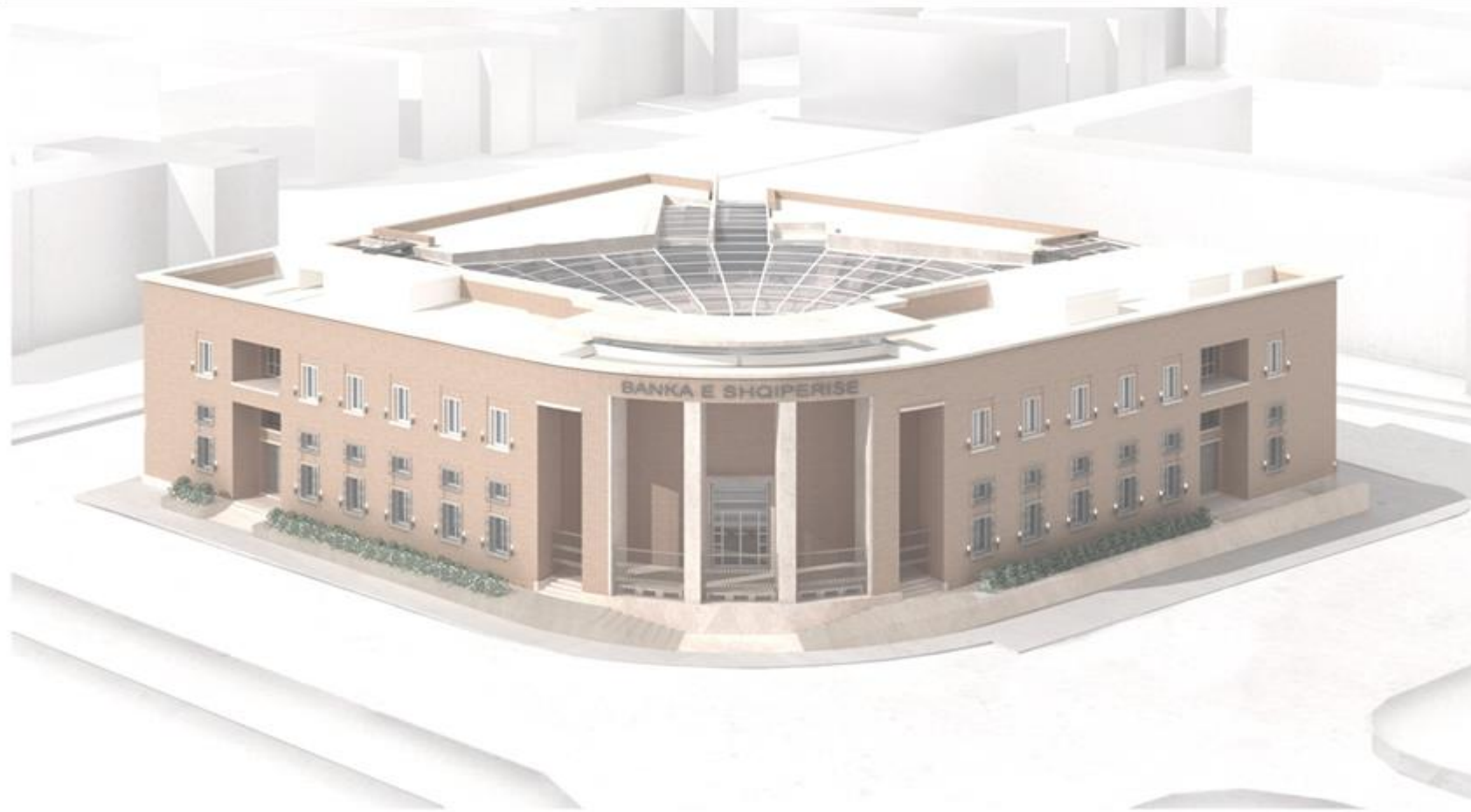


# Household's Demand in Albania: Measuring the Effects of Income and Price Shocks to Consumer Demand using Micro Data.



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## MOTIVATION

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- Consumption constitutes around **80% of the GDP in Albania** (*Instat, 2001-2018*).
- Both common sense and economic analysis suggest that changes in income and prices are expected to alter the ways in which consumers spend their income. **At the macro level**, the consumption patterns and the trends have been discussed extensively in the recent years in Albania for policymaking purposes.
- So far, consumers demand in Albania **at the micro level** has not been receiving enough attention in research (See: *Dushku and Cami, 2018*).

