seychelles) is expected to generate an increase in food consumption of about 85 basis points (and 68 basis points respectively). In other words, the proportion of expenditure (budget share) for food declines as household incomes increase even though overall expenditure on food goes up. This is in line with Engel's law in economics. On the other hand, households in both low and higher income countries allocate a greater proportion of their incomes on other consumer items deemed luxuries as their incomes go up. In the case of DRC and Seychelles, for example, a one percent increase in incomes is expected to increase consumption of a luxury such as communication by 1.34 percentage points and 1.15 percentage points, respectively.

When total expenditures on all consumption categories increase by 1%, households tend to decrease their budget share for food by an average of 17.81 basis points in low income countries and 25.65 basis points in higher income countries, on average. The decrease is lower for "clothing & footwear" (10.36 basis points in LICs and 12.6 basis points in HICs).

Own-Price elasticities: In addition to income elasticities, we compute three types of own-price elasticities of demand for the categories of goods and services using equations 8, 9 and 10. The results are reported in Appendix Table 8, Table 9 and Table 10. Except for Slutsky own-price elasticities, the results are in conformity with Timmer's proposition on the demand for food that: *own-price elasticities of demand are larger in absolute value for low-income countries than for high-income countries* (Timmer 1981). Our results are, however, in line with those obtained by Seale et al. (2003) and Andrew et al. (2011).

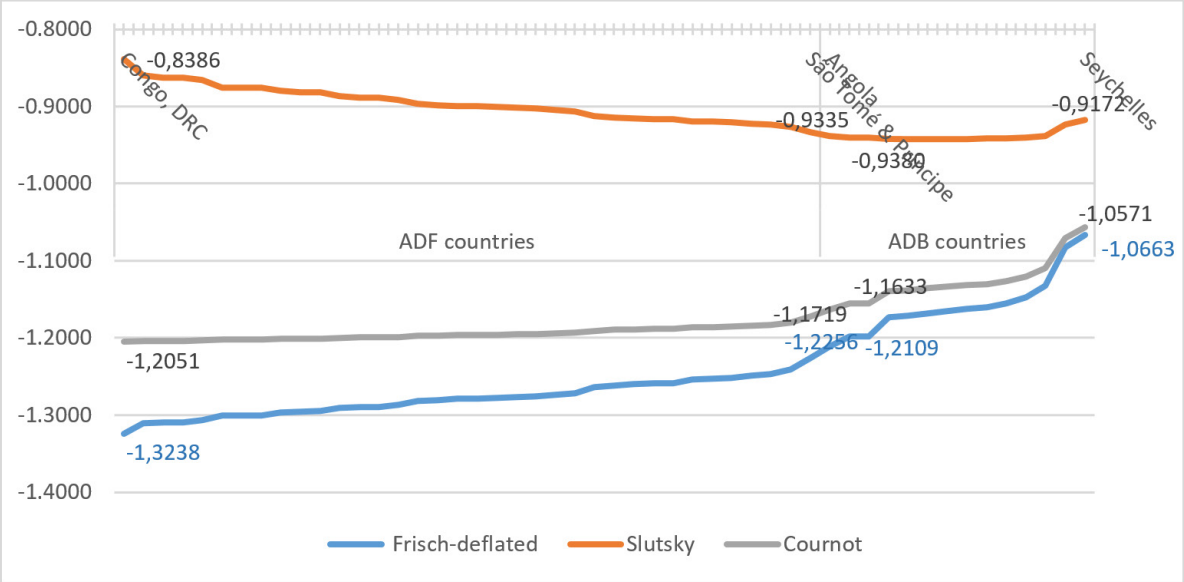
The estimated Cournot and Frisch own-price elasticities for food are all larger (in absolute value) than the corresponding Slutsky elasticities. Figure 2 below shows the evolution of the three own-price elasticities for the food category for low and higher income countries. The Cournot and Frisch own-price elasticities rise gradually from -1.2051 and -1.3238, respectively to -1.1719 and -1.2256, respectively in LICs. Similarly for higher income countries, the Cournot and Frisch own-price elasticities rise from -1.1633 and -1.2109, respectively to -1.0571 and -1.0663, respectively in HICs.

As mentioned earlier, only the Slutsky own-price elasticities for food seem not to strictly conform withTimmer's proposition. As the graph shows, instead of increasing, the Slutsky own-price elasticities for "Food & Non Alcoholic Beverages" decline from -0.8386 for Democratic Republic of Congo to -1.0571 for Seychelles. The reason for this is indicated by Seale et al. (2003) and Andrew et al. (2011). Like these authors, the logarithm derivative of the Slutsky own-price could be written as follows:

$$\frac{d\log\left(S/\varphi\right)}{Q_c} = \frac{-\beta_i\left[\bar{w}_{ic}^2 + \beta_i(1-\beta_i)\right]}{\bar{w}_{ic}(\bar{w}_{ic}+\beta_i)(1-\bar{w}_{ic}-\beta_i)} \quad (17)$$

Because β_i is negative for "Food & Non Alcoholic Beverages" category and the term in brackets on the right side of equation 17 is positive, then the derivative is positive. The Slutsky own-price elasticity therefore decreases with Q (φ is negative).

Figure 2: Frisch, Cournot and Slutsky own-price elasticities



Source: Authors' estimates using 2011 ICP data

Nonetheless, the Slutsky elasticities also show that consumption of food and non-food beverages is relatively price inelastic compared with all other categories of goods and services.

4.2 Food Subgroups—Second Stage Estimates and Elasticities

Table 5 presents the estimated parameters for the food subgroups (second-stage model). In this model, parameters are estimated conditional on total per capita food expenditures and not total per capita expenditures on all categories. When β is negative, then a good is expenditure inelastic. It is expenditure elastic otherwise. The results of this study show that four food subcategories are expenditure inelastic. These are "bread and cereals", "fish", "oils and fats" and "other food"[1]. The negative elements of the Slutsky price matrix are in conformity with the basic law of demand in economics which states that, all else being equal, the demand for a product will decline as its price increases.

[1] The "other food" category includes Sugar; Jams, marmalades and honey; Confectionery, chocolate and ice cream; Food products n.e.c.

Table 5: Estimation of the food sub-group model, 50 countries, 2011

	Parameter	Standard error
Beta		
Bread and cereals	-0.053	0.0043
Meat	0.032	0.0032
Fish	-0.002	0.0021
Milk, cheese and	0.017	0.0011
Oils and fats	-0.002	0.0014
Fruits, vegetables,	0.016	0.0036
Other food	-0.007	0.0027
Alpha		
Bread and cereals	0.3040	0.0169
Meat	0.1453	0.0138
Fish	0.0969	0.0088
Milk, cheese and	0.0526	0.0041
Oils and fats	0.0484	0.0056
Fruits, vegetables,	0.2549	0.0166
Other food	0.0978	0.0097
Diagonal of Slutsky Matrix		
π_{11}^{*}	-0.787	0.1246
π_{22}^{*}	-0.242	0.0691
π_{33}^{*}	-0.307	0.0374
π_{44}^{*}	-0.141	0.0321
π_{55}^{*}	-0.125	0.0317
π_{66}^{*}	-0.592	0.0572
π_{77}^{*}	-0.210	0.0558

Source: Authors' estimates using 2011 ICP data.

We use equations (13) to (16) to compute expenditure and price unconditional elasticities. The unconditional expenditure and unconditional Frisch own-price elasticities for food sub-categories are presented in Appendix Table 11 and 12. The unconditional expenditure elasticities measure the percentage change in demand arising from a percentage change in total expenditure; whereas the unconditional Frisch own-price elasticities measure changes in demand arising from changes in the price of the product.

The study results show that the unconditional income elasticities for "Bread & Cereals", "Fish", "Oils and fats", "Fruits, vegetables, & potatoes" and "other food" are all less than 1 but greater than zero, implying that they are necessities for households in both low and higher income African countries. These food subcategories account for more than three quarters of the total expenditure on food. The expenditure elasticities for the "milk, cheese & eggs" and "meat" food subcategories are either greater than or close to one. They could therefore be considered as luxury goods for most African households. According to the results, when incomes increase, African households tend to allocate a greater portion of their budgets on items like meat, milk, cheese and eggs. Similarly, they reduce the budgetary share of food items like cereals in response to increases in income.

