CONSUMER DEMAND FOR MAJOR FOODS IN EGYPT

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Abstract

This study provides information on the structure of the consumer demand for major foods in Egypt. The information is in the form of key parameters for consumer demand systems. The modern theory of consumer behavior is the basis for estimating systems of demand equations. These systems yield estimates of own and cross price elasticities. The Linear Almost Ideal Demand System (LAIDS) model is applied in estimating a system of demand equations for food commodities. A full demand matrix results with a coherent and consistent set of price and expenditure elasticity estimates. Using the estimated own and cross price and expenditure elasticities, food and agricultural policies during the transformation to the market economy can be analyzed. A framework for utilizing the estimated demand parameters in forecasting is also presented.

1. INTRODUCTION

1.1. PRELIMINARY COMMENTS

Consumer demand for food is an important component of the structure within which the agricultural sector must operate. Since the demand for food is, in general, inelastic and production or supply somewhat variable, accurate estimates of demand parameters are important as inputs for the development of national price, stabilization, trade, storage production and other policies (Hassan and Johnson 1976).

Effective analysis of Egyptian agriculture and food policy requires a comprehensive view of the sector. The analysis must take into consideration the interrelationships within the agriculture sector, and in particular on the consumption side of market. For Egypt, this aspect of policy analysis is relevant especially because of the importance of linkages among food consumption, agriculture, and trade policy. The highly sensitive nature of the economy, especially in the transformation to a market system, requires careful and comprehensive approaches to policy. The agriculture and food sectors are important to food security and political stability, and in themselves as major component of the economic system in Egypt.

Modern consumer theory is valuable in indicating plausible assumptions for making estimating of demand parameters in a statistically tractable framework. In particular, the theory offers conditions under which own- and cross-price and income elasticities of demand can be estimated with an economy of parameter and with systematic behavioral interrelations. Although the data bases required for estimating the demand systems are not often complete in Egypt and other nations, the estimates can be made and provide useful policy information.

1.2 OBJECTIVES

The general objective of the study is to provide a set of consistent and current estimates of consumer demand primarily for the food commodities. The specific objectives are:

a. To provide estimates of demand elasticities for major foods,

b. To estimate expenditure elasticities for major foods,

c. To present an estimated full system of demand parameters for major food commodities,

d. To make a general assessment of the policy analysis and projections for food consumption.

1.3 PROCEDURE

The study proceeds in straightforward manner. In section 2 the necessary theoretical basics are presented. The theoretical presentation covers the LAIDS model and the Rotterdam system. Section 3 covers the data and estimation methods used in this study. The food demand system based on the LAIDS model is given in section 4. Own- and cross-price and expenditure elasticities for all the food groups are presented. Estimated parameters for the Rotterdam system are in section 5, and are used to develop a set of food demand system parameters. In section 6, policy analysis implications and capacities for making projections of per capita consumption are reviewed. Concluding observations are presented in section 7.

2. THEORETICAL BASES

2.1 THE LINEAR ALMOST IDEAL DEMAND SYSTEM MODEL (LAIDS)

The AIDS has been widely used in applied studies. Although the AIDS model is intrinsically nonlinear in its parameters, the linear approximation version of AIDS (LAIDS) using the Stone's share weighted price index has been widely applied to simplify the estimation process. Besides its aggregation properties, LAIDS is popular due to availability of this approximate version with linear parameters. This LAIDS model has been widely estimated (Deaton and Muellbauer 1980) and (Moschini and Vissa 1992). Buse's (1994) literature review reveals 23 empirical applications between 1980 and 1991

that used LAIDS specification instead of nonlinear AIDS in applied agricultural economics studies. Recent applications such Moschini (1992), Wahl et al. (1993), Eales and Unnevehl (1993), and Xu (1995) have introduced some variations of LAIDS specification. In short, LAIDS is attractive for its relative ease of estimation, and the ease with which the classical restrictions can be imposed and/or tested.

Let a statistical model $y = f(x, \theta) + \varepsilon$, where x and y are two vectors of variables, θ is a vector of parameters, and ε is the error term. It is said to be nonlinear in parameter if $\partial y/\partial\theta = g(\theta, x)$, which is a function of parameter θ. A linear model is a special case of a nonlinear model when $\partial y/\partial\theta = h(x)$, which is not a function of parameter θ. The AIDS model of Deaton and Muelbauer [1980] is derived from a cost function with an appropriately defined functional form. The AIDS model is defined by

$$w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij}\ \ln(P_j) + \beta_i\ \ln\left(\frac{x}{p}\right) + \mu_i, \qquad (i = 1, ..., n) \qquad (1)$$

with

$$\ln(P) = \alpha_0 + \sum_{j=1}^{n} \alpha_j\ \ln(p) + \frac{1}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} \gamma_{ij}\ \ln(p_i)\ \ln(p_j) \qquad (2)$$

where w_i is the expenditure share of the ith good, p_i is its price, x is total expenditure, α_i, β_i and γ_{ij} are parameters to be estimated, P is the price index as defined in (2), and μ_i is the error term.

