FP7 Sustainmed Project

Workshop on WP5 and WP4

6th and 7th December 2011, Napoli (Italy)

In memory of Antonio Cioffi

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Empirical presentation on:

"Utilization of the household budget surveys in food security":

- Impacts of Price Policies on Food Demand,
- Estimation Poverty in Rural Versus Urban,
- Consumer's Behaviour

The income-consumption relation and consumer behavior Between:

- Per capita consumption of each commodity [Qi] and
- total annual per capita expenditure [Y].
- to determine the nature of response in nearly accurate state as either:
  - inferior, necessary, semi-superior, and superior goods
- Three proposed models should be tested among the following forms:
  - logarithmic,
  - double logarithmic,
  - double logarithmic inverse function
- The effects of induced "heteroskadastaticity" should be eliminated by using a weighted regression procedure
- The choice of the best fitted model depends upon:
  - The closeness of fit (coefficient of determination R2),
  - Economic logic,
  - Statistical inferences

A Case Study of Animal Products

Results of Engel's curve estimated function are:

Estimated Engel's Curve Function of Animal Protein Products

Product	Estimated Model's equation	R^2	Average Elasticity
Red Meat (Fresh)	$(Q') = 0.0420\ Y^{0.7651}$ (0.0219)	0.9902	0.765
Red Meat (Frozen)	$Ln(Q') = 1.5362 - 0.6533\ Ln\ Y$ (0.2451) $-(659.3138)/Y$ (146.2121)	0.9902	0.160
Poultry Meat	$(Q') = 0.0039\ Y^{1.1257}$ (0.0734)	0.9514	1.125
Fresh Fish	$(Q') = 0.0013Y^{1.2053}$ (0.0616)	0.9696	1.205
Fish (Preserved)	$Ln(Q') = 0.0455 + 0.1078\ Ln\ Y$ (0.0405) $-(538.5386)/Y$ (58.8735)	0.8853	0.560
Cheese (White)	$(Q') = 0.0005\ Y^{1.1877}$ (0.0622)	0.9681	1.187
Cheese (Karish)	$(Q') = 0.6818\ Y^{0.2146}$ (0.0493)	0.6120	0.214
Milk (Liquid)	$(Q') = 0.0016\ Y^{1.2940}$ (0.0763)	0.9599	1.294
Eggs	$(Q') = 109.8822 + 25.1465\ Ln\ Y$ (1.3872)	0.9648	0.090

Values between parentheses, below the estimates, are the standard error of the corresponding estimate.

:st-fitted form of Engel's curve for fresh meat was the double log function:

A constant statistically significant elasticity of 0.765 :

double logarithmic inverse equation form was the best fitted relationship for frozen meat:

21% of the population (The poorest group) considers frozen meat as a superior good

The consumer response passes through three stages: superior, necessary, and inferior good

15. %t of the population considers frozen meat a substitute for fresh red meat

40% of the population considers frozen meat as a necessary commodity

The highest one-fourth of the population considers frozen meat an inferior good.

The best-fitted model for poultry was the double log with a constant elasticity of 1.125

Then economic growth will greatly benefit the poultry industry more than other animal products.

The best fitting model for Table- eggs was the logarithmic function

It shows a decreasing rate of response with respect to income:

*At 10% increase in income :*1% of the population considers table-eggs as superior goods.
21 % of the population increases consumption of eggs at 6-7%.
The rest of the population increases consumption by 2-4 %

The best-fitted model for fresh fish was the double log with a constant elasticity of 1.2

Therefore, with significant economic growth, its market size is very promising

The best-fitted model for frozen and preserved canned fish was logarithmic Function

36 percent of the population (the poorest class considers it s a substitute of fresh fish

