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in the Mediterranean Partner Countries**

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Food demand for quality in Egypt

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INTRODUCTORY BACKGROUND

Since, early of nineties of the last century, Egypt has adopted the free price mechanism in the Egyptian markets. Such strategy implied to leave basic marketing functions to the private sector and identified the role of Government in providing a better environment for investment; accelerate development, and ensuring price stability and achieving the development of exports. Such dramatic changes implied, to develop the domestic market through restructuring the institutional and organizational framework of the market and empowerment surveillance of food commodities specifications. and creating an environment of fair competition, the prevention of commercial fraud It also implies dumping and monopoly, enhancing the effectiveness of the consumer protection, and supporting the efforts of non-governmental organizations and cooperatives in this regard Consequently to ensure marketing efficiency and tuning up the market performance, the Government has to rule up three functions for marketing acceleration. These are (1) To surveillance of the food quality, (2) To provide equitable competitive environment, and (3) The provision of market information.

The surveillance of food quality is the most important function of Government because it provides incentives towards market growth and development. The food quality is the resultant of certain specifications and standards, which are a package of the food safety and food grades. The safety is a combination of the health and environmental standards. The commercial food grades suppose to reflect the consumer's preference. It is the technical commercial specifications. The *health specifications* should be available in all types of food commodities in the market, in spite of their prices. They should keep pace with the evolution of the global scientific research published in the reports of the World Health Organization (WHO) and the Office of epidemics in Paris. Thereof, the development of scientific discoveries in the field of health should be the guide for these specifications, whether the food commodities are marketed in the domestic market or for export. The *environmental standards* imply the proper environmental management of production and marketing of the product from the producer until it reaches the consumer. It has been imposed by the global trade system and agreements in the recent years, despite the objection of developing countries that they cannot be implemented in their markets for the lack of funding required to establish those ecosystems. However, the lack of such environmental standards in the food commodities of the developing countries would limit in the forthcoming years, the exports of these countries and hit a deep depression spread. However, the surveillance of *the commercial grades* would be on the coincidence between the price levels and the grades of a certain food commodity, on one hand and between the package and the contents of each grade on the other hand. It should be mentioned that even though grading as a marketing function my raise the marketing costs but it minimizes loss and accelerate the market development. Therefore, the products food research is highly important for food commodities, particularly the perceivable ones.

Application of the quality control add much burdens of additional costs and investments on the national economy due to three types of costs associated with achieving health, environmental and commercial standards in food commodities, particularly, the perishable food commodities (animal products, fruits and vegetables). These three types of costs are:

- (a) *The direct costs of technical and administrative staff* including the costs of expansion of technical personnel administrative employment and mandated tasks of regulatory activities at the central, provincial and local government level,
- (b) *The additional costs of market regulation*, including regulatory and supervisory procedures required for the quality and safety of the product and the component of labeling and packaging, weights and additional costs required for the marketing, facilities,
- (c) *The cost of grading the marketed products* generates additional burden of costs. For example, grading of perishable food commodity output before being delivered to the processing stage implies minimization of waste, as lower quality portion is allocated for canned and frozen products, while the first grades are marketed for fresh consumption at high prices, The non-edible and byproducts of such commodity have chances to be processed for further usage. Even though. Grading as including input-output economic processes carries additional costs to the marketing margins of such commodity and thereof most probably raises the consumer price.

From all above, a question is raised. Who does bear the burden of these costs? Such burden depends upon the relative elasticity of demand versus supply of these commodities. The lower demand elasticity relative to the elasticity of supply carries a greater burden of these additional costs to the consumers, while high elasticity of demand relative to supply means greater burden of these additional costs would be borne by the food producers, processors and distributors.

A second question is derived from the first one. How do we assess the potential demand for both food safety (health and environmental standards), and commercial specifications? This type of assessment requires the estimation and analysis of demand for quantity and quality of a food commodity, especially perishable ones, in the target market. Empirically, the marketing enterprises would try to transfer this additional burden to the consumer.

OBJECTIVES OF THE STUDY

The study adopted the following objective: estimation of the food demand for quality of perishable food commodity groups. The magnitude of the estimated elasticity of demand for food quality would indicate to the incentives the market provides to the market stages, before the end users, to supply food quality, if effectively, applied.

DATA BASE AND ANALYTICAL PROCEDURES

The cross section data of the household budget survey of Egypt in 2009 were used to estimate per capita income-consumption function. The data were derived from a sample size around 50,000

households representing all governorates in Egypt, conducted from July 2008 to the end of June 2009 by the Central Agency for Public Mobilization and Statistics (CAPMAS). It should be noted that the survey included data of quantities consumed of the major food items and non-food expenditure of both urban and rural households. There were economic and demographic factors covered in the survey. For the purpose of this study, we used the data of the income groups for urban and rural to derive the per capita income, the per capita quantity consumed of each concerned food item and the per capita expenditure on such quantity.

