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EVALUATING THE PERFORMANCE OF LAIDS USING DIFFERENT PRICE INDICES AND MICRO DATA

By

Stathis Klonaris and *Giannis Karagiannis*
Agricultural University of Athens and University of Ioannina, Greece

Abstract

The main objective of this paper is to evaluate the performance of the linear AIDS using different price indices and micro-data. The comparison is undertaken in terms of expenditure and price elasticities and the two-stage Heckman model is employed for the estimation of the relevant elasticities. All elasticities are adjusted to account the changes of the inverse Mills ratio. Comparing the overall performance of different linear AIDS approximations with the non-linear AIDS is seems that the one relying on corrected Stone price index performs better than the other approximations at least for the particular data set concerning Greek household food consumption (JEL Classification: C34, C43, D12).

Key Words: AIDS model, micro data, Heckman's two-stage approach, Food consumption in Greece.

1. Introduction

Since the early 1980s, the Almost Ideal Demand System (AIDS) is the most widely used demand system for both micro (i.e., household) and macro (i.e., aggregate) applied studies. A great part of AIDS popularity is due to its linear counterpart that can relatively easy be estimated econometrically. Specifically, Deaton and Muellbauer (1980) have shown that the AIDS could be transformed to a linear - in - parameters system of equations by approximating the expenditure deflator with the standard Stone price index. Otherwise the AIDS is non-linear in estimated parameters and rather complicated to be estimated econometrically.

During the last decade, several attempts have been made to provide more insights for the relationship between the non-linear and the linear AIDS (LAIDS). Two rather distinct lines of research have dealt with (i) how well the LAIDS approximates the true non-linear specification and (ii)

$$S_{ih}=\alpha_i + \sum_j \gamma_{ij} ln p_{jh} + \beta_i (ln m_h - ln P_h) \quad (1)$$

$$lnP_h = \alpha_o + \sum_{i=1}^{n} \alpha_i lnp_{ih} + \frac{1}{2}\sum_{j=1}^{n}\sum_{i=1}^{n} \gamma_{ji} lnp_{jh} lnp_{ih} \quad (2)$$

The adding-up restriction requires $\sum_{i=1}^{n} a_i=1$, $\sum_{i=1}^{n} \gamma_{ij}=0$, and $\sum_{i=1}^{n} \beta_i=0$. By imposing $\sum_{i=1}^{n} \gamma_{ij} = 0$ (i=1,...n) the homogeneity condition is met, and requiring $\gamma_{ij}=\gamma_{ji}$ for all i, j ($i \neq j$) insures symmetry.

$$ln P_h^* = \sum_{i=1}^{n} s_{ih} lnp_{ih} \quad (3)$$

$$ln P_h^s = \sum_{i=1}^{n} s_{ih} ln(p_{ih}/p^0{}_i) \quad (4)$$

$$ln P_h^T = \frac{1}{2}\sum_{i=1}^{n} (S_{ih} + s_i^0)\, ln(p_{ih} / p_i^0) \quad (5)$$

$$log\, P^D = \sum_{i=1}^{n} [\frac{1}{6} s(p_h, m_h) + \frac{2}{3} s(p_{h,0}, m_{h,o}) + \frac{1}{6} (p_0, m_0)] log(p_h / p_0) \qquad (6)$$

Type of Resident	
R_1	Urban
R_2	Semi-urban
R_3	Rural
Season	
S_1	Fall
S_2	Winter
S_3	Spring
S_4	Summer
Regional Development Services	
RDS_1	Evrou, Komotinis, Rodopis, Dramas, Kavalas
RDS_2	Thessalonikis, Central Macedonia
RDS_3	West Macedonia
RDS_4	Epiros
RDS_5	Region of Thessaly
RDS_6	Zakinthos, Cefalonia, Lefkada and Corfou
RDS_7	Etoloakarnania, Ahaia and Ilia
RDS_8	Biotia, Evia, Evritania, Fokida and Fthiotida
RDS_9	Greater Athens and perfecture of Attica
RDS_{10}	Peloponissos
RDS_{11}	Lesbos, Samos and Chios
RDS_{12}	Cyclades and Dodekanisa
RDS_{13}	Crete
Head's Possition at the Work	
PO_1	Unemployed, Housekeeper, Pensioner and Student
PO_2	Wage earner
PO_3	Self-Employed
PO_4	Employer
PO_5	Trainee, or assistant in family business
Head's Education Level	
ED_1	Elementary Education
ED_2	Secondary Education: High School
ED_3	Higher Education: University
Family Composition	
FC1	Single Household
FC2	Couple
FC3	Couple with 1 till 3 children up to 16 years old
FC4	One parent with 1 till 3 children up to 16 years old
FC5	Other household composition
Head's Sex	
M	Sex of Head Male
F	Sex of Head Female
Other Variables	
HS	Household's size
IN	Household monthly income
AGE	Household Head's Age

$$rp_{ih}=a_i + \sum_{r=1}^{12} c_r RDS_r + \sum_{n=1}^{3} d_n S_n + e_{ih}$$

$$s_{ih} = a_{ih} + \sum_{j} \gamma_{ij} lnp_{jh} + \beta_i (lnm_h - lnP_h) + \delta_i IMR_{ih} \quad (7)$$