Most previous empirical applications have used a linear approximation for ln(P). The resultant AIDS is linear in parameters and the commonly used linear estimation procedures can be applied. The linear approximation is Stone's price index, defined as

$$P = \prod_{i=1}^{n} (p_i)^{w_i} \qquad \Leftrightarrow \qquad \ln(P) = \sum_{i=1}^{n} \ln(p_i). \qquad (3)$$

By substituting P or ln(P) given in (3) in (1), we have

$$w_i = \alpha_i - \sum_{j=1}^{n} \gamma_{ij} \ln(p_j) - \beta_i \sum_{j=1}^{n} w_j \ln(p_j) + \beta_i (x) + \mu_i . \tag{4}$$

With w_j exogenous, estimation (4) is linear in parameters α_i, β_i and γ_{ij}. Thus estimation can be can be used to obtain the parameters.

Using the definition of the uncompensated elasticities of demand elasticity ε_{ij} , it follows that

$$\varepsilon_{ij} = \frac{\partial \ln q_i}{\partial \ln p_i} = -\delta_{ij} + \frac{\partial \ln w_i}{\partial \ln p_j} = -\delta_{ij} + \frac{1}{w_i} \frac{\partial w_i}{\partial \ln p_j} \tag{5}$$

where δ_{ij} is the Kronecker delta with value equal to one when $i = j$ and equal to zero otherwise, we can easily derive the formulae for calculating the elasticities from the linear approximation of AIDS (LAIDS).

$$\varepsilon_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{w_i} - \frac{\beta_i}{w_i} (w_j + \sum_{k=1}^{n} w_k \ln p_k) (1 + \sum_{k=1}^{n} \beta_k lp_k)^{-1} \tag{6}$$

and for the expenditure elasticity,

$$\varepsilon_{ix} = 1 + \frac{\beta_i}{w_i} (1 - \sum_{j=1}^{n} w_j \ln p_j) . \tag{7}$$

For the case of three goods, three matrices can be defined showing the calculation of these elasticities.

$$\underbrace{\begin{pmatrix} \varepsilon_{11} & \varepsilon_{12} & \varepsilon_{13} \\ \varepsilon_{21} & \varepsilon_{22} & \varepsilon_{23} \\ \varepsilon_{31} & \varepsilon_{32} & \varepsilon_{33} \end{pmatrix}}_{E} = \underbrace{\begin{pmatrix} -1+ & (\gamma_{11}-\beta_1 w_1)/w_1 & (\gamma_{12}-\beta_1 w_1)/w_2 & (\gamma_{13}-\beta_1 w_1)/w_3 \\ & (\gamma_{21}-\beta_2 w_2)/w_1 & -1+ (\gamma_{22}-\beta_2 w_2)/w_2 & (\gamma_{23}-\beta_2 w_2)/w_3 \\ & (\gamma_{31}-\beta_3 w_3)/w_1 & (\gamma_{32}-\beta_3 w_3)/w_2 & -1+ (\gamma_{33}-\beta_3 w_3)/w_3 \end{pmatrix}}_{A}$$

$$+ \underbrace{\begin{pmatrix} \beta_1/w_1 \\ \beta_2/w_2 \\ \beta_3/w_3 \end{pmatrix}}_{B} \underbrace{\begin{pmatrix} w_1\ln p_1 & w_2\ln p_2 & w_3\ln p_3 \end{pmatrix}}_{c} \left[\underbrace{\begin{pmatrix} \varepsilon_{11} & \varepsilon_{12} & \varepsilon_{13} \\ \varepsilon_{21} & \varepsilon_{22} & \varepsilon_{32} \\ \varepsilon_{31} & \varepsilon_{32} & \varepsilon_{33} \end{pmatrix}}_{E} + \underbrace{\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}}_{I} \right]$$

$$\left[\underbrace{\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix}}_{N} - \underbrace{\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}}_{i} \right] = \underbrace{\begin{pmatrix} \beta_1/w_1 \\ \beta_2/w_2 \\ \beta_3/w_3 \end{pmatrix}}_{B} - \underbrace{\begin{pmatrix} \beta_1/w_1 \\ \beta_2/w_2 \\ \beta_3/w_3 \end{pmatrix}}_{B} \underbrace{\begin{pmatrix} w_1\ln p_1 & w_2\ln p_2 & w_3\ln p_3 \end{pmatrix}}_{c} \left[\underbrace{\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix}}_{N} - \underbrace{\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}}_{i} \right]$$