## OBJECTIVE

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Using **household-level** expenditure, and household/head characteristics covering **8714 households** from the Living Standard Measure Survey (LSMS) over the period **2005-2012**, **the aim** of this study is to:

- **Build and estimate a household demand system** which must incorporate **an investigation into the effects of changes in income and prices**, taking into account **household heterogeneity** related to demographics and composition **while being consistent with demand theory**; in order to **investigate into the effects of changes in income and prices** through obtaining:
  1. *Income elasticities*
  2. *Compensated/Uncompensated own price elasticities*
  3. *Cross-price elasticities*
- To **argue about the impact of regulated price changes on consumer demand**. Understanding the impact of regulated prices on consumer demand is important both for forecasting and for policy decisions. In Albania, regulated prices have always been an important contributor/driver of inflation (Bank of Albania, 2005-2013).

# THEORETICAL MODELS

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Demand Modelling is mostly based on four stationary microeconomic approaches:

- **The Linear Expenditure System (LES)** (Stone, 1954) based on Klein and Rubin (1947)
- **The Rotterdam Model** based on Theil (1965)
- **The Almost Ideal Demand System (AIDS)** (Deaton and Muellbauer (1980))
- **The Quadratic Almost Ideal Demand System (QUAIDS)** (Banks et al. (1997))

Unfortunately, the LES and the AIDS has a strong bias in estimating Engel curves due to the inflexibility built in shape that would not allow for a “hump” shape for certain budget shares.

Banks et al. (1997) introduced the QUAIDS by **adding a quadratic term of log income (expenditure) to the AIDS** and showed that no additional degree of dependence on log expenditure is needed.



# QUADRATIC ALMOST IDEAL DEMAND SYSTEM (I) THE BASE MODEL

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Under QUAIDS, the i-th budget share ( $w_i$ ) equation for household “h” is given by:

$$w_{ih} = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left\{ \frac{x_h}{a(p)} \right\} + \frac{\mu_i}{b(p)} \left[ \ln \left\{ \frac{x_h}{c(p)} \right\} \right]^2 \quad (1)$$

where  $i=1, \dots, n$  indicates good i

and  $w_{ih} = p_{ih} q_{ih} / x_h$

(Derivation)

# QUADRATIC ALMOST IDEAL DEMAND SYSTEM (II) RESTRICTIONS

The restrictions that are required to make the model **consistent with the theory of demand** are :

- The **adding-up restrictions** ensure that the sum of budget shares equals one. They are defined as following:

$$\begin{aligned} \sum_{i=1}^n \alpha_i &= 1 & \sum_{i=1}^n \gamma_{ij} &= 0 & \forall j \\ \sum_{i=1}^n \beta_i &= 0 & \sum_i \mu_i &= 0 \end{aligned} \quad (2)$$

- The **homogeneity restriction** implies that the budget share function should be homogeneous of degree zero in p and x or:

$$\sum_j \gamma_{ij} = 0 \quad \forall i. \quad (3)$$

- The **symmetry restriction** implies that the elasticity matrix is symmetric:

$$\gamma_{ij} = \gamma_{ji} \quad (4)$$



# QUADRATIC ALMOST IDEAL DEMAND SYSTEM (III)

## ASSUMPTIONS

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- I. Each consumer is faced with **fixed prices**
- II. **Weak separability of preferences** between :
  - 1. goods **included** and **excluded** from the model.
  - 2. goods **in any two periods**.
  - 3. **durables** and **non-durables**.

We assume that the decision on the side of demand is not made by individuals but rather by the household as a whole. We **consider the household to be the unit** of our analysis.

# QUADRATIC ALMOST IDEAL DEMAND SYSTEM (IV)

## DEMAND ELASTICITIES

To calculate the elasticities, we **differentiate equation (1) with respect to  $\ln x$  and  $\ln p_j$** , respectively and we obtain:

$$\theta_i = \frac{\partial w_i}{\partial \ln x} = \beta_i + \frac{2\mu_i}{b(p)} * \ln \left[ \frac{m}{a(p)} \right] \quad (5)$$

$$\theta_{ij} = \frac{\partial w_i}{\partial \ln p_j} = \gamma_{ij} - \mu_i (\alpha_j + \sum_k \gamma_{jk} \ln P_k - \frac{\mu_i \beta_j}{b(p)} * \ln \left[ \frac{m}{a(p)} \right]^2) \quad (6)$$