The estimated Frisch own-price elasticities for the food subcategories presented in Appendix Table 12 calculated with the estimated parameters vary according to economic theory: consumers in HICs are less responsive to price changes than those in HICs; these elasticities in HICs are less (in absolute value) than those in LICs and almost close to one. For instance, the value for "breads and cereals" varies from -1.1098 (Liberia) to -0.8964 (Comoros).

Conclusion

This paper estimates a two stage cross-country-demand system across 50 countries in Africa by using 2011 ICP Africa data. Specifically, we fit a two-stage-demand system with the Florida-PI and Florida-Slutsky models for twelve broad categories and seven food sub-categories. Study results confirm Engel's law: that when income increases, the budget share of food declines. The decrease is far more pronounced in High Income African Countries compared to the Low Income Countries.

The results also show that "food & non-alcoholic beverages" and "clothing and footwear" are necessary goods and that all other consumption categories are luxuries including education. In addition, "Bread and Cereals", "Fish", "Oils and fats" and "other food" are expenditure inelastic in that an increase in the prices of items in each of these categories causes total expenditure on these categories to increase. This is because at the same level of income, households reallocate their resources by reducing consumption of items in other categories.

The results have implications for public policy measures aimed at ensuring household food security and overall welfare in many African countries, especially for the 40 percent plus of African living under absolute poverty conditions. In particular, the results are critical for informing policy measures to ensure price stability for items such as food that comprise a major component of the consumption basket of poor households. More so since these items have been shown to be expenditure inelastic. As prices of these items go down, this provides households more disposable income to spend on other items, including the "luxury" items like education and health. On the other hand, increases in the prices of these essential and expenditure inelastic items results in a decrease in disposable income available to households and a reallocation of the household budget away from items considered as luxurious. In such cases, expenditure on items such as education and health tend to be among the first to be curtailed by poor households in preference for food. This worsens an already bad situation for poor households since education and health are critical for enhancing human capital and improving access to and prospects for income generating opportunities and improved household welfare.

Identifying households that are susceptible to such predicament would go a long way in strengthening targeting mechanisms for public social programs and safety nets for poor households. The sensitivity analysis arising from this study could therefore be helpful in helping to identify items that are particularly critical for poor households and ensuring that price fluctuations for these items are minimized to safeguard the food security and welfare of poor households. This assumes greater criticality in lower income African countries where the proportion of poor households in much larger than in higher income countries.

References

1. AfDB (2014). Comparing the Real Size of African Economies: Results of the 2011 Round of the International Comparison Program for Africa
2. AfDB (2012). Gender, Poverty and Environmental Indicators on African Countries. African Development Bank;
3. Barten, A. P. (1964). "Consumer Demand Functions under Conditions of Almost Additive Preferences".Econometrica 32.1, pp. 1–38;
4. Muhammad, Andrew, James L. Seale, Birgit Meade, and Anita Regmi (2011). International Evidence on Food Consumption Patterns: An Update Using 2005 International Comparison Program Data. USDA-ERS Technical Bulletin 1929. Rochester, NY: Social Science Research Network;

5. Seale, James L., Anita Regmi, and Jason Bernstein (2003). International Evidence on Food Consumption Patterns. Technical Bulletins 33580. United States Department of Agriculture, Economic Research Service;
6. Theil, Henri (1965). “The Information Approach to Demand Analysis”. Econometrica 33.1, pp. 67–87.
7. Theil, Henri, Ching-Fan Chung, and James L. Seale (1989). International evidence on consumption patterns. JAI Press. 248 pp.
8. Timmer, C. Peter (1981). “Is There "Curvature" in the Slutsky Matrix?” The Review of Economics and Statistics 63.3, pp. 395–402.

Appendix

A.1 Appendix for aggregate model

Table 6: Estimated marginal shares

	Food & Non Alcoholic Beverages	Alcoholic Beverages & Tobacco	Clothing & Footwear	Housing, Water, Electricity, Gas & other Fuels	Furnishings Household Equipment and Operation	Health	Transport	Communication	Recreation & Culture	Education	Others
ADF countries											
Benin	0.2963	0.0342	0.0587	0.1528	0.0643	0.0805	0.077	0.0179	0.0260	0.1105	0.0814
Burkina Faso	0.3218	0.0334	0.0614	0.1513	0.0629	0.0755	0.071	0.0165	0.0244	0.1011	0.0808
Burundi	0.3414	0.0329	0.0634	0.1500	0.0617	0.0717	0.066	0.0154	0.0231	0.0940	0.0803
Cameroon	0.2664	0.0351	0.0555	0.1547	0.0661	0.0864	0.084	0.0195	0.0280	0.1215	0.0822
Central Afr. Rep.	0.3267	0.0333	0.0619	0.1510	0.0626	0.0745	0.069	0.0162	0.0240	0.0993	0.0806
Chad	0.2895	0.0344	0.0579	0.1533	0.0647	0.0819	0.079	0.0182	0.0265	0.1130	0.0816
Comoros	0.3440	0.0328	0.0637	0.1499	0.0616	0.0711	0.065	0.0152	0.0229	0.0930	0.0802
Congo	0.2874	0.0345	0.0577	0.1534	0.0649	0.0823	0.079	0.0184	0.0266	0.1138	0.0816
Congo, DRC	0.3665	0.0321	0.0661	0.1485	0.0602	0.0667	0.060	0.0140	0.0214	0.0847	0.0796
Côte d'Ivoire	0.2725	0.0349	0.0561	0.1543	0.0657	0.0852	0.083	0.0192	0.0276	0.1192	0.0820
Djibouti	0.2755	0.0348	0.0565	0.1541	0.0656	0.0846	0.082	0.0190	0.0274	0.1181	0.0819
Ethiopia	0.3198	0.0335	0.0612	0.1514	0.0630	0.0759	0.071	0.0166	0.0245	0.1019	0.0808
Gambia, The	0.2939	0.0343	0.0584	0.1530	0.0645	0.0810	0.077	0.0180	0.0262	0.1114	0.0815
Ghana	0.2530	0.0355	0.0541	0.1555	0.0669	0.0890	0.087	0.0203	0.0289	0.1264	0.0825
Guinea	0.3270	0.0333	0.0619	0.1509	0.0626	0.0745	0.069	0.0162	0.0240	0.0992	0.0806
Guinea Bissau	0.3190	0.0335	0.0611	0.1514	0.0630	0.0761	0.071	0.0166	0.0245	0.1022	0.0808
Kenya	0.2738	0.0349	0.0563	0.1542	0.0657	0.0849	0.082	0.0191	0.0275	0.1187	0.0820
Lesotho	0.2595	0.0353	0.0548	0.1551	0.0665	0.0878	0.086	0.0199	0.0284	0.1240	0.0823
Liberia	0.3409	0.0329	0.0634	0.1501	0.0617	0.0717	0.066	0.0154	0.0231	0.0941	0.0803
Madagascar	0.2965	0.0342	0.0587	0.1528	0.0643	0.0805	0.077	0.0179	0.0260	0.1104	0.0814
Malawi	0.3114	0.0338	0.0603	0.1519	0.0635	0.0776	0.073	0.0170	0.0250	0.1050	0.0810
Mali	0.3111	0.0338	0.0602	0.1519	0.0635	0.0776	0.073	0.0171	0.0251	0.1051	0.0810
Mauritania	0.2661	0.0351	0.0555	0.1547	0.0661	0.0865	0.084	0.0195	0.0280	0.1216	0.0822
Mozambique	0.3268	0.0333	0.0619	0.1510	0.0626	0.0745	0.069	0.0162	0.0240	0.0993	0.0806
Niger	0.3375	0.0330	0.0630	0.1503	0.0619	0.0724	0.067	0.0156	0.0233	0.0954	0.0804
Nigeria	0.2614	0.0352	0.0550	0.1550	0.0664	0.0874	0.085	0.0198	0.0283	0.1233	0.0823
Rwanda	0.3005	0.0341	0.0591	0.1526	0.0641	0.0797	0.076	0.0176	0.0258	0.1089	0.0813
São Tomé & Príncipe	0.2383	0.0359	0.0525	0.1564	0.0677	0.0919	0.091	0.0211	0.0298	0.1318	0.0829
Senegal	0.2723	0.0349	0.0561	0.1543	0.0657	0.0852	0.083	0.0192	0.0276	0.1193	0.0820
Sierra Leone	0.2956	0.0342	0.0586	0.1529	0.0644	0.0807	0.077	0.0179	0.0261	0.1108	0.0814
Sudan	0.2642	0.0352	0.0553	0.1548	0.0662	0.0868	0.085	0.0197	0.0281	0.1223	0.0822
Tanzania	0.3133	0.0337	0.0605	0.1518	0.0634	0.0772	0.073	0.0169	0.0249	0.1043	0.0810
Togo	0.3074	0.0339	0.0598	0.1522	0.0637	0.0783	0.074	0.0173	0.0253	0.1064	0.0811
Uganda	0.2926	0.0343	0.0583	0.1531	0.0646	0.0813	0.078	0.0181	0.0263	0.1119	0.0815
Zambia	0.2785	0.0347	0.0568	0.1539	0.0654	0.0840	0.081	0.0189	0.0272	0.1170	0.0819
Zimbabwe	0.2985	0.0341	0.0589	0.1527	0.0642	0.0801	0.076	0.0178	0.0259	0.1097	0.0814
ADB countries											
Algeria	0.1967	0.0372	0.0481	0.1590	0.0702	0.1001	0.101	0.0234	0.0325	0.1470	0.0839
Angola	0.2254	0.0363	0.0512	0.1572	0.0685	0.0945	0.094	0.0218	0.0307	0.1365	0.0832
Botswana	0.1896	0.0374	0.0474	0.1595	0.0706	0.1015	0.103	0.0238	0.0330	0.1496	0.0841
Cabo Verde	0.2148	0.0366	0.0500	0.1579	0.0691	0.0965	0.097	0.0224	0.0314	0.1404	0.0835
Egypt	0.1715	0.0379	0.0455	0.1606	0.0716	0.1050	0.108	0.0248	0.0342	0.1563	0.0846
Equatorial Guinea	0.1914	0.0373	0.0476	0.1594	0.0705	0.1011	0.103	0.0237	0.0329	0.1490	0.0841
Gabon	0.1887	0.0374	0.0473	0.1595	0.0706	0.1017	0.103	0.0238	0.0331	0.1500	0.0842
Mauritius	0.1471	0.0386	0.0429	0.1621	0.0731	0.1099	0.114	0.0262	0.0358	0.1653	0.0852
Morocco	0.2154	0.0366	0.0501	0.1579	0.0691	0.0964	0.097	0.0224	0.0313	0.1402	0.0835
Namibia	0.1958	0.0372	0.0480	0.1591	0.0702	0.1003	0.102	0.0234	0.0326	0.1474	0.0840
Seychelles	0.1398	0.0388	0.0421	0.1626	0.0735	0.1113	0.115	0.0266	0.0363	0.1679	0.0854
South Africa	0.1802	0.0377	0.0464	0.1601	0.0711	0.1034	0.105	0.0243	0.0336	0.1531	0.0844
Swaziland	0.1937	0.0373	0.0478	0.1592	0.0703	0.1007	0.102	0.0236	0.0327	0.1481	0.0840
Tunisia	0.1853	0.0375	0.0469	0.1597	0.0708	0.1023	0.104	0.0240	0.0333	0.1512	0.0842