From the above matrices it is clear that the uncompensated price elasticities (E) and expenditure elasticities (N) are:

$$E = (I + BC)^{-1}(A + I) - I \tag{8}$$

and

$$N = (I + BC)^{-1}B + i. \tag{9}$$

After estimating the LAIDS model, the price and expenditure elasticities can be calculated from the three constructed matrices, using (8) and (9) (Green and Alston 1990, 1991; Xu 1995).

2.2 THE ROTTERDAM DEMAND SYSTEM

The Theil-Barten approach to estimation of the parameters of demand functions is based on the idea that they can be specified in terms of prices and a measure of real income $\overline{m}$.

This presentation is based on Hassan and Johnson (1976). Logarithmic differentials of demand functions developed using this specification can be written

$$d(\ln q_i) = \sum_j E_{ij} \, d(\ln p_j) + \eta_i \, d(\ln \overline{m}) \qquad (i = 1, ..., n) \qquad (10)$$

where E_{ij} is the cross price elasticity of the ith commodity with respect to the jth price and η_i is the income elasticity of the commodity i. Individual commodity demand function as expressed in (10) are then weighted by the expenditure proportion $w_i = p_i q_i / m$. That is, multiplying both sides of equation (10) by w_i gives the expression

$$w_i d(\ln q_i) = \sum_j \pi_{ij} \, d(\ln p_j) + \mu_i \, d(\ln \overline{m}) \qquad (i = 1, ..., n). \qquad (11)$$

In expression (11), the price coefficient, $\pi_{ij} = \dfrac{p_i q_i}{m} \cdot \dfrac{\partial q_i}{\partial p_i}$, is the cross-price elasticity e_{ij} weighted by the ith expenditure proportion, and the coefficient $\mu_i = p_i \dfrac{\partial q_i}{\partial m}$ is the marginal propensity to spend on the ith commodity. Note that equation (11) is formulated in terms of absolute prices. In what follows, the relative price version of the Rotterdam model is introduced. For this purpose it will be instructive to write the price derivative $\dfrac{\partial q_i}{\partial p_j}$ in the following form,

$$\frac{\partial q_i}{\partial p_j} = \lambda u^{ij} - \frac{\lambda}{\partial \lambda / \partial m} \frac{\partial q_i}{\partial m} \frac{\partial q_i}{\partial m} \qquad (i, j = 1, ..., n)$$

and where λ is the marginal utility of income and u^{ij} is the (i, j)th element of the inverse of the Hessian matrix implied by the second-order conditions of the consumer optimization problem.

The logarithmic change in real income $\overline{m}$ can be expressed as: $d(\ln \overline{m}) = d(\ln m) - \sum_k W_k d(\ln p_k)$. Equation (11) can now written in terms of relative prices,

$$w_i \, d(\ln q_i) = \sum_j b_{ij}[d(\ln p_j) - \sum_k \mu_k d(\ln p_k)]$$

$$+ \mu_i[d(\ln m - \sum_k W_k d(\ln p_k)] \qquad (i = 1, ..., n) \qquad (12)$$

where $b_{ij} = \lambda \, p_i p_j u^{ij} / m$ is the coefficient of the relative price, j. With the share equation specified as in (12), the parameters μ_i and b_{ij} satisfy the conditions

$$\sum_i \mu_i = 1$$

$$b_{ij} = b_{ji}$$

and

$$\sum_j b_{ij} = \phi \mu_i$$

i.e., the Engel aggregation, symmetry, and homogeneity, respectively. The term ϕ is the income flexibility parameter. For the Rotterdam model, the income elasticity is given as

$$\eta_i = \mu_i / w_i . \qquad (13)$$

On the differentiation of equation (12) with respect to p_i and p_j, one has

$$e_{ii} = (b_{ii} - b_{ii} \mu_i - \mu_i w_i) / w_i$$

and

$$e_{ij} = (b_{ij} - b_{ij} \mu_j - w_j \mu_i) / w_i.$$

These expressions can be also written as

$$e_{ii} = \phi\eta_i - \eta_i w_i - (1 + \phi\eta_i) \qquad (14)$$

and

$$e_{ij} = -\eta_i w_j - (1 + \phi\eta_j) \ . \qquad (15)$$

The estimation of expenditure elasticities from time series data is confounded by a number of statistical problems. High correlations between prices and income (= total expenditure) make it difficult to separate the effects of income and price in estimating the associated parameters. To avoid these statistical problems, cross sectional data can be used to estimate the expenditure elasticities. By constructing the full demand matrix using the Rotterdam demand system, estimated expenditure elasticities from the household survey data from 1991 (Fayyad and El-Khishin 1995) have been used. These estimates will replace η_i in Equation (13). At the same time, the restriction of Engel aggregation will remain imposed.