1. The **income elasticities** are given by  $e_i = \frac{\theta_i}{w_i} + 1$

(Definitions)

2. We are going to calculate two types of price elasticities: **compensated and uncompensated price elasticities**.

- I. The **uncompensated price elasticities** (Marshall Price Elasticity) are calculated using the formula  $e_{ij}^u = \frac{\theta_{ij}}{w_i} - \delta_{ij}$  where  $\delta_{ij}$  is the Kronecker delta.
- II. The Slutsky equation  $e_{ij}^c = e_{ij}^u + e_i w_j$  is used to calculate the **compensated price elasticities**  $e_{ij}^c$  (Hicks Price Elasticity).

# QUADRATIC ALMOST IDEAL DEMAND SYSTEM (IV)

## DEMAND ELASTICITIES

The **theoretical** and **empirical** literature **converges into similar estimates** for elasticities

### Definitions

#### Income Elasticities

elasticity  $< 1$  the commodity is considered a necessity, elasticity  $> 1$  the commodity is considered a luxury

- Consumers in rich countries devote less than 20 percent of their budget to food, while this rises to more than 50 percent in poor countries Clements et al. (2004).
- Food and utilities are considered necessities and entertainment and transportation are considered luxuries Deaton and Muellbauer (1980); Banks et al. (1997); Lechene and Levell (2015); Dybczak et al. (2010) etc.
- Income elasticity of food falls in the range between 0.4-0.6 for richer countries and 0.7-0.9 for poorer countries. Clothing is considered a luxury in poor to middle income countries Houthakker, (1957).

#### Price Elasticities

elasticity  $< 1$  the demand of the commodity is inelastic, elasticity  $> 1$  the demand of commodity is elastic.

Cross-price elasticity (+) the goods are complements, cross-price elasticity (-) goods are substitutes.

- Goods that have few to no substitutes display high inelasticity to price changes: tobacco, electricity, fuel, gas etc Frank, (2008).
- In the case of food, the estimated own-price elasticities range from -0.20 to -0.96 Lewbel, (1997). Blundell (1988) estimated budget elasticities are about 0.6, 0.3, 1.3, and 1.2 for food, fuel, clothing, and transportation, respectively. Expenditure on transportation and communication to be the most affected by changes in their own prices Dybczak et al., (2010).

# DATA(I)

## BUDGET SHARES

- Using established Instat guidelines from the official basket of the inflation and CPI estimation methodology (Instat uses the [ECOICOP classification](#)), we consider the following [eight groups of commodities](#):

- |                        |                                 |
|------------------------|---------------------------------|
| 1. Food                | 5. Household Items              |
| 2. Alcohol and Tobacco | 6. Transportation               |
| 3. Clothing            | 7. Entertainment                |
| 4. Utilities           | 8. Other Items ( Personal Care) |

We have **excluded** the groups of: **education and health, hotels and restaurants**, and all [durable goods](#).

- The data used in the estimation is [a pool](#) of the Living Standards Measure Survey (LSMS) of **2005, 2008 and 2012**.
- Data on food expenditure are collected by means of a 14-day diary. Data on utilities are reported for 1 month. Other goods and services are reported on a 1, 6 and 12 month basis.

We assume that consumption in a month is a good representation of consumption for the following 11 months. Thus, we have multiplied by 26, 12 and 2 respectively the 14-day, 1 month and 6 month data in order to **work on annual data**.

[ECOICOP CLASSIFICATION](#)

## DATA(II) PRICES

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- A common limitation with cross-sectional data is the **lack of price information**, an important variable in estimating demand systems.
- Lewbel (1989) developed an approach for the construction of household level commodity price indices (**Stone-Lewbel prices**) using only budget shares and CPIs of the goods comprising the commodity groups. He treats prices just as **costs of living of a certain household**.
  1. The prices are first computed for each commodity as **weighted average of prices from the CPI with weights being the expenditures**.
  2. The **aggregated prices** are then computed for each bundle with **weights being expenditures of all the households**.