Source: Authors' estimates using 2011 ICP data.

A.2 Appendix for food sub-group model

Table 7: Income elasticities for aggregate consumption categories, 50 countries, 2011

	Food & Non Alcoholic Beverages	Alcoholic Beverages & Tobacco	Clothing & Footwear	Housing, Water, Electricity, Gas & other Fuels	Furnishings Household Equipment and Operation	Health	Transport	Communication	Recreation & Culture	Education	Others
ADF countries											
Benin	0.8220	1.0590	0.8962	1.0268	1.0619	1.1858	1.2562	1.2486	1.1922	1.2709	1.0205
Burkina Faso	0.8338	1.0604	0.9003	1.0271	1.0635	1.2005	1.2851	1.2758	1.2080	1.3035	1.0207
Burundi	0.8418	1.0615	0.9033	1.0273	1.0647	1.2136	1.3123	1.3012	1.2221	1.3345	1.0208
Cameroon	0.8059	1.0574	0.8910	1.0264	1.0602	1.1709	1.2288	1.2228	1.1763	1.2405	1.0203
Central Afr. Rep.	0.8359	1.0606	0.9011	1.0271	1.0638	1.2037	1.2915	1.2818	1.2114	1.3108	1.0207
Chad	0.8186	1.0586	0.8951	1.0267	1.0615	1.1822	1.2494	1.2422	1.1883	1.2633	1.0204
Comoros	0.8428	1.0617	0.9037	1.0273	1.0649	1.2155	1.3164	1.3050	1.2242	1.3392	1.0208
Congo	0.8175	1.0585	0.8947	1.0267	1.0614	1.1811	1.2473	1.2403	1.1871	1.2610	1.0204
Congo, DRC	0.8510	1.0630	0.9068	1.0276	1.0664	1.2331	1.3558	1.3415	1.2433	1.3850	1.0210
Côte d'Ivoire	0.8094	1.0577	0.8921	1.0265	1.0605	1.1738	1.2339	1.2276	1.1794	1.2462	1.0203
Djibouti	0.8111	1.0578	0.8926	1.0265	1.0607	1.1752	1.2365	1.2300	1.1809	1.2490	1.0203
Ethiopia	0.8329	1.0603	0.9000	1.0270	1.0633	1.1993	1.2826	1.2735	1.2067	1.3007	1.0206
Gambia, The	0.8208	1.0588	0.8958	1.0267	1.0618	1.1844	1.2537	1.2463	1.1908	1.2681	1.0205
Ghana	0.7977	1.0567	0.8884	1.0263	1.0594	1.1651	1.2184	1.2129	1.1701	1.2290	1.0202
Guinea	0.8360	1.0607	0.9011	1.0271	1.0638	1.2038	1.2918	1.2821	1.2116	1.3112	1.0207
Guinea Bissau	0.8326	1.0602	0.8999	1.0270	1.0633	1.1988	1.2816	1.2726	1.2062	1.2996	1.0206
Kenya	0.8102	1.0578	0.8923	1.0265	1.0606	1.1744	1.2350	1.2287	1.1800	1.2474	1.0203
Lesotho	0.8018	1.0570	0.8897	1.0264	1.0598	1.1679	1.2233	1.2176	1.1731	1.2344	1.0202
Liberia	0.8416	1.0615	0.9032	1.0273	1.0647	1.2133	1.3116	1.3006	1.2218	1.3338	1.0208
Madagascar	0.8221	1.0590	0.8963	1.0268	1.0619	1.1859	1.2564	1.2488	1.1923	1.2711	1.0205
Malawi	0.8291	1.0598	0.8987	1.0269	1.0628	1.1942	1.2725	1.2640	1.2012	1.2893	1.0206
Mali	0.8290	1.0598	0.8987	1.0269	1.0628	1.1941	1.2722	1.2637	1.2010	1.2889	1.0206
Mauritania	0.8057	1.0574	0.8909	1.0264	1.0601	1.1708	1.2285	1.2226	1.1762	1.2402	1.0203
Mozambique	0.8359	1.0607	0.9011	1.0271	1.0638	1.2037	1.2916	1.2819	1.2114	1.3109	1.0207
Niger	0.8403	1.0613	0.9027	1.0272	1.0645	1.2109	1.3065	1.2958	1.2192	1.3279	1.0208
Nigeria	0.8029	1.0571	0.8900	1.0264	1.0599	1.1687	1.2248	1.2190	1.1740	1.2361	1.0203
Rwanda	0.8241	1.0592	0.8969	1.0268	1.0622	1.1880	1.2605	1.2527	1.1946	1.2758	1.0205
São Tomé & Príncipe	0.7879	1.0560	0.8855	1.0261	1.0586	1.1590	1.2080	1.2030	1.1637	1.2176	1.0201
Senegal	0.8093	1.0577	0.8920	1.0265	1.0605	1.1736	1.2337	1.2274	1.1792	1.2459	1.0203
Sierra Leone	0.8216	1.0589	0.8961	1.0268	1.0619	1.1853	1.2554	1.2479	1.1917	1.2700	1.0205
Sudan	0.8046	1.0573	0.8905	1.0264	1.0600	1.1699	1.2270	1.2211	1.1753	1.2385	1.0203
Tanzania	0.8300	1.0599	0.8990	1.0270	1.0629	1.1953	1.2747	1.2661	1.2024	1.2917	1.0206
Togo	0.8273	1.0596	0.8980	1.0269	1.0626	1.1919	1.2679	1.2597	1.1987	1.2841	1.0206
Uganda	0.8201	1.0587	0.8956	1.0267	1.0617	1.1837	1.2523	1.2450	1.1900	1.2667	1.0205
Zambia	0.8128	1.0580	0.8932	1.0266	1.0609	1.1766	1.2391	1.2326	1.1824	1.2520	1.0204
Zimbabwe	0.8231	1.0591	0.8966	1.0268	1.0620	1.1869	1.2583	1.2507	1.1934	1.2734	1.0205
ADB countries											
Algeria	0.7540	1.0540	0.8763	1.0257	1.0565	1.1442	1.1832	1.1794	1.1480	1.1907	1.0199
Angola	0.7784	1.0553	0.8828	1.0260	1.0579	1.1541	1.1996	1.1950	1.1585	1.2085	1.0200
Botswana	0.7472	1.0537	0.8746	1.0256	1.0561	1.1419	1.1796	1.1759	1.1456	1.1868	1.0198
Cabo Verde	0.7700	1.0548	0.8805	1.0259	1.0574	1.1503	1.1933	1.1890	1.1545	1.2016	1.0200
Egypt	0.7278	1.0529	0.8700	1.0254	1.0553	1.1365	1.1710	1.1676	1.1399	1.1774	1.0197
Equatorial Guinea	0.7490	1.0538	0.8750	1.0256	1.0562	1.1425	1.1805	1.1768	1.1462	1.1877	1.0198
Gabon	0.7462	1.0536	0.8743	1.0256	1.0561	1.1416	1.1791	1.1754	1.1453	1.1862	1.0198
Mauritius	0.6962	1.0518	0.8632	1.0252	1.0541	1.1297	1.1605	1.1575	1.1328	1.1662	1.0196
Morocco	0.7705	1.0549	0.8806	1.0259	1.0574	1.1505	1.1936	1.1893	1.1547	1.2019	1.0200
Namibia	0.7532	1.0540	0.8761	1.0257	1.0564	1.1439	1.1828	1.1789	1.1477	1.1902	1.0198
Seychelles	0.6855	1.0515	0.8611	1.0251	1.0538	1.1278	1.1577	1.1548	1.1308	1.1631	1.0195
South Africa	0.7374	1.0533	0.8722	1.0255	1.0557	1.1390	1.1750	1.1714	1.1426	1.1818	1.0198
Swaziland	0.7512	1.0539	0.8756	1.0257	1.0563	1.1432	1.1817	1.1779	1.1470	1.1890	1.0198
Tunisia	0.7428	1.0535	0.8735	1.0256	1.0559	1.1406	1.1775	1.1739	1.1442	1.1845	1.0198