Own price elasticities estimated from the LAIDS models, weighted averages between the rural and urban areas of the expenditure elasticities estimated from the household survey data, and the shares of the commodities from the total expenditure were used in Equation (15) to calculate the income flexibility parameter. The calculated income flexibility parameter -0.4875 is the simple average among all 21 food commodity equations. Then, the own- and cross-price elasticities were reestimated using the average of the expenditure elasticities, shares of commodities from total expenditure, and the calculated income price parameter as explained in equations (14) and (15). This adjustment of the Rotterdam system is one practical way to construct a full matrix demand system in situations with limited data.

3. DATA AND ESTIMATION METHOD

Data necessary to estimate the parameters required for the LAIDS model and for the Rotterdam demand system are retail prices, per capita food consumption, and per capita disposable income. The Rotterdam demand system it is required also requires the income flexibility parameter. Given the available data, various LAIDS submodels for the 21 food commodities were estimated. Each model includes selected commodities. Sugar parameters are estimated in one model with other foods and non food items. In each model, the 21 food commodities are not specifically aggregated into an "other foods." Variable nonfood is defined as all other expenditure for consumer goods and services less the expenditure for the selected 21 food commodities indicated below. Note that "non food" includes food commodities (e.g. sesame and peanuts) not separately specified in the LAIDS.

The specific food groups and food commodities within the food groups used in the empirical analysis are:

CEREALS   MEAT AND POULTRY
Wheat   Red Meat
Corn   Poultry

OTHER STAPLES   FISH
Rice
Beans   DAIRY
Potatoes   Fresh Milk
                                           Other Dairy
VEGETABLES
Onion   EGGS
Tomatoes
Watermelons   OILS
Other Vegetables   Cottonseed Oil
                                           Hydrogenated Oils
FRUIT
Dates   REFINED SUGAR
Citrus
Other Fruit

These commodities account for about 44 percent of total consummation in the period of investigation. The total expenditure for all food commodities is estimated from the latest available household survey data 1990/91 as 49.5 percent of the total expenditure.

The time series used to estimate the LAIDS models is for the period 1981 to 1992, unless otherwise indicated. Price data are from the Statistical Yearbook and unpublished data of the Central Agency for Public Mobilization and Statistic (CAPMS). Price indices are for the base year 1986/87 (1986/87 = 100). Data employed to calculate price indices were collected by CAPMS. The annual price indices used for statistical analysis are simple averages of reported monthly prices and also simple averages between rural and urban areas. Income and population data were taken directly from the Statistical Yearbook.

Quantity data are mainly from balance sheets that adjust production for stocks, exports, imports and disappearance prepared by the Agricultural Economics Research Institute(AERI) / Ministry of Agriculture (MOA). For some commodities and some years, quantity data are calculated from published and unpublished data from the (AERI), Union of Egyptian Industries (UEI), Ministry of Industry (MOI) and from the foreign trade database of CAPMS. All price and quantity data are compared with the database of the Agribusiness, Research and Training Center (ARTC) / Higher Institute for Agricultural Cooperation (HIAC).

To construct the full demand matrix, the Rotterdam demand system requires data on food expenditure shares. The required data for the individual commodities are taken from the 1991 household survey data. The Rotterdam system estimates were adjusted and completed with weighted averages of the estimates for expenditure elasticities between rural and urban areas using the household survey data (Fayyad and El-Khishin 1995) as explained in Section 2.2 .

The LAIDS models were estimated using the Iterated Seemingly Unrelated Regressions (ITSUR). ITSUR ensures consistent and asymptotically efficiently estimates. ITSUR was therefore used to estimate the LAIDS models with correlated random errors when the

share equations are not simultaneous. The parameter estimates in LAIDS are estimated using the ITSUR method available in PROC MODEL in the SAS/ETS package with adding up, homogeneity, and symmetry restrictions imposed (SAS Institute Inc. 1993).