$$a_i = p_{i0} + \sum_{k=1}^{s} p_{ij} d_j \quad \text{i=1, ...n} \qquad (8)$$

$$s_{ih} = p_{i0} + \sum_{k=1}^{s} p_{ij} d_i + \sum_{j}^{n} \gamma_{ij} \ln p_{jh} + \beta_i \ln(m_h/P^*_h) + \delta_i IMR_{ih} \quad (9)$$

$$\sum_{i=1}^{n} p_{io} = 1, \sum_{i=1}^{n} \gamma_{ij} = 0, \sum_{i=1}^{n} \beta_i = 0 \text{ and } \sum_{i=1}^{n} p_{ij} = 0 \quad (10)$$

$$\sum_{j=1}^{n} \gamma_{ij} = 0 \text{ and } \gamma_{ij} = \gamma_{ji} \text{ for all } i,j \ (i \neq j) \quad (11)$$

$$s_{ih} = p_{io} + \sum_{k=1}^{s} p_{ij} d_{ih} + \sum_{j}^{n} \gamma_{ij} \ln p_{jh} + \beta_i \ln (m_h/P^*_h) - \sum_{j=1}^{n-1} \delta_j IMR_{jh} \quad (12)$$

$$e_{ij}=-\delta_{ij}+\gamma_{ij}/s_i - \frac{\beta_i \alpha_j}{s_i} - \frac{\beta_i}{s_i}\sum_k \gamma_{kj} lnp_k$$

$$E_i=1+\beta_i/S_i \tag{13}$$

$$e_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{s_i} - \frac{\beta_i}{s_i} - \{s_j + \sum_k s_k 1n P_k (e_{kj}+\delta_{kj})\}$$

$$E_i=1+\beta_i/s_i \tag{14}$$

$$M\hat{E}_j^A = \frac{\partial E[s_i | z_i=1]}{\partial \gamma_{ij}}|_{sample-mean} = \hat{\gamma}_{ij} - \hat{\delta}_j \hat{g}_{ij} \{\sum_{j=1}^{n} 1n\overline{p}_i \hat{\gamma}_{ij} I\overline{\hat{M}}R_j^A + (I\overline{\hat{M}}R_j^A)^2\} \tag{15}$$

and

$$M\hat{E}_j^B = \frac{\partial E[s_i | z_i=0]}{\partial \gamma_{ij}}|_{sample-mean} = \hat{\gamma}_{ij} - \hat{\delta}_j \hat{g}_{ij} \{\sum_{j=1}^{n} 1n\overline{p}_i \hat{\gamma}_{ij} I\overline{\hat{M}}R_j^B + (I\overline{\hat{M}}R_j^B)^2\} \tag{16}$$

$$M\hat{E}_j = \theta_i M\hat{E}_j^A + (1-\theta_i) M\hat{E}_j^B \tag{17}$$

	NL	STONE	CORRECTED STONE	TORNQVIST	EXACT
Bread & Cereals	-0.825	-0.847	-0.827	-0.810	-0.816
Meat	-0.760	-0.645	-0.781	-0.756	-0.754
Fish	-0.420	-0.360	-0.374	-0.365	-0.367
Oils & Fats	-0.451	-0.534	-0.466	-0.527	-0.529
Dairy Products	-0.988	-0.983	-0.978	-0.980	-0.979
Fruits & Vegetables	-1.039	-0.888	-0.951	-0.952	-0.950
Sugar & Confectionery	-0.863	-0.939	-0.865	-0.864	-0.863
Coffee, Tea etc.	-0.742	-0.744	-0.742	-0.738	-0.736
Other Foods	-0.643	-0.047	-0.721	-0.010	-0.011

	NL	STONE	CORRE-CTED STONE	TORN-QVIST	EXACT
Bread & Cereals	0.498	0.678	0.515	0.503	0.501
Meat	1.381	1.065	1.388	1.367	1.371
Fish	1.463	1.101	1.264	1.260	1.271
Oils & Fats	1.344	1.358	1.282	1.318	1.322
Dairy Products	0.895	0.896	0.844	0.872	0.862
Fruits & Vegetables	0.896	0.595	0.917	0.917	0.913
Sugar & Confectionery	0.964	1.274	0.977	0.972	0.968
Coffee, Tea etc	0.840	0.857	0.757	0.773	0.845
Other Foods	0.095	-0.312	0.026	0.002	0.013

	NL	STONE	CORRE-CTED STONE	TORN-QVIST	EXACT
Bread & Cereals	-0.750	-0.744	-0.749	-0.734	-0.741
Meat	-0.406	-0.371	-0.425	-0.405	-0.402
Fish	-0.315	-0.281	-0.283	-0.274	-0.276
Oils & Fats	-0.361	-0.444	-0.380	-0.439	-0.441
Dairy Products	-0.822	-0.817	-0.822	-0.818	-0.819
Fruits & Vegetables	-1.031	-0.882	-0.942	-0.943	-0.941
Sugar & Confectionery	-0.652	-0.659	-0.650	-0.650	-0.651
Coffee, Tea etc	-0.726	-0.728	-0.728	-0.723	-0.720
Other Foods	-0.663	-0.054	-0.720	-0.010	-0.011

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