The economic concept assumes that the per capita consumption curve (Equation 1) is not linear. In addition, the study concerns the comparison between urban and rural regions. Therefore, the appropriate model that combines both economic concept and easy mathematical derivatives, for the purpose of this study, was the power function or Cobb-Douglas function (Equation 2).

Estimation of Demand for quality requires estimating the Expenditure- Income response, by substitution of per capita quantity consumed for per capita expenditure in L.E as represented by (equation 3). The features of the power function implies that the regression coefficients of (Equation 2) is the income elasticity coefficient of the quantity consumed of commodity i, (ξ_{cy}) and the regression coefficient of (Equation 3) is the income elasticity coefficient of the expenditure on commodity i (ξ_{vy}). Thereof, the elasticity of demand for food quality (ξ_{qy}) is the difference between the expenditure elasticity and quantity elasticity coefficients (Equation 4). in the year of the survey (2009) 1-US\$= 6.02 L. E.

Equation 1 $C_{ij} = f(Y_{ij})$

Equation 2 $C_{ij} = b_0 Y_{ij}^b + \hat{e}_{ij}$

Equation 3 $V_{ij} = b_0 Y_{ij}^b + \hat{e}_{ij}$

Equation 4 $\xi_{vy} - \xi_{cy} = \xi_{qy}$

Where:

C_{ij} = Annual per capita consumption of commodity i in Region j in Kg.

Y_{ij} = Annual per capita income of commodity i in Region j in (L.E.)

V_{ij} = Annual per capita Expenditure on commodity i in Region j in L.E.

\hat{e}_{ij} = Residual Variable

ξ_{cy} Estimated income elasticity of the quantity consumed of food commodity i

ξ_{vy} = Estimated income elasticity of expenditure on food commodity i

ξ_{qy} = Estimated income elasticity of food quality of commodity i

To reflect the regional impact (Urban versus Rural) on food demand, an additional model was estimated that included a structural variable (dummy variable) for the region effect. It was an analysis of covariance model (ANCOVA) which measures the effect of a quantitative variable (income) as well as a qualitative (dummy variable) that measures the regional effect and an interaction effect of both

variables. (Equation 5) represents the covariance model

$$\text{(Equation 5) } Y_i = B_0 + \sum B_j X_{ij} + \sum B_{k(ij)} + \varepsilon_i$$

Where:

y_i is the value observed for the dependent variable for observation i ,

X_{ij} is the value taken by quantitative variable j for observation i ,

$k(ij)$ is the index of the category of factor j for observation i , and

ε_i is the error of the model at observation i

The interaction variable has a main application, which is testing if the level of a qualitative variable has an influence on the slope of the quantitative variable. (Equation 6) illustrates a model with one quantitative variable and a factor (dummy variable) with the interaction between both

$$\text{(Equation 6) } Y_i = B_0 + B_i X_{i1} + \sum B_{k(i)1} + B_{k(i)2} X_{i1} + \varepsilon_i$$

The analysis of the ANCOVA model starts with testing if the region (the dummy variable) has an effect on the slope of the quantitative variable (income). If not, then the impact of the region's effect on the intercept is tested.

RESULTS & DISCUSSION

The concerned food commodities were the major perishable ones of the Egyptian food basket. These are red meat, fresh fish, white cheese and liquid milk among animal products and tomatoes, orange among fruits and vegetables. The ANCOV model estimates not only the impact of income on food commodities consumption, but it also applied to estimate both the interaction of the income with the demographic region and the independent effect of the demographic region (Rural versus Urban) on the consumption.

All estimated food consumption functions for concerned commodities have shown insignificant interaction effect of income with the demographic region, i.e. the local community has not direct effect on income allocation among concerned food commodities. Therefrom, the response of the annual per capita consumption to the annual per capita income is, entirely, independent from the local community as shown in (Table 1) up to (Table 12)

On the other hand, there is an independent significant effect of the demographic region on the per capita consumption of dairy products (white cheese and liquid milk) and fresh tomatoes at significance level less than 1%. The region was also significant on per capita consumption of orange consumption, at acceptable significance level Prop.($< 6\%$) for such cross section field sample survey data. Such results implied that the per capita consumption of dairy products, tomatoes and oranges was significant less in the rural region than the urban. As shown from (Table 5) the rural per capita consumption of white cheese was 0.466 kg less than the urban per year, while (Table 7) shows that the rural per capita consumption of liquid milk was 0.241 kg less per year than urban.