4. RESULTS OF LAIDS MODELS

The estimated elasticities, especially the price elasticities, can only be discussed in general terms, since there are no other similar estimates of price elasticities from time series data for Egypt. In this section, selected estimated expenditure elasticities will be compared with alternatives estimated from the household survey data for 1991. Estimated expenditure elasticities can also be compared with the weighted averages between rural and urban areas. Estimation of own price elasticities from the expenditure elasticities (Ahmed et al. 1989) and (Ibrahim 1988) has been attempted for different demand system specifications. However available estimates are from data compiled while Egypt was a planned economy. Unfortunately, these estimates do not explain recent price liberalization of almost all commodities.

4.1 CEREALS

Annual per capita expenditure for the two cereals commodities - wheat (including wheat and wheat flour) and corn (including millet and maize) - is about 8.4 percent of total expenditure, with wheat accounting for nearly 65 percent of this total. Estimated parameters for cereals are contained in Table 1. Data used in these estimates are for 1981 to 1992. The signs of parameter estimates and their magnitude relative to their standard errors indicate that the demand specification is fairly consistent with the data.

TABLE 1 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR CEREALS : ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)

Commodity	Wheat	Corn	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Wheat	0.04885	-0.00240	-0.05276	0.00631	0.00982	0.927
	(0.00717)[c]	(0.00402)	(0.01339)			
Corn		0.03126	-0.02928	0.00041	-0.00856	0.544
		(0.00612)	(0.00798)			
Other Foods			0.02228	0.05976	0.16939	0.943
		Symmetric	(0.02962)			
Nonfood				-0.06648	-0.17064	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 2 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR CEREALS

Commodity and Estimation Method		Wheat	Corn	Non Food	Expenditure Elasticity
Wheat	ITSUR[a]	**-0.12183**	-0.05445	-0.14813	**1.17667**
Corn	ITSUR	-0.14389	**-0.23661**	0.10184	**0.69724**
Non Food	ITSUR	-0.01792	-0.01061	**-0.67913**	**0.67671**

a) ITSUR indicates Iterated Seemingly Unrelated Regression.

The calculated price and expenditure elasticities for cereals given in Table 2 indicate that direct price elasticities for each commodity have a negative sign, and are all different from zero. The estimated elasticities indicate that a 10 percent increase in the price of wheat reduces its estimated consumption by about 1.2 percent.

The calculated cross price elasticities between wheat and corn have a negative sign, which indicates that consumers view the two commodities as complements rather than substitutes. Also, according to the cross price elasticities, the consumption of corn is more affected by the change of wheat price than *vice versa.*

The expenditure elasticities shown in Table 2 are positive, implying that all of the cereals commodities are "superior." For corn, the estimated expenditure elasticity is between the expenditure elasticities of rural and urban areas estimated using the households survey

data 1991, (shown later in this section). In general terms, these results indicate that a 10 percent increase in total expenditure is associated with an increase of about 11.7 and 6.97 percent in wheat and corn consumption, respectively.

4.2 OTHER STAPLE

Rice, beans, and potatoes were included in the same group since they are normally considered as close substitutes for one another. The expenditure for other staples increased during 1983 to 1991 period with an average share of almost 3.6 percent of total expenditure. Rice accounted for nearly 61 percent of total expenditure for the three commodities. The estimated parameters for other staples in Table 3 are encouraging, as they are for cereal commodities. Most coefficients of equations in the model are statistically significant at high rejection levels.

On an economic basis, the calculated elasticities in Table 4 seem to be plausible. All own price elasticities are negative in sign and expenditure elasticities have positive signs. The own price elasticities for the three commodities are magnitudes consistent with observed consumption. While the cross price elasticities between rice and beans are positive, they are negative between rice and potatoes. The positive sign of the cross-price elasticities between beans and potatoes indicate a substitute rather than a complementary effect. While price changes for beans and potatoes have almost the same impact on consumption, the consumption of beans and potatoes are more affected by price change of rice than vice versa. Also, bean consumption is more affected by rice and potato prices than by its own price change.

While the estimated expenditure elasticity for rice, 0.259, is lower than the estimated expenditure elasticities for rural and urban areas using the household survey data of 1991, the estimated expenditure elasticity for potatoes in this model, 1.310, is higher. The expenditure elasticity of beans (1.301) is high and not consistent with the fact that bean consumption is important for the poor and is likely to decrease with higher income. This

TABLE 3 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR OTHER STAPLE : ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)