Source: Authors' estimates using 2011 ICP data.

Table 8: Frisch own-price elasticities for aggregate consumption categories, 50 countries, 2011

	Food & Non Alcoholic	Alcoholic Beverages & Tobacco	Clothing & Footwear	Housing, Water, Electricity	Furnishings Household Equipment	Health	Transport	Communication	Recreation & Culture	Education	Others
ADF countries											
Benin	-1.2787	-1.6473	-1.3942	-1.5972	-1.6519	-1.8445	-1.9541	-1.9424	-1.8545	-1.9770	-1.5874
Burkina Faso	-1.2970	-1.6495	-1.4005	-1.5977	-1.6543	-1.8675	-1.9991	-1.9847	-1.8791	-2.0277	-1.5877
Burundi	-1.3095	-1.6512	-1.4051	-1.5980	-1.6563	-1.8878	-2.0413	-2.0241	-1.9011	-2.0759	-1.5879
Cameroon	-1.2537	-1.6448	-1.3860	-1.5967	-1.6492	-1.8215	-1.9115	-1.9022	-1.8299	-1.9297	-1.5871
Central Afr. Rep.	-1.3002	-1.6499	-1.4017	-1.5978	-1.6548	-1.8724	-2.0090	-1.9940	-1.8844	-2.0390	-1.5878
Chad	-1.2734	-1.6467	-1.3924	-1.5971	-1.6513	-1.8390	-1.9435	-1.9324	-1.8485	-1.9652	-1.5874
Comoros	-1.3111	-1.6515	-1.4057	-1.5981	-1.6565	-1.8908	-2.0478	-2.0301	-1.9043	-2.0833	-1.5879
Congo	-1.2717	-1.6465	-1.3918	-1.5971	-1.6511	-1.8372	-1.9403	-1.9294	-1.8467	-1.9616	-1.5874
Congo, DRC	-1.3238	-1.6536	-1.4106	-1.5985	-1.6589	-1.9182	-2.1091	-2.0869	-1.9340	-2.1545	-1.5882
Côte d'Ivoire	-1.2591	-1.6453	-1.3877	-1.5968	-1.6497	-1.8259	-1.9194	-1.9097	-1.8346	-1.9385	-1.5872
Djibouti	-1.2617	-1.6456	-1.3885	-1.5969	-1.6500	-1.8281	-1.9234	-1.9134	-1.8369	-1.9429	-1.5872
Ethiopia	-1.2957	-1.6493	-1.4001	-1.5976	-1.6541	-1.8656	-1.9953	-1.9811	-1.8771	-2.0234	-1.5877
Gambia, The	-1.2768	-1.6471	-1.3935	-1.5972	-1.6517	-1.8425	-1.9502	-1.9387	-1.8523	-1.9727	-1.5874
Ghana	-1.2409	-1.6438	-1.3820	-1.5965	-1.6480	-1.8124	-1.8953	-1.8868	-1.8202	-1.9119	-1.5870
Guinea	-1.3004	-1.6499	-1.4018	-1.5978	-1.6548	-1.8727	-2.0096	-1.9945	-1.8847	-2.0396	-1.5878
Guinea Bissau	-1.2951	-1.6492	-1.3999	-1.5976	-1.6540	-1.8648	-1.9937	-1.9796	-1.8763	-2.0216	-1.5877
Kenya	-1.2603	-1.6454	-1.3881	-1.5968	-1.6498	-1.8269	-1.9212	-1.9113	-1.8356	-1.9404	-1.5872
Lesotho	-1.2472	-1.6443	-1.3839	-1.5966	-1.6486	-1.8167	-1.9029	-1.8940	-1.8248	-1.9203	-1.5871
Liberia	-1.3092	-1.6512	-1.4050	-1.5980	-1.6562	-1.8874	-2.0403	-2.0232	-1.9006	-2.0748	-1.5879
Madagascar	-1.2789	-1.6473	-1.3942	-1.5972	-1.6519	-1.8447	-1.9544	-1.9427	-1.8547	-1.9774	-1.5874
Malawi	-1.2898	-1.6486	-1.3980	-1.5975	-1.6533	-1.8577	-1.9795	-1.9663	-1.8686	-2.0056	-1.5876
Mali	-1.2896	-1.6486	-1.3979	-1.5975	-1.6533	-1.8575	-1.9790	-1.9659	-1.8683	-2.0050	-1.5876
Mauritania	-1.2534	-1.6448	-1.3859	-1.5967	-1.6491	-1.8213	-1.9111	-1.9018	-1.8297	-1.9293	-1.5871
Mozambique	-1.3003	-1.6499	-1.4017	-1.5978	-1.6548	-1.8725	-2.0092	-1.9941	-1.8845	-2.0392	-1.5878
Niger	-1.3071	-1.6509	-1.4042	-1.5980	-1.6559	-1.8836	-2.0324	-2.0158	-1.8965	-2.0657	-1.5879
Nigeria	-1.2490	-1.6444	-1.3845	-1.5966	-1.6487	-1.8180	-1.9053	-1.8963	-1.8262	-1.9229	-1.5871
Rwanda	-1.2819	-1.6476	-1.3952	-1.5973	-1.6523	-1.8481	-1.9608	-1.9487	-1.8583	-1.9845	-1.5875
São Tomé & Príncipe	-1.2256	-1.6427	-1.3775	-1.5962	-1.6468	-1.8030	-1.8791	-1.8714	-1.8102	-1.8941	-1.5869
Senegal	-1.2589	-1.6453	-1.3876	-1.5968	-1.6497	-1.8257	-1.9191	-1.9093	-1.8344	-1.9381	-1.5872
Sierra Leone	-1.2781	-1.6472	-1.3940	-1.5972	-1.6518	-1.8439	-1.9528	-1.9412	-1.8538	-1.9756	-1.5874
Sudan	-1.2516	-1.6447	-1.3853	-1.5967	-1.6490	-1.8199	-1.9087	-1.8995	-1.8282	-1.9267	-1.5871
Tanzania	-1.2911	-1.6487	-1.3985	-1.5975	-1.6535	-1.8594	-1.9829	-1.9695	-1.8704	-2.0094	-1.5876
Togo	-1.2869	-1.6482	-1.3970	-1.5974	-1.6529	-1.8541	-1.9724	-1.9596	-1.8647	-1.9976	-1.5876
Uganda	-1.2758	-1.6470	-1.3932	-1.5972	-1.6515	-1.8414	-1.9481	-1.9368	-1.8511	-1.9704	-1.5874
Zambia	-1.2643	-1.6458	-1.3894	-1.5969	-1.6503	-1.8304	-1.9276	-1.9174	-1.8394	-1.9475	-1.5873
Zimbabwe	-1.2804	-1.6475	-1.3947	-1.5973	-1.6521	-1.8463	-1.9575	-1.9456	-1.8564	-1.9808	-1.5875
ADB countries											
Algeria	-1.1730	-1.6396	-1.3632	-1.5956	-1.6434	-1.7798	-1.8406	-1.8346	-1.7858	-1.8522	-1.5865
Angola	-1.2109	-1.6417	-1.3732	-1.5960	-1.6457	-1.7953	-1.8661	-1.8589	-1.8021	-1.8799	-1.5867
Botswana	-1.1623	-1.6391	-1.3605	-1.5955	-1.6429	-1.7764	-1.8350	-1.8292	-1.7821	-1.8461	-1.5864
Cabo Verde	-1.1979	-1.6409	-1.3697	-1.5959	-1.6449	-1.7894	-1.8562	-1.8495	-1.7959	-1.8691	-1.5866
Egypt	-1.1321	-1.6379	-1.3533	-1.5952	-1.6415	-1.7679	-1.8215	-1.8163	-1.7732	-1.8316	-1.5862
Equatorial Guinea	-1.1651	-1.6392	-1.3612	-1.5955	-1.6430	-1.7772	-1.8364	-1.8306	-1.7830	-1.8476	-1.5864
Gabon	-1.1608	-1.6390	-1.3601	-1.5954	-1.6428	-1.7759	-1.8342	-1.8285	-1.7816	-1.8453	-1.5864
Mauritius	-1.0830	-1.6362	-1.3428	-1.5948	-1.6398	-1.7573	-1.8052	-1.8006	-1.7621	-1.8141	-1.5860
Morocco	-1.1986	-1.6409	-1.3699	-1.5959	-1.6449	-1.7897	-1.8567	-1.8500	-1.7962	-1.8697	-1.5866
Namibia	-1.1717	-1.6395	-1.3628	-1.5956	-1.6434	-1.7794	-1.8399	-1.8339	-1.7853	-1.8514	-1.5865
Seychelles	-1.0663	-1.6358	-1.3395	-1.5947	-1.6392	-1.7544	-1.8008	-1.7964	-1.7591	-1.8093	-1.5859
South Africa	-1.1471	-1.6384	-1.3568	-1.5953	-1.6422	-1.7718	-1.8278	-1.8223	-1.7773	-1.8383	-1.5863
Swaziland	-1.1686	-1.6394	-1.3620	-1.5955	-1.6432	-1.7784	-1.8382	-1.8323	-1.7842	-1.8496	-1.5864
Tunisia	-1.1556	-1.6388	-1.3588	-1.5954	-1.6426	-1.7743	-1.8317	-1.8260	-1.7799	-1.8425	-1.5864