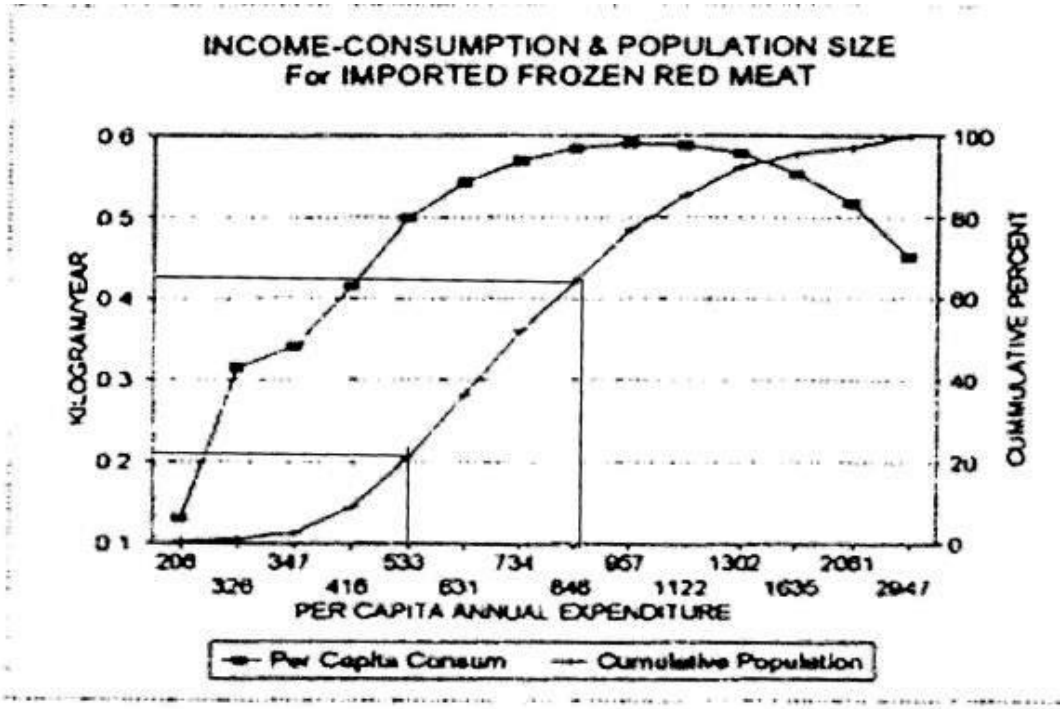
The rest of the population has continuous decreasing income response.(elasticity)

Estimates of the Expenditure Elasticity for the Variable Elasticity Commodities

Household Expenditure	Cumulative Population	Frozen Red Meat	Frozen & Canned Fish	Table-Eggs
<1000	0.69	25.84	21.78	1.08
<1200	1.09	3.49	6.88	0.72
<1600	2.47	2.76	3.61	0.71
<2400	8.88	1.98	1.09	0.65
<3200	21.04	1.08	1.31	0.56
<4000	36.5	0.73	1.00	0.48
<4800	52.14	0.40	0.70	0.42
<5600	64.39	0.28	0.50	040
<6800	77.12	0.06	0.46	0.39
<8000	85.59	-0.16	0.30	0.36
<10000	92.51	-0.23	0.27	0.33
<12000	95.72	-0.62	0.21	0.32
<14000	97.25	-0.58	0.20	0.30
14000+	2.75	-0.70	0.09	0.21
Average		0.16	0.56	0.09

The Figures show two curves;

- the first presents the predicted average per capita consumption of each commodity at the comparable per capita total annual expenditure
- the second curve measures the cumulative population (percent) along expenditure levels.
- it is possible to simulate the proportion of population that consume a certain level of a commodity at a given income limit.


INCOME-CONSUMPTION & POPULATION SIZE
For IMPORTED FROZEN RED MEAT
KILOGRAM/YEAR
0.6
0.5
0.4
0.3
0.2
0.1
CUMMULATIVE PERCENT
100
80
60
40
20
0
208
326
347
416
533
631
734
848
957
1122
1302
1635
2061
2947
PER CAPITA ANNUAL EXPENDITURE
Per Capita Consum
Cumulative Population

The demand for quality

It is the difference between the two Elasticity coefficients of the following per capita consumption functions:

- Income - expenditure on commodity (i): $\acute{\varepsilon}_{yvi}$
- Income - quantity consumed of commodity: (i) $\therefore \acute{\varepsilon}_{yQi}$
- Demand Elasticity for Quality = $\acute{\varepsilon}_{yvi} - \acute{\varepsilon}_{yQi}$

A case study of Red meat as commodity with several grades and types

The double logarithm function was the best-fitted model

The income elasticity of the demand for quality was 0.114 for urban and 0.0036 for rural.

10% increase in income increases the demand for red meat quality by I% in urban and nil in rural

The demand for:

Grading, packaging, storage, processing, product research and promotion are very limited

The Egyptian consumer is looking for quantity at lower price, regardless of the marketing functions.

The questions that may arise:

Is this due to the low-income level or the consumer attitude due to lack of awareness?

difference between rural and urban consumption due to income OR the regional differential?

quires an Income-Consumption Function with a A dummy variable reflects the regional effect,

ıe region, as a socially and demographically distinct community, has two effects
An independent effect on the Consumption of a commodity
An interaction Effect with income
A covariance mode's application is needed to identify the model