Commodity	Rice	Beans	Potatoes	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Rice	0.00895	0.00713	-0.00691	0.00918	-0.00184	-0.02351	0.905
	(0.00358)[c]	(0.00261)	(0.00156)	(0.00477)		(0.00854)	
Beans		0.00510	0.00429	-0.02574	0.00926	0.00208	0.789
		(0.00248)	(0.00139)	(0.00273)		(0.00221)	
Potatoes			0.00297	0.00521	-0.00552	0.00217	0.809
			(0.00132)	(0.00202)		(0.00175)	
Other Foods				-0.08027	0.09162	0.19683	0.957
		Symmetric		(0.00886)		(0.00195)	
Non Food					-0.07701	-0.17757	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 4 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR OTHER STAPLE COMMODITIES

Commodity and Estimation Method		Rice	Beans	Potatoes	Non Food	Expenditure Elasticity
Rice	ITSUR[a]	**-0.44683**	0.26990	-0.34094	0.79170	**0.25909**
Beans	ITSUR	0.77332	**-0.26218**	0.60863	0.86325	**1.30100**
Potatoes	ITSUR	-1.04219	0.61690	**-0.57261**	-1.27385	**1.31067**

a) ITSUR indicates Iterated Seemingly Unrelated Regression.

This high expenditure elasticity might be related in art with the on-going structural changes in the Egyptian economy. The expenditure price elasticities for rice and potatoes indicate that the total expenditure change has nearly the same effect on both commodities.

4.3 VEGETABLES
The parameter estimates in this model are for onion, tomatoes, watermelons, and other vegetables. For the share from total expenditure, this group is the third after meat and poultry and cereals. The share of this group is 7.7 percent of the total expenditure from 1981 to 1992. Coefficients are statistically significant at high levels of rejection. The signs of parameter estimates in Table 5 relative to standard errors indicate that the specification of the demand system is consistent with the data.

TABLE 5 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR VEGETABLES : ITERATED SEEMINGLY UNRELATED REGRESSION(ITSUR)

Commodity	Onion	Tomatoes	Water-melons	Other Vegetables	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Onion	0.00433[c]	0.00029	0.00095	-0.00358	-0.00175	-0.00025	0.00033	0.921
	(0.00036)	(0.00066)	(0.00054)	(0.00090)	(0.00092)		(0.00672)	
Tomatoes		0.02423	-0.00333	-0.00947	0.02306	-0.03992	0.02306	0.767
		(0.00783)	(0.00314)	(0.00318)	(0.00789)		(0.00789)	
Watermelons			0.01636	-0.00653	-0.01474	0.00729	-0.00969	0.936
			(0.00192)	(0.00238)	(0.00415)		(0.00317)	
Other Vegetables				0.02292	-0.00976	0.00641	0.00779	0.685
		Symmetric		(0.00403)	(0.00452)		(0.00398)	
Other Foods					0.001365	0.04058	0.13452	0.792
					(0.01969)		(0.02444)	
Non Food						-0.05802	-0.01752	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 6 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR VEGETABLES

Commodity and Estimation Method		Onion	Tomatoes	Water-melons	Other Vegetables	Non Food	Expenditure Elasticity
Onion	ITSUR[a]	**-0.10031**	0.06687	0.20098	-0.74O13	-0.15868	**1.06953**
Tomatoes	ITSUR	0.00405	**-0.11941**	-0.07921	-0.29812	-1.05135	**1.77474**
Watermelons	ITSUR	0.03912	-0.13568	**-0.13858**	-0.33163	-0.39712	**1.50175**
Other Vegetables	ITSUR	-0.15617	-0.37291	-0.26398	**-0.10207**	-0.23487	**1.32733**

a) ITSUR indicates Iterated Seemingly Unrelated Regression.

All calculated own price elasticities are negative, consistent with the theory. The relatively low own price elasticities for vegetable commodities in Table 6 (-0.101 for onion, -0.119 for tomatoes, -0.139 for watermelons and -0.102 for other vegetables), can be justified because that vegetables have a fixed position in the Egyptian menu. The cross-price elasticities suggest that the consumption of onion, tomatoes, and watermelons are more affected by price changes of other vegetables than by their own Consumption of onions and tomatoes are linked to the consumption of all other vegetables. This argument also explains why the consumption of other vegetables is more affected by the price change of onion and tomatoes than by its own price change.

For onions, tomatoes, watermelons, and other vegetables, expenditure elasticities of 1.069, 1.775, 1.502, and 1.327 might be considered high. They are not. Comparing the estimated elasticities from the households survey data: onion, 0.378 and 1.813; tomatoes, 0.384 and 1.625; watermelons, 0.315 and 1.187; and other vegetables, 0.3419 and 1.482, for rural and urban areas, those estimated using this model appear plausible, except for tomatoes. Increased total expenditure has a clear impact on the consumption of vegetables.