With respect to tomatoes, the per capita consumption of tomatoes was less than urban by 0.262kg per year, (Table 9). The per capita consumption of orange in rural region was less than the corresponding level in urban by 0.157 kg per year.

The rural region showed the same effect on the value of the annual expenditure of the same set of commodities, regardless the per capita income level. Therefore, the rural consumers spend less than the urban consumers do on dairy products, tomatoes and oranges. (Table 13) provides evidences that the less per capita expenditure on those commodities in rural region were not only due to less quantity consumption but it was also due to lower price in the rural market than in the urban market. The estimated weighted annual average of per capita consumption, as shown in Table 13, confirmed that the rural household consumes less than urban with respect to white cheese, liquid milk, orange and tomatoes at lower prices than the urban households do.

The rural household earns almost two-thirds of urban annual per capita income, (Table 13). The lower price of food commodities in rural market could be a resultant of less purchasing power in rural than urban, and it could be also due to high proportion of home produced quantity share in rural food consumption relative to urban. A third reason that might be considered was the less marketing costs of these perishable food commodities in rural than urban regions because these commodities are usually sold in rural markets without grading, modern packing, processing and/or retailing services.

Estimation of the demand elasticity coefficients for quality of the perishable food commodities were derived, using (Equation 4) and were presented in (Table 14). In general, such derived elasticity coefficients were of low value for all concerned commodities. The maximum value of the demand elasticity for food quality was that of fresh fish and white cheese with values 0.149 and 0.146, respectively.

Liquid milk, orange and tomatoes represent the second category of demand for food quality among perishable food commodities with elasticity for income about 0.09, while fresh red meat shows the least elastic demand for food quality, i.e. around 0.04.

CONCLUSION & RECOMMENDATION

, The additional costs associated with Implementation of the food quality specifications in the Egyptian market hamper the attainment to accessibility of food commodities to the majority of the consumers due to expected high food prices that do not fit with the average low per capita income. As sufficient income, level and developed marketing system lasts long time to achieve such objective

Accordingly, to secure food commodities enjoying satisfactory quality standards, some direct and indirect support and subsidy should be provided to the marketing firms to help them to apply the quality control system. Such support could be in terms of credit facilities to establish equipped quality control units, exempt of the required equipment and tools for quality and safety standards of food from custom duties and providing credit facilities for establishment manufacturing these types equipment in Egypt.

Establishment of an extended program for enlarging the number of required human resources

for quality control, and food market surveillance as the current numbers are not satisfactory to rule an effective surveillance of food health, environmental and commercial specifications.. Such program should be associated with efficient training programs. It is recommended to allocate a significant proportion of the foreign donation and low cost loans that are received from international development agencies to finance such human resource development policies. The technical facilities of the governmental universities and research institutes could provide an effective support to the marketing firms for applying food quality control system. A parallel program for building up a common awareness of consumers towards food safety should be applied among, the urban and rural communities.

Table 1 QUANTITY/INCOME RESPONSE of FRESH READ MEAT

Variable	Estimate	Standard Error	t Stat	P-value	Lower bound (95%)	Upper bound (95%)
Intercept	-1.340	0.305	-4.392	< 0.0001	-1.958	-0.722
Ln(Per Capita Income)	0.409	0.036	11.214	< 0.0001	0.335	0.483

F = 64.098, Adjusted R² = 0.764

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), and Central Agency for public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 2 EXPENDITURE/INCOME RESPONSE: FRESH READ MEAT

Variable	Estimate	Standard Error	t Stat	P-value	Lower bound (95%)	Upper bound (95%)
Intercept	1.866	0.351	5.311	< 0.0001	1.154	2.578
Ln(Per Capita Income)	0.447	0.042	10.629	< 0.0001	0.361	0.532

F = 58.656, Adjusted R² = 0.747

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 3 QUANTITY/INCOME RESPONSE: FRESH FISH

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-2.277	0.641	-3.551	0.001	-3.577	-0.978
LN(Per Capita Income)	0.534	0.077	6.962	< 0.0001	0.378	0.689

F = 24.285, Adjusted R² = 0.568

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 4 EXPENDITURE/INCOME RESPONSE: FRESH FISH

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-1.351	0.648	-2.084	<0.044	-2.664	-0.038
LN(Per Capita Income)	0.683	0.077	8.818	< 0.0001	0.526	0.840

F = 40.175, Adjusted R² = 0.668

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 5 QUANTITY/INCOME RESPONSE: WHITE CHEESE