## DATA(III) FINAL SAMPLE

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- First, we want to track the expenditure activity of only the households with a possible or potentially economically active head excluding households whose members have retired. For this purpose we have **omitted observations for the households whose heads are younger than 25 and older than 62.**
- Second, due to the existence of extreme values in the net income observations we have decided to **exclude households with the net total expenditure lower than the 5th and higher than the 95th percentile.**
- Third, we have **removed all observations below the first and above the last percentile in each commodity group** in order to avoid bias arising from the presence of outliers.
- Fourth, **all monetary variables are discounted for the CPI and accounted for the differences of the costs of living between regions.**

The final sample equals **8714 households**

Descriptive Statistics

## ESTIMATION

We estimate the following system of equations:

$$w_{ih} = \alpha_i z_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i z_i \ln \left\{ \frac{x_h}{a(p)} \right\} + \frac{\mu_i z_i}{b(p)} \left[ \ln \left\{ \frac{x_h}{c(p)} \right\} \right]^2 + \varepsilon_i \quad (7)$$

where  $z_i$  is the coefficient estimated of other household characteristics.

- The QUAIDS is constructed in a way that demographics and other household characteristics could be allowed to enter all terms as in (7).  
**Household characteristics:** head sex, head marital status, number of children living in the household, urban dummy, head education, dummy for the residence size, head age, head age square and subjective poverty.
- The equation is estimated using **iterated linear least squares (ILLS)** of *Blundell and Robin (1999)* (using the *Lecocq, Robin (2015) STATA application technique*), and the potential endogeneity resulting from total expenditure is accounted for by using *the instrumental variable (IV) and augmented regression technique of Hausman (1978) and Holly and Sargan (1982)*.
- We **estimate n-1 equations** and use the formulas of the **adding-up restriction** to calculate the coefficients of the n-th (5-th) equation. We impose the **homogeneity restriction** by considering **N-1 relative prices** instead of N absolute prices during the estimation and furthermore **test the restriction on symmetry** through a  $\chi^2$  test. Errors are **bootstrapped**.

## RESULTS (I) INCOME ELASTICITIES

Table 1: Income elasticities estimated using QUAIDS Estimated Coefficients ...

| Commodity                           | Expenditure Elasticity |
|-------------------------------------|------------------------|
| 1. Food and non-alcoholic beverages | 0.89***                |
| 2. Alcoholic beverages and tobacco  | 1.10**                 |
| 3. Clothing                         | 1.17***                |
| 4. Utilities                        | 0.83**                 |
| 5. Household Items                  | 1.18**                 |
| 6. Transportation                   | 1.10**                 |
| 7. Entertainment                    | 1.91***                |
| 8. Other items (Personal Care)      | 0.98**                 |

Symmetry Test

Chi2( 21) = 29.54

Prob > chi2 = 0.2016

# RESULTS (II)

## PRICE ELASTICITIES (Estimates)

Table 2: Price elasticities estimated using QUAIDS

- 1. Food
- 2. Alcoholic beverages, tobacco
- 3. Clothing
- 4. Utilities
- 5. Household Items
- 6. Transportation
- 7. Entertainment
- 8. Other items (Personal Care)

### Marshall (uncompensated) price elasticities

### Hicks (compensated) price elasticities

|    | 1             | 2             | 3             | 4             | 5             | 6             | 7             | 8             |  | 1             | 2             | 3             | 4             | 5             | 6             | 7             | 8             |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 1. | <b>-0.237</b> | 0.140         | 0.077         | 0.043         | 0.097         | 0.102         | 0.091         | 0.199         |  | <b>-0.231</b> | 0.138         | 0.074         | 0.042         | 0.094         | 0.100         | 0.091         | 0.197         |
| 2. | 0.123         | <b>-0.754</b> | 0.382         | 0.047         | 0.370         | 0.492         | 0.536         | 0.513         |  | 0.123         | <b>-0.702</b> | 0.385         | 0.045         | 0.373         | 0.492         | 0.536         | 0.513         |
| 3. | 0.023         | 0.337         | <b>-2.482</b> | 0.045         | 1.759         | 0.174         | 2.201         | 1.186         |  | 0.023         | 0.338         | <b>-2.222</b> | 0.045         | 1.754         | 0.173         | 2.203         | 1.186         |
| 4. | 0.099         | 0.085         | 0.045         | <b>-0.161</b> | 0.064         | 0.074         | 0.069         | 0.069         |  | 0.097         | 0.084         | 0.041         | <b>-0.151</b> | 0.061         | 0.073         | 0.068         | 0.067         |
| 5. | 0.102         | 0.321         | 1.185         | 0.145         | <b>-2.552</b> | 1.222         | 2.246         | 1.23          |  | 0.101         | 0.327         | 1.188         | 0.145         | <b>-2.449</b> | 1.222         | 2.247         | 1.231         |
| 6. | 0.196         | 0.587         | 0.958         | 0.103         | 1.421         | <b>-3.676</b> | 2.458         | 0.438         |  | 0.195         | 0.587         | 0.958         | 0.103         | 1.421         | <b>-3.645</b> | 2.458         | 0.439         |
| 7. | 0.107         | 0.866         | 2.217         | 0.155         | 2.685         | 2.803         | <b>-4.161</b> | 0.988         |  | 0.107         | 0.866         | 2.217         | 0.155         | 2.685         | 2.803         | <b>-3.393</b> | 0.952         |
| 8. | 0.111         | 0.529         | 1.306         | 0.122         | 1.363         | 0.387         | 0.451         | <b>-1.388</b> |  | 0.111         | 0.532         | 1.306         | 0.122         | 1.365         | 0.39          | 0.471         | <b>-1.385</b> |