4.4 FRUITS

Since the late 1970s fruit has increased its share in expenditure. For 1981 through 1992, on average the share of fruit accounts for 5.7 percent of the total expenditure, with citrus accounting for nearly 28 percent of this total. Most signs and magnitudes of parameter estimates in Table 7, relative to their standard errors, indicate that the specification of the demand system is consistent with the data.

The own price elasticities represented in Table 8 have negative signs. The estimated dates, citrus, and other fruits own-price elasticities of -0.426, -0.186, and -0.314 are plausible. The relatively high date price elasticity is expected since its total production has not been increased clearly in the last decade and fruit is consumed extensively during religious fasting. The cross price elasticities between dates and citrus are positive in sign, implying substitution effect. The negative sign for cross-price elasticities between dates and other fruit indicates a complementary effect. This result can be justified, in part, because especially in rural areas, dates are not a fruit but also a major food sources (in particular, pressed dates). For other fruits, dates and citrus are complements. The price change for dates has the same impact on its consumption as the price change of citrus and other fruits. The consumption of other fruits is less affected by its own price change than by price changes for dates and citrus.

TABLE 7 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR FRUITS: ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)

Commodity	Dates	Citrus	Other Fruits	Other Foods[a]	Non Food [b]	Expenditure	R-Square
Dates	0.00194	0.00146	-0.00169	-0.00040	-0.00131	0.00155	0.921
	(0.00085)[c]	(0.00052)	(0.00073)	(0.00077)		(0.00095)	
Citrus		0.01326	-0.00711	-0.00880	0.01198	0.00559	0.489
		(0.00219)	(0.0026)	(0.00396)		(0.00902)	
Other Fruits			0.0250	-0.01733	0.00113	0.01962	0.496
			(0.00495)	(0.00727)		(0.01575)	
Other Foods				0.18422	0.12723	0.184219	0.670
		Symmetric		(0.00675)		(0.06754)	
Non Food					-0.12825	-0.19098	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 8 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR FRUITS

Commodity and Estimation Method		Dates	Citrus	Other Fruits	Non Food	Expenditure Elasticity
Dates	ITSUR[a]	**-0.42625**	0.43591	-0.45602	-1.25005	**1.45641**
Citrus	ITSUR	0.09062	**-0.18590**	-0.40311	-0.57425	**1.34190**
Other Fruits	ITSUR	-0.05818	-0.19621	**-0.31379**	-0.95900	**1.51378**

a) ITSUR indicates Iterated Seemingly Unrelated Regression

Expenditure elasticities of dates, citrus, and other fruits of 1.456, 1.342, and 1.514 appear to be high compared with those estimated using the household survey data; dates, 0.401 and 0.933; citrus, 0.446 and 1.293; and other fruits, 0.439 and 0.895 for rural and urban areas. The consumption of fruit commodities, along with vegetables and meat, are more likely to increase with higher income than are any other commodities.

4.5 MEAT, POULTRY, AND FISH

All red meat commodities - mainly beef, veal and other red meat - were included in this model. Red meat, poultry, and fish accounted for 11 percent of total expenditure, with red meat accounting for 63 percent of this total for 1981 through 1992. Poultry consumption increased rapidly during the same period. The signs and magnitudes of the parameters in Table 9 for red meat, poultry, and fish relative to their standard errors indicate that the

TABLE 9 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR MEAT, POULTRY AND FISH : ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)

Commodity	Red Meat	Poultry	Fish	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Red Meat	0.00670	-0.02014	-0.03024	-0.03024	0.01579	0.01363	0.884
	(0.04761)[c]	(0.01048)	(0.01334)	(0.01017)		(0.00917)	
Poultry		0.00836	-0.01592	-0.0044188	0.00529	0.00905	0.642
		(0.03367)	(0.02162)	(0.01537)		(0.00892)	
Fish			(0.01661)	0.020594	-0.00114	-0.00129	0.746
			(0.01889)	(0.01204)		(0.00599)	
Other Foods				-0.050136	0.06420	0.18337	0.879
		Symmetric		(0.01383)		(0.02675)	
Non Food					-0.08413	-0.18475	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 10 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR MEAT, POULTRY AND EGGS

Commodity and Estimation Method		Red Meat	Poultry	Fish	Non Food	Expenditure Elasticity
Red Meat	ITSUR [a]	**-0.60527**	0.08750	-0.31557	-0.09191	**1.19348**
Poultry	ITSUR	0.35089	**-0.58301**	-0.81625	-0.43527	**1.44075**
Fish	ITSUR	-0.70884	-0.59790	**-0.17261**	0.04001	**0.93565**

a) ITSUR indicates Iterated Seemingly Unrelated Regression.

demand specification was consistent with the data. However, this is not the case with poultry. Most coefficients of the model estimates are statistically significant. From Table 10, the red meat own-price elasticity, -0.605, is in the range of those estimated for other countries, reflecting the increase of the price of red meat and the increase of poultry consumption. The poultry own-price elasticity, -0.583, appears less than expected. It is, however, plausible that the increased of its production has affected its consumption during the last decade. The fish own-price elasticity (Table 12) is -0.173. Fish supplies have not increased during the last 20 years. However, fish still an important food commodity for consumers in areas near the sea.