Source: Authors' estimates using 2011 ICP data.

Table 9: Slutsky own-price elasticities for aggregate consumption categories, 50 countries, 2011

	Food & Non Alcoholic Beverages	Alcoholic Beverages & Tobacco	Clothing & Footwear	Housing, Water, Electricity, Gas & other Fuels	Furnishings Household Equipment and Operation	Health	Transport	Communication	Recreation & Culture	Education	Others
ADF countries											
Benin	-0.8998	-1.5909	-1.3124	-1.3531	-1.5456	-1.6960	-1.8030	-1.9077	-1.8062	-1.7586	-1.4582
Burkina Faso	-0.8796	-1.5943	-1.3146	-1.3560	-1.5503	-1.7265	-1.8570	-1.9520	-1.8334	-1.8227	-1.4595
Burundi	-0.8625	-1.5970	-1.3160	-1.3582	-1.5540	-1.7525	-1.9061	-1.9930	-1.8572	-1.8809	-1.4605
Cameroon	-0.9197	-1.5871	-1.3090	-1.3497	-1.5402	-1.6641	-1.7497	-1.8650	-1.7787	-1.6953	-1.4567
Central Afr. Rep.	-0.8754	-1.5950	-1.3150	-1.3566	-1.5513	-1.7328	-1.8687	-1.9617	-1.8391	-1.8365	-1.4597
Chad	-0.9047	-1.5901	-1.3117	-1.3523	-1.5443	-1.6884	-1.7900	-1.8971	-1.7996	-1.7432	-1.4579
Comoros	-0.8600	-1.5973	-1.3162	-1.3586	-1.5546	-1.7563	-1.9135	-1.9992	-1.8607	-1.8896	-1.4606
Congo	-0.9062	-1.5898	-1.3115	-1.3521	-1.5440	-1.6861	-1.7860	-1.8939	-1.7975	-1.7385	-1.4578
Congo, DRC	-0.8386	-1.6005	-1.3174	-1.3611	-1.5589	-1.7902	-1.9824	-2.0577	-1.8926	-1.9720	-1.4617
Côte d'Ivoire	-0.9160	-1.5879	-1.3098	-1.3504	-1.5413	-1.6703	-1.7598	-1.8730	-1.7840	-1.7074	-1.4570
Djibouti	-0.9141	-1.5883	-1.3101	-1.3507	-1.5418	-1.6734	-1.7649	-1.8770	-1.7866	-1.7134	-1.4572
Ethiopia	-0.8813	-1.5941	-1.3145	-1.3558	-1.5500	-1.7240	-1.8525	-1.9483	-1.8311	-1.8173	-1.4594
Gambia, The	-0.9016	-1.5906	-1.3121	-1.3528	-1.5451	-1.6933	-1.7982	-1.9038	-1.8038	-1.7530	-1.4581
Ghana	-0.9269	-1.5854	-1.3073	-1.3482	-1.5378	-1.6510	-1.7286	-1.8485	-1.7677	-1.6703	-1.4561
Guinea	-0.8752	-1.5950	-1.3150	-1.3566	-1.5513	-1.7332	-1.8693	-1.9622	-1.8394	-1.8372	-1.4597
Guinea Bissau	-0.8819	-1.5939	-1.3144	-1.3557	-1.5498	-1.7230	-1.8507	-1.9467	-1.8302	-1.8151	-1.4593
Kenya	-0.9152	-1.5881	-1.3099	-1.3505	-1.5415	-1.6717	-1.7620	-1.8748	-1.7851	-1.7100	-1.4571
Lesotho	-0.9236	-1.5862	-1.3081	-1.3489	-1.5390	-1.6573	-1.7386	-1.8563	-1.7729	-1.6822	-1.4564
Liberia	-0.8629	-1.5969	-1.3160	-1.3582	-1.5540	-1.7520	-1.9050	-1.9920	-1.8566	-1.8795	-1.4604
Madagascar	-0.8996	-1.5910	-1.3124	-1.3531	-1.5456	-1.6963	-1.8034	-1.9080	-1.8064	-1.7591	-1.4582
Malawi	-0.8882	-1.5929	-1.3138	-1.3548	-1.5484	-1.7136	-1.8337	-1.9328	-1.8218	-1.7950	-1.4590
Mali	-0.8884	-1.5929	-1.3137	-1.3548	-1.5483	-1.7133	-1.8332	-1.9323	-1.8215	-1.7944	-1.4590
Mauritania	-0.9199	-1.5871	-1.3090	-1.3497	-1.5401	-1.6638	-1.7492	-1.8646	-1.7784	-1.6947	-1.4567
Mozambique	-0.8754	-1.5950	-1.3150	-1.3566	-1.5513	-1.7329	-1.8689	-1.9619	-1.8392	-1.8367	-1.4597
Niger	-0.8660	-1.5964	-1.3157	-1.3578	-1.5533	-1.7472	-1.8958	-1.9843	-1.8523	-1.8687	-1.4603
Nigeria	-0.9225	-1.5865	-1.3084	-1.3491	-1.5393	-1.6592	-1.7417	-1.8587	-1.7745	-1.6858	-1.4565
Rwanda	-0.8967	-1.5915	-1.3128	-1.3536	-1.5464	-1.7008	-1.8112	-1.9143	-1.8104	-1.7683	-1.4584
São Tomé & Príncipe	-0.9335	-1.5836	-1.3051	-1.3465	-1.5352	-1.6373	-1.7070	-1.8319	-1.7563	-1.6445	-1.4553
Senegal	-0.9162	-1.5879	-1.3098	-1.3504	-1.5412	-1.6701	-1.7594	-1.8727	-1.7837	-1.7069	-1.4570
Sierra Leone	-0.9004	-1.5908	-1.3123	-1.3530	-1.5455	-1.6952	-1.8015	-1.9064	-1.8055	-1.7568	-1.4582
Sudan	-0.9209	-1.5868	-1.3088	-1.3494	-1.5398	-1.6619	-1.7461	-1.8622	-1.7768	-1.6911	-1.4566
Tanzania	-0.8867	-1.5932	-1.3139	-1.3550	-1.5487	-1.7159	-1.8378	-1.9361	-1.8238	-1.7999	-1.4591
Togo	-0.8914	-1.5924	-1.3134	-1.3544	-1.5476	-1.7088	-1.8252	-1.9258	-1.8175	-1.7850	-1.4588
Uganda	-0.9025	-1.5905	-1.3120	-1.3527	-1.5449	-1.6918	-1.7957	-1.9018	-1.8025	-1.7500	-1.4580
Zambia	-0.9122	-1.5887	-1.3105	-1.3511	-1.5424	-1.6766	-1.7701	-1.8812	-1.7893	-1.7197	-1.4573
Zimbabwe	-0.8982	-1.5912	-1.3126	-1.3533	-1.5460	-1.6985	-1.8072	-1.9111	-1.8084	-1.7636	-1.4583
ADB countries											
Algeria	-0.9423	-1.5787	-1.2976	-1.3418	-1.5281	-1.6017	-1.6533	-1.7917	-1.7277	-1.5798	-1.4533
Angola	-0.9380	-1.5821	-1.3030	-1.3451	-1.5330	-1.6257	-1.6893	-1.8184	-1.7468	-1.6232	-1.4547
Botswana	-0.9419	-1.5778	-1.2961	-1.3410	-1.5269	-1.5961	-1.6450	-1.7857	-1.7233	-1.5699	-1.4529
Cabo Verde	-0.9405	-1.5808	-1.3011	-1.3439	-1.5312	-1.6166	-1.6756	-1.8081	-1.7395	-1.6067	-1.4542
Egypt	-0.9379	-1.5758	-1.2918	-1.3390	-1.5239	-1.5821	-1.6249	-1.7713	-1.7126	-1.5453	-1.4521
Equatorial Guinea	-0.9421	-1.5781	-1.2964	-1.3412	-1.5272	-1.5975	-1.6471	-1.7872	-1.7244	-1.5724	-1.4530
Gabon	-0.9418	-1.5777	-1.2958	-1.3409	-1.5268	-1.5953	-1.6439	-1.7849	-1.7227	-1.5685	-1.4529
Mauritius	-0.9238	-1.5730	-1.2852	-1.3362	-1.5199	-1.5643	-1.5995	-1.7535	-1.6991	-1.5143	-1.4509
Morocco	-0.9404	-1.5809	-1.3012	-1.3439	-1.5313	-1.6171	-1.6763	-1.8086	-1.7399	-1.6076	-1.4542
Namibia	-0.9422	-1.5786	-1.2974	-1.3417	-1.5280	-1.6010	-1.6523	-1.7909	-1.7271	-1.5786	-1.4532
Seychelles	-0.9172	-1.5722	-1.2831	-1.3354	-1.5188	-1.5592	-1.5924	-1.7487	-1.6953	-1.5055	-1.4505
South Africa	-0.9404	-1.5768	-1.2939	-1.3400	-1.5254	-1.5887	-1.6343	-1.7780	-1.7176	-1.5568	-1.4525
Swaziland	-0.9422	-1.5783	-1.2969	-1.3415	-1.5276	-1.5993	-1.6498	-1.7891	-1.7258	-1.5756	-1.4531
Tunisia	-0.9414	-1.5774	-1.2951	-1.3405	-1.5262	-1.5927	-1.6401	-1.7822	-1.7207	-1.5639	-1.4527