## RESULTS (II) REGULATED PRICES

Table 3: Simulation by 10% increase of total expenditures and 30% increase in energy prices

|                       | Avg.<br>2005-2012 | 10% increase in<br>total expenses | 30% increase in<br>energy prices |
|-----------------------|-------------------|-----------------------------------|----------------------------------|
| 1.Food                | 0.607             | <b>0.602</b>                      | <b>0.608</b>                     |
| 2.Alcohol and Tobacco | 0.037             | 0.038                             | 0.037                            |
| 3.Clothing            | 0.054             | 0.056                             | 0.053                            |
| 4.Utilities           | 0.172             | 0.170                             | <b>0.172</b>                     |
| 5.Household Items     | 0.054             | 0.055                             | 0.054                            |
| 6.Transportation      | 0.031             | 0.035                             | 0.031                            |
| 7.Entertainment       | 0.005             | 0.007                             | 0.007                            |
| 8.Other               | 0.037             | 0.037                             | 0.037                            |

- If we simulate a 10% increase in total expenditures, holding everything else constant, the consumption share of food and utilities is going to decrease and substituted by an increase in the consumption share of entertainment, transport and the other “luxury” items.
- If we simulate a 30% increase in energy prices, the combination of low budget elasticity and low own-price elasticity suggests that households need energy whatever the level of their income, and do not reflect price developments significantly. As presented in the table above, the effects of a change in regulated energy prices on other commodities are estimated to be very limited according to the cross-price elasticities.

## FINDINGS AND CONCLUSIONS

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- (1) food and non-alcoholic beverages (4) utilities and (8) personal care can be considered **necessities** from the households of the sample (elasticity  $< 1$ ). All other budget components have an elasticity higher than “1” suggesting that all of these goods are considered luxuries.
- No quadratic behavior towards income.
- Demand for **food, alcohol, tobacco and utilities** is **inelastic**.
- The demand for **household items, transport, entertainment** is highly **elastic** suggesting that the households easily move away from the consumption of these goods if their price increases. The cross-price elasticities suggest that households **easily substitute** between **transportation, household items and entertainment**.
- If we simulate a 10% increase in total expenditures, holding everything else constant, the consumption share of food and utilities is going to **decrease** and substituted by an increase in the consumption share of **entertainment, transport and the other “luxury” items**.
- If we simulate a 30% increase in energy prices, the effects of a change in regulated energy prices on other commodities are estimated to be very limited according to the cross-price elasticities.

THANK YOU!!!

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# APPENDIX

## QUAIDS DERIVATION (I) Quadratic Almost Ideal Demand System

The QUAIDS is derived from the following indirect utility function:

$$\ln u(x, p) = \left\{ \left[ \frac{\ln x - \ln a(p)}{b(p)} \right]^{-1} + \mu(p) \right\}^{-1} \quad (1)$$

$[\ln x - \ln a(p)]/b(p)$  is the indirect utility functions of the PIGLOG demand system developed by Muellbauer (1975, 1976) and...  $\mu$  is an extra term which is a differentiable, homogeneous function of degree zero of prices  $p$ .