. Impacts of Income and Region on Animal Protein Products Consumption

Animal product	Variable	Estimate	Standard Error	t-Ratio	Adjusted R^2	F-Ratio
Red Meat	Intercept	-2.1655	0.3496	-6.1947*	0.9791	422.3
	Ln(Y)	0.6461	0.04712	13.710*		
	1/Y	-61.8766	23.6756	-2.6135*		
	R	-0.0391	00316	-1.235 (ns)		
Poultry	Intercept	-1.8925	0.5167	-3.6626*	0.9817	484.6
	Ln(Y)	0.6672	0.0696	9.5788*		
	1/Y	-295.362	34.9953	8.4400*		
	R	-0.18525	0.0467	-3.9644*		
Eggs	Intercept	-86.1736	14.0975	6.1127*	0.8456	74.94
	Ln(Y)	20.6027	2.1674	9.5056*		
	1/Y	-	-	-		
	R	13.0234	3.050	4.2697*		
Milk	Intercept	-3.6200	0.9423	-3.8417*	0.9580	206.5
	Ln(Y)	0.9354	0.1270	7.3637*		
	1/Y	-252.452	63.8204	-3.9557*		
	R	0.0312	0.0852	0.3657 (ns)		
Fish	Intercept	-4.6694	0.2543	-18.3606	0.9435	210.7
	Ln(Y)	0.9616	0.1056	9.1037		
	1/Y	-109.3130	-109.313	-2.0598		
	R	0.102763	0.1027	1.4502 (ns)		

(*) = Statistically significant at P<5%;. (ns) = not statistically significant.

The region had shown an independent effect on the Consumption of poultry and table-eggs,
The urban community tended to decrease poultry meat consumption below that of the rural.
The urban consumer tended to expand consumption of table eggs above the rural level.
The regional effect was indifferent with respect to red meat, fish and liquid milk.

al Protein Foods and the Poor

Even though animal products are generally, considered "superior goods" in the Egyptian market some imported animal protein food items are "inferior goods",
Imported frozen red meat is of low price,
it is a substitute for fresh locally produced red meat for 75% of the population.
Imported frozen fish is a substitute for fresh meat for 36% of the population
Increasing imports of frozen red meat and fish would fulfill the gap in animal protein of the poor.
Several previous studies have shown that:

- Egypt has not comparative advantage in red meat production,
- Egypt has a comparative advantage in production of poultry and fish
- Both sectors could play a role in partial fulfillment of the increasing gap in animal protein
- Rural consumers can benefit more from poultry meat development than urban consumers
- The converse is true in the case of eggs
- Low demand for red meat quality requires further research
    - Lack of awareness
    - Effect of low income
    - Role of government in subsidizing marketing functions for quality

Standard of Living of Rural Versus Urban Community in Egypt

Average Food Price Level and Food Price Inflation Rate

Region	Urban			Rural			Rural/Urban Parity Food Price
Year	Average Value/ Kg of Food Consumed	Food Prices Index%	Annual Food Prices Inflation rate%	Average Value/ Kg of Food Consumed	Food Prices Inflation Index%	Annual Food Prices Inflation rate between each two successive periods %	
1975	0.14	100%	-	0.12	100%	-	86%
1990	1.55	1107%	16.0%	1.39	1158%	16.3%	90%
1995	1.74	1243%	2.3%	1.25	1042%	-2.1%	72%
2000	2.73	1950%	9.0%	1.43	1192%	2.7%	52%
2005	2.97	2121%	2.1%	2.29	1908%	9.4%	77%
2009	3.40	2431%	3.4%	3.13	2606%	7.8%	92%

Income Level and Growth Rate

Year	Annual Per Capita Expenditure	Annual growth rate between each two successive periods (%)	Real Annual Per Capita Expenditure	Economic Growth Rate (%)	Annual Per Capita Expenditure	Annual growth rate between the two successive periods (%)	Real Annual Per Capita Expenditure	Annual Economic Growth Rate between the two successive periods (%)
1975	103	-	103	-	63	-	63	
1990	1058	-	96	-0.50%	703	16.1%	61	-0.25%
1995	1793	15.5%	144	8.23%	1038	7.8%	100	9.90%
2000	2653	10.6%	136	-1.17%	1455	6.8%	122	4.06%
2005	2769	7.8%	131	-0.28%	2328	9.4%	122	-0.01%
2009	4843	0.9%	199	8.45%	2924	4.6%	112	-1.68%

ive demand Projection

- $r_{di} = r_h + r_{ci}$
- $r_{ci} = \acute{\varepsilon}_{yQi} \times r_y$
- where:
  - r_{di} = Annual growth rate of the Effective demand for Commodity i
  - r_{di} = Annual population Growth Rate
  - r_{ci} = annual per capita annual consumption of the commodity i
  - $\acute{\varepsilon}_{yQi}$ = income elasticity coefficient of commodity i
  - r_y = Annual Economic growth Rate
- **Market Segmentation**
  - If the best fitted form of the consumption function was not double log
  - If the dummy variable of the region was significant
  - Thereof: Estimate the effective demand for each segment, then sum up
- Food Gap projection
- $r_{fgi} = r_{di} - r_{fpi}$
- where:
  - r_{fgi} = Annual growth rate of food gap in Commodity i
  - r_{di} = Annual growth rate of the Effective demand for Commodity i
  - $r_{fgi} = r_{fpi}$ = Annual growth rate of the production of commodity i
- Production growth could follow alternative (optional) Scenarios