Source: Authors' estimates using 2011 ICP data.

Table 10: Cournot own-price elasticities for aggregate consumption categories, 50 countries, 2011

	Food & Non Alcoholic Beverages	Alcoholic Beverages & Tobacco	Clothing & Footwear	Housing, Water, Electricity, Gas & other Fuels	Furnishings Household Equipment and Operation	Health	Transport	Communication	Recreation & Culture	Education	Others
ADF countries											
Benin	-1.1961	-1.6252	-1.3710	-1.5059	-1.6099	-1.7766	-1.8803	-1.9255	-1.8323	-1.8691	-1.5396
Burkina Faso	-1.2014	-1.6278	-1.3760	-1.5073	-1.6132	-1.8020	-1.9281	-1.9685	-1.8577	-1.9238	-1.5402
Burundi	-1.2038	-1.6298	-1.3794	-1.5083	-1.6158	-1.8242	-1.9723	-2.0083	-1.8803	-1.9748	-1.5407
Cameroon	-1.1861	-1.6222	-1.3645	-1.5044	-1.6063	-1.7505	-1.8343	-1.8845	-1.8067	-1.8168	-1.5389
Central Afr. Rep.	-1.2021	-1.6283	-1.3769	-1.5075	-1.6138	-1.8074	-1.9386	-1.9779	-1.8631	-1.9358	-1.5404
Chad	-1.1942	-1.6245	-1.3696	-1.5056	-1.6091	-1.7703	-1.8690	-1.9154	-1.8261	-1.8562	-1.5395
Comoros	-1.2041	-1.6301	-1.3799	-1.5084	-1.6161	-1.8275	-1.9791	-2.0144	-1.8836	-1.9826	-1.5408
Congo	-1.1936	-1.6243	-1.3692	-1.5055	-1.6088	-1.7683	-1.8655	-1.9123	-1.8241	-1.8522	-1.5394
Congo, DRC	-1.2051	-1.6326	-1.3835	-1.5096	-1.6192	-1.8570	-2.0425	-2.0717	-1.9140	-2.0567	-1.5413
Côte d'Ivoire	-1.1885	-1.6228	-1.3659	-1.5047	-1.6070	-1.7555	-1.8430	-1.8922	-1.8116	-1.8266	-1.5390
Djibouti	-1.1896	-1.6231	-1.3666	-1.5049	-1.6074	-1.7580	-1.8473	-1.8961	-1.8140	-1.8315	-1.5391
Ethiopia	-1.2011	-1.6276	-1.3756	-1.5072	-1.6129	-1.7999	-1.9241	-1.9648	-1.8556	-1.9192	-1.5402
Gambia, The	-1.1955	-1.6249	-1.3705	-1.5058	-1.6096	-1.7743	-1.8762	-1.9218	-1.8300	-1.8644	-1.5396
Ghana	-1.1800	-1.6209	-1.3614	-1.5037	-1.6047	-1.7400	-1.8166	-1.8688	-1.7965	-1.7967	-1.5386
Guinea	-1.2022	-1.6283	-1.3769	-1.5075	-1.6139	-1.8077	-1.9391	-1.9784	-1.8634	-1.9365	-1.5404
Guinea Bissau	-1.2010	-1.6275	-1.3755	-1.5071	-1.6128	-1.7991	-1.9224	-1.9634	-1.8548	-1.9173	-1.5402
Kenya	-1.1890	-1.6229	-1.3662	-1.5048	-1.6072	-1.7566	-1.8448	-1.8939	-1.8126	-1.8287	-1.5391
Lesotho	-1.1831	-1.6215	-1.3629	-1.5040	-1.6054	-1.7450	-1.8250	-1.8762	-1.8013	-1.8062	-1.5387
Liberia	-1.2038	-1.6298	-1.3794	-1.5083	-1.6157	-1.8237	-1.9713	-2.0074	-1.8797	-1.9736	-1.5407
Madagascar	-1.1962	-1.6252	-1.3711	-1.5060	-1.6100	-1.7767	-1.8806	-1.9258	-1.8324	-1.8695	-1.5396
Malawi	-1.1996	-1.6267	-1.3740	-1.5067	-1.6118	-1.7912	-1.9074	-1.9498	-1.8468	-1.9000	-1.5400
Mali	-1.1995	-1.6267	-1.3740	-1.5067	-1.6118	-1.7909	-1.9069	-1.9494	-1.8466	-1.8995	-1.5400
Mauritania	-1.1860	-1.6222	-1.3645	-1.5044	-1.6062	-1.7503	-1.8339	-1.8842	-1.8064	-1.8163	-1.5389
Mozambique	-1.2022	-1.6283	-1.3769	-1.5075	-1.6138	-1.8075	-1.9387	-1.9780	-1.8632	-1.9360	-1.5404
Niger	-1.2035	-1.6294	-1.3788	-1.5081	-1.6152	-1.8196	-1.9630	-1.9999	-1.8756	-1.9640	-1.5406
Nigeria	-1.1839	-1.6217	-1.3634	-1.5041	-1.6057	-1.7466	-1.8276	-1.8785	-1.8028	-1.8091	-1.5388
Rwanda	-1.1972	-1.6256	-1.3719	-1.5062	-1.6105	-1.7805	-1.8875	-1.9320	-1.8362	-1.8773	-1.5397
São Tomé & Príncipe	-1.1719	-1.6196	-1.3576	-1.5030	-1.6030	-1.7292	-1.7986	-1.8530	-1.7861	-1.7763	-1.5382
Senegal	-1.1884	-1.6228	-1.3659	-1.5047	-1.6070	-1.7553	-1.8426	-1.8919	-1.8113	-1.8262	-1.5390
Sierra Leone	-1.1959	-1.6251	-1.3709	-1.5059	-1.6098	-1.7758	-1.8790	-1.9243	-1.8315	-1.8676	-1.5396
Sudan	-1.1851	-1.6220	-1.3640	-1.5043	-1.6060	-1.7488	-1.8313	-1.8819	-1.8050	-1.8134	-1.5388
Tanzania	-1.1999	-1.6269	-1.3744	-1.5068	-1.6121	-1.7931	-1.9110	-1.9531	-1.8487	-1.9042	-1.5400
Togo	-1.1987	-1.6263	-1.3732	-1.5065	-1.6113	-1.7872	-1.8998	-1.9431	-1.8428	-1.8914	-1.5399
Uganda	-1.1951	-1.6248	-1.3703	-1.5057	-1.6095	-1.7730	-1.8739	-1.9198	-1.8288	-1.8618	-1.5395
Zambia	-1.1907	-1.6234	-1.3673	-1.5050	-1.6077	-1.7606	-1.8518	-1.9001	-1.8165	-1.8367	-1.5392
Zimbabwe	-1.1967	-1.6254	-1.3715	-1.5061	-1.6102	-1.7786	-1.8839	-1.9288	-1.8342	-1.8733	-1.5397
ADB countries											
Algeria	-1.1389	-1.6158	-1.3457	-1.5009	-1.5983	-1.7018	-1.7551	-1.8151	-1.7602	-1.7269	-1.5372
Angola	-1.1633	-1.6184	-1.3541	-1.5023	-1.6015	-1.7202	-1.7840	-1.8402	-1.7775	-1.7597	-1.5379
Botswana	-1.1316	-1.6152	-1.3434	-1.5005	-1.5975	-1.6976	-1.7486	-1.8095	-1.7563	-1.7195	-1.5371