$\ln a(p)$  has the translog form of:

$$\ln a(p) = \alpha_0 + \sum_{i=1}^n \alpha_i \ln p_i + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \gamma_{ij} \ln p_i \ln p_j \quad (2)$$

$b(p)$  is the simple Cobb-Douglas price aggregator defined by the formula:

$$b(p) = \prod_{i=1}^n p_i^{\beta_i} \quad (3)$$

- The term  $\mu(p)$  is the one which allows for the transformation to a rank 3 demand system but allowing for a quadratic shaped Engel curve. The AIDS model has an indirect utility function given by equation (1) but with  $\mu$  term equal to zero.

$$\mu(p) = \sum_{i=1}^n \mu_i \ln p_i \quad (4)$$

## APPENDIX QUAIDS DERIVATION (II)

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Applying Roy's identity in the indirect utility function we get the budget share  $w$  of commodity  $i$  as described by the formula:

$$w_{ih} = \frac{\partial \ln a(p)}{\partial \ln p_i} + \frac{\partial \ln b(p)}{\partial \ln p_i} (\ln x) + \frac{\partial \mu(p)}{\partial \ln p_i} \frac{(\ln x)^2}{b(p)} \quad (5)$$

Notice that if  $\mu(p)$  is equal to zero than (5) reduces to an AIDS budget share model.

Solving we arrive at the formula:

$$w_{ih} = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left\{ \frac{x_h}{a(p)} \right\} + \frac{\mu_i}{b(p)} \left[ \ln \left\{ \frac{x_h}{c(p)} \right\} \right]^2 \quad (6)$$

# APPENDIX

## THEORETICAL DEFINITIONS

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The **Uncompensated (Marshall-ian)** demand curve deals with how demand changes when price changes, holding income and utility constant.

The **Compensated (Hicks-ian)** demand curve deals with how demand changes when price changes, holding utility constant.

The **Slutsky equation** says that the total (Marshallian) price effect is equal to the sum of the substitution effect (i.e., Hicks-ian price effect) plus an income effect. What this does is eliminate the income effect from Hicks-ian demand, it isolates the substitution effect. This is because in a Hicks-ian demand function the consumer is assumed to receive precisely enough (minimised) income to achieve a fixed level of utility.

The **cross elasticity of demand** or cross-price elasticity of demand measures the responsiveness of the quantity demanded for a good to a change in the price of another good, ceteris paribus.

- If the elasticity is positive, then the goods are substitutes and if the elasticities are negative, the goods are complements.
- Moreover, the higher the elasticity the stronger the connection between the goods.

The **income elasticity of demand** is a measure of the responsiveness of purchase decisions to small changes in income ceteris paribus.

- If the elasticity is greater than 1, the goods are considered luxuries and if the elasticity is smaller than 1 the goods are considered necessities

### DEMAND ELASTICITIES

# APPENDIX

## ECOICOP CLASSIFICATION

Data

|   |  |
|---|--|
| <b>ECOICOP: breakdown of individual consumption</b><br>Expenditure of households<br>By division and group   | <b>07 transport</b><br>07.1 purchase of vehicles<br>07.2 operation of personal transport equipment<br>07.3 transport services  |
| <b>01 food and non-alcoholic beverages</b><br>01.1 food<br>01.2 non-alcoholic beverages   | <b>08 communication</b><br>08.1 postal services<br>08.2 telephone and telefax equipment<br>08.3 telephone and telefax services   |
| <b>02 alcoholic beverages, tobacco and narcotics</b><br>02.1 alcoholic beverages<br>02.2 tobacco<br>02.3 narcotics  | <b>09 recreation and culture</b><br>09.1 audio-visual, photographic and information processing equipment<br>09.2 other major durables for recreation and culture<br>09.3 other recreational items and equipment, gardens and pets<br>09.4 recreational and cultural services<br>09.5 newspapers, books and stationery<br>09.6 package holidays |
| <b>03 clothing and footwear</b><br>03.1 clothing<br>03.2 footwear   | <b>10 education</b><br>10.1 pre-primary and primary education<br>10.2 secondary education<br>10.3 post-secondary non-tertiary education<br>10.4 tertiary education<br>10.5 education not definable by level  |
| <b>04 housing, water, electricity, gas and other fuels</b><br>04.1 actual rentals for housing<br>04.2 imputed rentals for housing<br>04.3 maintenance and repair of the dwelling<br>04.4 water supply and miscellaneous services relating to the dwelling<br>04.5 electricity, gas and other fuels  | <b>11 restaurants and hotels</b><br>11.1 catering services<br>11.2 accommodation services  |
| <b>05 furnishings, household equipment and routine household maintenance</b><br>05.1 furniture and furnishings, carpets and other floor coverings<br>05.2 household textiles<br>05.3 household appliances<br>05.4 glassware, tableware and household utensils<br>05.5 tools and equipment for house and garden<br>05.6 goods and services for routine household maintenance | <b>12 miscellaneous goods and services</b><br>12.1 personal care<br>12.2 prostitution<br>12.3 personal effects n.e.c.<br>12.4 social protection<br>12.5 insurance<br>12.6 financial services n.e.c.<br>12.7 other services n.e.c.  |
| <b>06 health</b><br>06.1 medical products, appliances and equipment<br>06.2 outpatient services<br>06.3 hospital services   |  |