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-3.067	0.681	-4.504	< 0.0001	-4.446	-1.687
LN(Per Capita Income)	0.493	0.081	6.056	< 0.0001	0.328	0.658
RURAL	-0.466	0.112	-4.139	0.000	-0.693	-0.238

F = 33.116, Adjusted R² = 0.622

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 6 EXPENDITURE/INCOME RESPONSE: WHITE CHEESE

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-1.717	0.581	-2.954	0.005	-2.895	-0.539
LN(Per Capita Income)	0.639	0.069	9.195	< 0.0001	0.498	0.780
RURAL	-0.764	0.096	-7.955	< 0.0001	-0.958	-0.569

F = 91.858, Adjusted R² = 0.823

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 7 QUANTITY/INCOME RESPONSE: LIQID MILK

Variable	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-0.222	0.199	-1.120	0.270	-0.625	0.180
LN(Per Capita Income)	0.377	0.024	15.880	< 0.0001	0.329	0.425
RURAL	-0.241	0.033	-7.332	< 0.0001	-0.307	-0.174

F = 182.959, Adjusted R² = 0.903

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 8 EXPENDITURE/INCOME RESPONSE: LIQUID MILK

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	0.295	0.270	1.094	0.281	-0.252	0.842
LN(Per Capita Income)	0.471	0.032	14.599	< 0.0001	0.406	0.536
RURAL	-0.362	0.045	-8.116	< 0.0001	-0.452	-0.272

F = 169.369, Adjusted R² = 0.896

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 9 QUANTITY/INCOME RESPONSE: TOMATOES

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	2.743	0.282	9.717	< 0.0001	2.171	3.315
LN(Per Capita Income)	0.089	0.034	2.639	0.012	0.021	0.157
RURAL	-0.262	0.047	-5.616	< 0.0001	-0.356	-0.167

F = 23.056, Adjusted R² = 0.531

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 10 EXPENDITURE/INCOME RESPONSE: TOMATOES

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	2.489	0.341	7.296	< 0.0001	1.798	3.181
LN(Per Capita Income)	0.183	0.041	4.481	< 0.0001	0.100	0.265
RURAL	-0.272	0.056	-4.822	< 0.0001	-0.386	-0.158

F = 26.958, Adjusted R² = 0.571

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 11 QUANTITY/INCOME RESPONSE: ORANGE

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-0.232	0.490	-0.475	0.638	-1.225	0.760
LN(Per Capita Income)	0.245	0.059	4.175	0.000	0.126	0.363
RURAL	-0.157	0.081	-1.942	0.060	-0.321	0.007

F = 12.689, Adjusted R² = 0.375

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 12 EXPENDITURE/INCOME RESPONSE: ORANGE

Source	Value	Standard error	t	Prop > t	Lower bound (95%)	Upper bound (95%)
Intercept	-0.141	0.522	-0.271	0.788	-1.198	0.916
LN(Per Capita Income)	0.334	0.062	5.359	< 0.0001	0.208	0.461
RURAL	-0.120	0.086	-1.396	0.171	-0.295	0.054

F = 17.486, Adjusted R² = 0.458

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt, by applying (Equation 5) & (Equation 6)

Table 13 Weighted Average of annual Per Capita Consumption and Price of Perishable Food Commodities

Commodity	RURAL		Urban	
	Weighted Average Kg/Capita Per Year	Price/Kg (L.E.)	Weighted Average Kg/Capita Per Year	Price/Kg (L.E.)
Fresh Red Meat	7.19	32.26	7.37	32.72
Fresh Fish	8.96	15.85	11.01	16.26
White Cheese	1.81	7.17	2.77	20.47
Liquid Milk	12.76	3.15	19.44	3.65
Orange	4.59	2.14	6.47	2.22
Tomatoes	24.94	1.59	32.77	1.60
Per Capita Income (L. E.)	2977		4434	

Source Estimated from Household Budget Survey of Egypt in 2009, Conducted by (CAPMAS), Central Agency for Public Mobilization and Statistics, Nasr City, Cairo, Egypt

Table 14 ESTIMATED ELASTICITY OF INCOME FOOD DEMAND FOR QUALITY IN EGYPT

Commodity	Per Capita Food-Income Elasticity		Food Demand Elasticity for quality= [(2) –(1)]
	Demand for Quantity (1)	Demand for Expenditure (2)	
Fresh Red Meat	0.409	0.447	0.038
Fresh Fish	0.534	0.683	0.149
White Cheese	0.493	0.639	0.146
Liquid Milk	0.377	0.471	0.094
Oranges	0.245	0.334	0.090
Tomatoes	0.089	0.183	0.094

Source: Estimated from (Equation 4) and (Table 1) up to (Table 10)

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