Cabo Verde	-1.1553	-1.6174	-1.3512	-1.5018	-1.6003	-1.7132	-1.7729	-1.8305	-1.7709	-1.7471	-1.5377
Egypt	-1.1095	-1.6137	-1.3373	-1.4996	-1.5956	-1.6872	-1.7328	-1.7960	-1.7467	-1.7016	-1.5366
Equatorial Guinea	-1.1335	-1.6154	-1.3440	-1.5006	-1.5977	-1.6986	-1.7502	-1.8109	-1.7573	-1.7214	-1.5371
Gabon	-1.1305	-1.6151	-1.3431	-1.5004	-1.5974	-1.6970	-1.7477	-1.8087	-1.7558	-1.7185	-1.5370
Mauritius	-1.0708	-1.6116	-1.3281	-1.4984	-1.5930	-1.6741	-1.7135	-1.7797	-1.7349	-1.6795	-1.5361
Morocco	-1.1558	-1.6175	-1.3513	-1.5018	-1.6004	-1.7135	-1.7735	-1.8310	-1.7712	-1.7478	-1.5377
Namibia	-1.1381	-1.6158	-1.3454	-1.5008	-1.5982	-1.7013	-1.7543	-1.8144	-1.7597	-1.7260	-1.5372
Seychelles	-1.0571	-1.6111	-1.3252	-1.4980	-1.5923	-1.6705	-1.7081	-1.7752	-1.7316	-1.6734	-1.5359
South Africa	-1.1206	-1.6144	-1.3403	-1.5000	-1.5965	-1.6920	-1.7402	-1.8023	-1.7512	-1.7100	-1.5368
Swaziland	-1.1359	-1.6156	-1.3447	-1.5007	-1.5980	-1.7000	-1.7523	-1.8127	-1.7586	-1.7238	-1.5372
Tunisia	-1.1267	-1.6149	-1.3420	-1.5003	-1.5971	-1.6950	-1.7447	-1.8062	-1.7540	-1.7151	-1.5370

Source: Authors' estimates using 2011 ICP data.

Table 11: Unconditional expenditure elasticity for food sub-categories, 50 countries in 2011

	Bread and cereals	Meat	Fish	Milk, cheese and eggs	Oils and fats	Fruits, vegetables, potatoes	Other food
ADF countries							
Benin	0.6100	0.9014	0.7296	0.9629	0.7106	0.7931	0.6911
Burkina Faso	0.6050	0.8947	0.7108	0.9720	0.6930	0.7738	0.6750
Burundi	0.6300	0.9366	0.7316	1.0358	0.7138	0.7975	0.6961
Cameroon	0.5948	0.8853	0.7284	0.9336	0.7087	0.7906	0.6879
Central Afr. Rep.	0.6411	0.9481	0.7525	1.0310	0.7337	0.8193	0.7147
Chad	0.6138	0.9073	0.7354	0.9680	0.7163	0.7993	0.6965
Comoros	0.5762	0.8562	0.6696	0.9456	0.6533	0.7298	0.6370
Congo	0.6118	0.9043	0.7202	0.9802	0.7020	0.7839	0.6837
Congo, DRC	0.6379	0.9563	0.7339	1.0804	0.7165	0.8009	0.6994
Côte d'Ivoire	0.5995	0.8883	0.7252	0.9422	0.7060	0.7877	0.6859
Djibouti	0.6774	1.0005	0.8027	1.0769	0.7823	0.8732	0.7614
Ethiopia	0.6758	1.0027	0.7872	1.1027	0.7679	0.8577	0.7486
Gambia, The	0.6792	1.0039	0.7995	1.0882	0.7794	0.8702	0.7590
Ghana	0.6907	1.0202	0.8230	1.0929	0.8018	0.8948	0.7800
Guinea	0.6854	1.0168	0.7985	1.1179	0.7789	0.8700	0.7593
Guinea Bissau	0.7055	1.0426	0.8311	1.1290	0.8102	0.9046	0.7890
Kenya	0.6638	0.9805	0.7904	1.0510	0.7700	0.8594	0.7492
Lesotho	0.6637	0.9805	0.7920	1.0492	0.7715	0.8610	0.7504
Liberia	0.7134	1.0839	0.8139	1.2626	0.7950	0.8893	0.7768
Madagascar	0.6775	1.0007	0.8016	1.0788	0.7812	0.8721	0.7604
Malawi	0.6637	0.9816	0.7791	1.0673	0.7596	0.8482	0.7400
Mali	0.6913	1.0213	0.8164	1.1030	0.7957	0.8883	0.7747
Mauritania	0.6632	0.9875	0.8127	1.0410	0.7907	0.8820	0.7674
Mozambique	0.6989	1.0332	0.8220	1.1211	0.8013	0.8947	0.7805
Niger	0.7004	1.0445	0.8100	1.1649	0.7905	0.8833	0.7712
Nigeria	0.6796	1.0038	0.8095	1.0755	0.7887	0.8802	0.7672
Rwanda	0.6577	0.9719	0.7867	1.0381	0.7663	0.8552	0.7452
São Tomé & Príncipe	0.6535	0.9823	0.8157	1.0290	0.7932	0.8846	0.7688
Senegal	0.6799	1.0066	0.8203	1.0691	0.7987	0.8912	0.7762
Sierra Leone	0.6873	1.0173	0.8049	1.1097	0.7848	0.8765	0.7647
Sudan	0.6486	0.9633	0.7900	1.0182	0.7689	0.8577	0.7466
Tanzania	0.6581	0.9722	0.7856	1.0399	0.7653	0.8541	0.7444
Togo	0.6897	1.0197	0.8106	1.1071	0.7903	0.8824	0.7698
Uganda	0.6774	1.0005	0.8009	1.0792	0.7806	0.8714	0.7599
Zambia	0.6516	0.9677	0.7934	1.0230	0.7722	0.8614	0.7498
Zimbabwe	0.6693	0.9898	0.8036	1.0545	0.7826	0.8733	0.7608
ADB countries							
Algeria	0.5859	0.8839	0.7358	0.9244	0.7153	0.7977	0.6930
Angola	0.6061	0.9132	0.7596	0.9556	0.7385	0.8236	0.7156
Botswana	0.6145	0.9143	0.7516	0.9646	0.7314	0.8159	0.7100
Cabo Verde	0.5470	0.8200	0.6795	0.8602	0.6608	0.7370	0.6407
Egypt	0.6273	0.9671	0.8134	1.0049	0.7899	0.8808	0.7637
Equatorial Guinea	0.6595	0.9902	0.8215	1.0379	0.7988	0.8909	0.7744
Gabon	0.6565	0.9843	0.8158	1.0326	0.7933	0.8848	0.7691
Mauritius	0.6008	0.9363	0.7903	0.9709	0.7672	0.8555	0.7411
Morocco	0.6338	0.9471	0.7825	0.9955	0.7612	0.8490	0.7383
Namibia	0.6554	0.9755	0.8025	1.0287	0.7809	0.8710	0.7579
Seychelles	0.5700	0.9203	0.7831	0.9499	0.7594	0.8468	0.7320
South Africa	0.6146	0.9251	0.7689	0.9685	0.7476	0.8337	0.7244
Swaziland	0.6184	0.9531	0.8016	0.9904	0.7785	0.8681	0.7527
Tunisia	0.6473	0.9726	0.8074	1.0191	0.7851	0.8755	0.7609