# APPENDIX

## DESCRIPTIVE STATISTICS Estimation

|                           | Mean    | St. Dev  | Min    | Max    |
|---------------------------|---------|----------|--------|--------|
| Food Share                | 0.606   | 0.125    | 0.157  | 0.937  |
| Alcohol and Tobacco Share | 0.036   | 0.05     | 0      | 0.346  |
| Clothing Share            | 0.055   | 0.044    | 0.001  | 0.396  |
| Utilities Share           | 0.172   | 0.074    | 0.022  | 0.527  |
| Household Items Share     | 0.054   | 0.038    | 0.002  | 0.372  |
| Transportation Share      | 0.031   | 0.055    | 0      | 0.491  |
| Entertainment Share       | 0.005   | 0.012    | 0      | 0.147  |
| Other Goods Share         | 0.037   | 0.028    | 0      | 0.263  |
| Total Expenditure         | 432923  | 130695   | 214843 | 815577 |
| Urban Dummy               | 0.577   | 0.494    | 0      | 1      |
| Square meters dummy       | 0.126   | 0.881    | 0      | 1      |
| Head Age                  | 44.5    | 8.167    | 25     | 62     |
| Head Education dummy      | 3.629   | 0.752    | 0      | 1      |
| Subjective Poverty        | 4.74    | 1.79     | 1      | 10     |
| Head Sex                  | .879546 | .3255009 | 0      | 1      |
| Marital Status            | 0.816   | 0.215    | 0      | 1      |
| Number of children        | 2.051   | 1.18     | 0      | 6      |

|                           | Mean   | St. Dev | Min    | Max    |
|---------------------------|--------|---------|--------|--------|
| <b>2005</b>               |        |         |        |        |
| Food Share                | 0.602  | 0.120   | 0.205  | 0.925  |
| Alcohol and Tobacco Share | 0.042  | 0.052   | 0      | 0.336  |
| Clothing Share            | 0.055  | 0.046   | 0.001  | 0.349  |
| Utilities Share           | 0.189  | 0.066   | 0.022  | 0.472  |
| Household Items Share     | 0.05   | 0.036   | 0.002  | 0.362  |
| Transportation Share      | 0.029  | 0.053   | 0      | 0.490  |
| Entertainment Share       | 0.004  | 0.011   | 0      | 0.115  |
| Other Goods Share         | 0.035  | 0.025   | 0      | 0.173  |
| Total Expenditure         | 433293 | 128001  | 215297 | 813488 |
| <b>2008</b>               |        |         |        |        |
| Food Share                | 0.601  | 0.121   | 0.227  | 0.925  |
| Alcohol and Tobacco Share | 0.041  | 0.049   | 0      | 0.272  |
| Clothing Share            | 0.047  | 0.035   | 0.001  | 0.278  |
| Utilities Share           | 0.188  | 0.083   | 0.0255 | 0.527  |
| Household Items Share     | 0.055  | 0.039   | 0.002  | 0.372  |
| Transportation Share      | 0.029  | 0.052   | 0      | 0.375  |
| Entertainment Share       | 0.005  | 0.012   | 0      | 0.112  |
| Other Goods Share         | 0.035  | 0.025   | 0      | 0.263  |
| Total Expenditure         | 433564 | 128342  | 216843 | 815577 |
| <b>2012</b>               |        |         |        |        |
| Food Share                | 0.599  | 0.129   | 0.157  | 0.925  |
| Alcohol and Tobacco Share | 0.029  | 0.047   | 0      | 0.346  |
| Clothing Share            | 0.056  | 0.046   | 0.001  | 0.396  |
| Utilities Share           | 0.186  | 0.069   | 0.031  | 0.511  |
| Household Items Share     | 0.056  | 0.039   | 0.002  | 0.343  |
| Transportation Share      | 0.034  | 0.058   | 0      | 0.429  |
| Entertainment Share       | 0.005  | 0.014   | 0      | 0.147  |
| Other Goods Share         | 0.035  | 0.031   | 0      | 0.197  |
| Total Expenditure         | 438809 | 126161  | 217528 | 815583 |