Source: Authors' estimates using 2011 ICP data.

Table 12: Unconditional Frisch own-price elasticity for food sub-categories, 50 countries in 2011

	Bread and cereals	Meat	Fish	Milk, cheese and eggs	Oils and fats	Fruits, vegetables, potatoes	Other food
ADF countries							
Benin	-0.9489	-1.4023	-1.1349	-1.4979	-1.1055	-1.2337	-1.0750
Burkina Faso	-0.9412	-1.3917	-1.1057	-1.5120	-1.0780	-1.2037	-1.0501
Burundi	-0.9801	-1.4569	-1.1381	-1.6112	-1.1104	-1.2405	-1.0828
Cameroon	-0.9252	-1.3772	-1.1331	-1.4522	-1.1025	-1.2298	-1.0701
Central Afr. Rep.	-0.9972	-1.4749	-1.1706	-1.6038	-1.1413	-1.2745	-1.1119
Chad	-0.9549	-1.4115	-1.1440	-1.5059	-1.1142	-1.2434	-1.0834
Comoros	-0.8964	-1.3319	-1.0417	-1.4710	-1.0162	-1.1353	-0.9910
Congo	-0.9518	-1.4068	-1.1203	-1.5248	-1.0921	-1.2193	-1.0636
Congo, DRC	-0.9922	-1.4876	-1.1417	-1.6806	-1.1145	-1.2459	-1.0879
Côte d'Ivoire	-0.9326	-1.3818	-1.1281	-1.4656	-1.0983	-1.2253	-1.0670
Djibouti	-1.0538	-1.5564	-1.2487	-1.6753	-1.2169	-1.3584	-1.1844
Ethiopia	-1.0513	-1.5597	-1.2246	-1.7154	-1.1945	-1.3343	-1.1645
Gambia, The	-1.0566	-1.5617	-1.2436	-1.6927	-1.2124	-1.3536	-1.1807
Ghana	-1.0744	-1.5871	-1.2802	-1.7001	-1.2472	-1.3920	-1.2133
Guinea	-1.0662	-1.5817	-1.2422	-1.7390	-1.2116	-1.3534	-1.1812
Guinea Bissau	-1.0975	-1.6218	-1.2929	-1.7562	-1.2603	-1.4071	-1.2273
Kenya	-1.0327	-1.5253	-1.2295	-1.6350	-1.1979	-1.3369	-1.1654
Lesotho	-1.0325	-1.5253	-1.2320	-1.6321	-1.2002	-1.3394	-1.1674
Liberia	-1.1098	-1.6860	-1.2661	-1.9641	-1.2367	-1.3834	-1.2083
Madagascar	-1.0540	-1.5567	-1.2469	-1.6782	-1.2152	-1.3566	-1.1829
Malawi	-1.0324	-1.5269	-1.2120	-1.6603	-1.1817	-1.3195	-1.1511
Mali	-1.0754	-1.5887	-1.2700	-1.7158	-1.2378	-1.3819	-1.2051
Mauritania	-1.0316	-1.5361	-1.2642	-1.6194	-1.2301	-1.3721	-1.1938
Mozambique	-1.0872	-1.6073	-1.2786	-1.7440	-1.2465	-1.3918	-1.2141
Niger	-1.0895	-1.6248	-1.2601	-1.8121	-1.2296	-1.3741	-1.1997
Nigeria	-1.0571	-1.5615	-1.2593	-1.6730	-1.2268	-1.3692	-1.1935
Rwanda	-1.0231	-1.5119	-1.2238	-1.6149	-1.1920	-1.3303	-1.1592
São Tomé & Príncipe	-1.0165	-1.5281	-1.2690	-1.6007	-1.2339	-1.3761	-1.1959
Senegal	-1.0576	-1.5658	-1.2761	-1.6631	-1.2425	-1.3863	-1.2074
Sierra Leone	-1.0691	-1.5824	-1.2520	-1.7263	-1.2209	-1.3634	-1.1896
Sudan	-1.0089	-1.4985	-1.2289	-1.5838	-1.1960	-1.3343	-1.1613
Tanzania	-1.0237	-1.5124	-1.2221	-1.6177	-1.1905	-1.3286	-1.1579
Togo	-1.0728	-1.5862	-1.2610	-1.7222	-1.2294	-1.3727	-1.1975
Uganda	-1.0537	-1.5564	-1.2459	-1.6788	-1.2143	-1.3555	-1.1821
Zambia	-1.0136	-1.5053	-1.2342	-1.5914	-1.2012	-1.3401	-1.1664
Zimbabwe	-1.0412	-1.5397	-1.2501	-1.6404	-1.2174	-1.3585	-1.1835
ADB countries							
Algeria	-0.9114	-1.3750	-1.1446	-1.4380	-1.1127	-1.2409	-1.0780
Angola	-0.9428	-1.4206	-1.1817	-1.4866	-1.1488	-1.2812	-1.1131
Botswana	-0.9559	-1.4222	-1.1692	-1.5005	-1.1378	-1.2692	-1.1044
Cabo Verde	-0.8508	-1.2755	-1.0570	-1.3382	-1.0279	-1.1464	-0.9966
Egypt	-0.9758	-1.5044	-1.2653	-1.5632	-1.2288	-1.3702	-1.1881
Equatorial Guinea	-1.0258	-1.5403	-1.2779	-1.6145	-1.2427	-1.3859	-1.2046
Gabon	-1.0213	-1.5312	-1.2690	-1.6063	-1.2341	-1.3764	-1.1965
Mauritius	-0.9346	-1.4566	-1.2294	-1.5103	-1.1935	-1.3308	-1.1529
Morocco	-0.9859	-1.4732	-1.2173	-1.5486	-1.1841	-1.3207	-1.1485
Namibia	-1.0195	-1.5174	-1.2483	-1.6002	-1.2147	-1.3549	-1.1790
Seychelles	-0.8868	-1.4316	-1.2181	-1.4777	-1.1813	-1.3173	-1.1387
South Africa	-0.9561	-1.4390	-1.1961	-1.5066	-1.1629	-1.2969	-1.1269
Swaziland	-0.9619	-1.4827	-1.2469	-1.5407	-1.2110	-1.3503	-1.1708
Tunisia	-1.0069	-1.5129	-1.2559	-1.5853	-1.2212	-1.3620	-1.1837

Source: Authors' estimates using 2011 ICP data.