# APPENDIX

## ESTIMATED COEFFICIENTS

[Results \(I\) \(Estimates\)](#); [Results \(II\) \(Estimates\)](#)

|                          | 1. Food an...        | 2. Alcohol...         | 3.Clothing            | 4. Utilities          | 5.House<br>It...      | 6. Transpo...         | 7. Entertai...        | 8. Other<br>it...     |
|--------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Constant                 | 0.339***<br>(0.055)  | -0.016***<br>(0.002)  | -0.041**<br>(0.018)   | 0.082**<br>(0.019)    | -0.259***<br>(0.012)  | -0.346***<br>(0.017)  | -0.317***<br>(0.012)  | -0.003**<br>(0.001)   |
| <b>PRICES</b>            |                      |                       |                       |                       |                       |                       |                       |                       |
| lnp1                     | -0.449***<br>(0.004) |                       |                       |                       |                       |                       |                       |                       |
| lnp2                     | 0.084***<br>(0.001)  | -0.0112***<br>(0.005) |                       |                       |                       |                       |                       |                       |
| lnp3                     | 0.045***<br>(0.001)  | 0.0145***<br>(0.002)  | -0.0672***<br>(0.002) |                       |                       |                       |                       |                       |
| lnp4                     | 0.087***<br>(0.001)  | 0.0172***<br>(0.002)  | 0.082***<br>(0.001)   | -0.0797***<br>(0.003) |                       |                       |                       |                       |
| lnp5                     | 0.057***<br>(0.001)  | 0.0178***<br>(0.002)  | 0.097***<br>(0.002)   | 0.0106***<br>(0.001)  | -0.0797***<br>(0.001) |                       |                       |                       |
| lnp6                     | 0.061***<br>(0.001)  | 0.0186***<br>(0.003)  | 0.0100***<br>(0.002)  | 0.0126***<br>(0.002)  | 0.0123***<br>(0.001)  | -0.0082***<br>(0.003) |                       |                       |
| lnp7                     | 0.055***<br>(0.001)  | 0.0202***<br>(0.002)  | 0.0111***<br>(0.002)  | 0.0119***<br>(0.002)  | 0.0135***<br>(0.001)  | 0.0142***<br>(0.001)  | -0.0088***<br>(0.002) |                       |
| lnp8                     | 0.059***<br>(0.001)  | 0.0194***<br>(0.002)  | 0.0107***<br>(0.002)  | 0.0117***<br>(0.001)  | 0.0128***<br>(0.001)  | 0.0136***<br>(0.001)  | 0.0152***<br>(0.002)  | -0.0086***<br>(0.002) |
| <b>INCOME</b>            |                      |                       |                       |                       |                       |                       |                       |                       |
| lnm                      | -0.038***<br>(0.011) | 0.002<br>(0.004)      | 0.015**<br>(0.003)    | -0.008*<br>(0.004)    | 0.006**<br>(0.002)    | 0.001<br>(0.004)      | 0.007**<br>(0.003)    | 0.006**<br>(0.002)    |
| lnm2                     | 0.004***<br>(0.001)  | 0.007<br>(0.000)      | 0.004***<br>(0.001)   | -0.003**<br>(0.000)   | 0.004***<br>(0.000)   | 0.001<br>(0.000)      | 0.005**<br>(0.000)    | 0.004***<br>(0.000)   |
| <b>DEMOGRAPHIC<br/>S</b> |                      |                       |                       |                       |                       |                       |                       |                       |
| Yes                      | Yes                  | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   |
| N                        | 8714                 |                       |                       |                       |                       |                       |                       |                       |
| Average R2               | 0.87                 |                       |                       |                       |                       |                       |                       |                       |
| Alpha 0=                 | 14.5                 |                       |                       |                       |                       |                       |                       |                       |
| Symmetry Test            | Chi2( 21) = 29.54    |                       |                       |                       | Prob > chi2 = 0.2016  |                       |                       |                       |