Cross-price elasticities between red meat and poultry are positive, implying that they are substitutes. The effect of the red meat price change on poultry consumption is less than vice versa. The cross-price elasticities show that a 10 percent increase in the price of red meat increases the consumption of poultry by 3.5 percent. The negative cross-price elasticities between fish and red meat and poultry indicate that consumers view fish as a complement to red meat and poultry. The consumption of fish is more affected by price change of red meat and poultry than by its own price. The price of fish has more impact on the consumption of poultry than on the consumption of red meat.

The expenditure elasticity of red meat (1.195) is close to the estimate from the household survey data for urban areas (1.251). This might imply that red meat is mainly consumed in urban areas. The estimated expenditure elasticity for poultry (1.441) is higher than the estimated using the households survey data for rural (0.388) and urban areas (0.993. The high fish expenditure elasticity (0.936) is close to the estimated fish expenditure elasticity for urban areas using household survey data (0.984), indicating that fish consumption increases with higher income in urban areas more than it does in the rural areas.

4.6 DAIRY AND EGGS

Milk, other dairy products, and eggs have traditionally been important food commodities in both rural and urban areas in Egypt. Not only are they protein sources, but their prices, compared to prices of other food commodities, were for a long time relative low. The share of dairy and eggs in the total expenditure during 1981 through 1992 was 8.1 percent. This relatively large share indicates that dairy and eggs are major foods for breakfast and dinner. The estimated own-price and expenditure elasticities for eggs were very high. Thus, the expenditure elasticity for eggs has been set at be 0.955, as estimated from the Rotterdam system. Most estimated coefficients are statistically significant (see Table 11).

TABLE 11 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR DAIRY AND EGGS: ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)

Commodity	Fresh Milk	Other Dairy	Eggs	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Fresh Milk	0.03087	-0.00427	0.01380	-0.06117	0.02076	0.04131	0.737
	(0.02087)[c]	(0.0032)	(0.00709)	(0.01902)		(0.01201)	
Other dairy		0.02022	0.00185	-0.02337	0.00457	0.00264	0.961
		(0.002449)	(0.00314)	(0.00396)		(0.00213)	
Eggs			0.00842	-0.01356	-0.01051	-0.00044	0.371
			(0.00698)	(0.00645)			
Other Foods		*Symmetric*		0.06424	0.03285	0.17179	0.924
				(0.02024)		(0.01670)	
Non food					-0.04768	-0.18521	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 12 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR DAIRY AND EGGS

Commodity and Estimation Method		Fresh Milk	Other Dairy	Eggs	Non Food	Expenditure Elasticity
Fresh Milk	ITSUR[a]	**-0.15266**	-0.09401	0.17122	-0.14631	**1.40102**
Other Dairy	ITSUR	-0.13744	**-0.28822**	0.05947	-0.01491	**1.09305**
Eggs	ITSUR	0.63291	0.18543	**-0.24466**	-0.89383	**0.95519**

a) ITSUR indicates Iterated Seemingly Unrelated Regression

The estimated own-price elasticity for milk (fresh milk) reported in Table 12 is -0.152, implying that, as with vegetables, milk has a fixed place in the menu of the Egyptian consumer. The other dairy, including milk powder with an own-price elasticity of -0.289, indicates a response that is almost the same as for milk. The egg own-price elasticity is -0.245. Eggs, since 1986, have had an important share of total consumption. Its share of total expenditure in the period of investigation 1981-1992 was about 1 percent. On the other hand, there are many indications that egg consumption has decreased since 1992, while chicken farms have had a number of financial problems.

Cross-price elasticities between milk and dairy are negative, implying a complementary rather than a substitution effect. The positive sign of the cross-price elasticities between eggs and milk and other dairy suggest that consumers view eggs as substitutes for dairy.

The estimated expenditure elasticity for milk (1.401) is high, while the estimate for other dairy (1.095) appears to be plausible compared to the estimates for urban areas from the household survey (data 0.959 and 0.813). However, as with fruits, the consumption of other dairy is likely to increase with higher incomes.

4.7 OILS

Cottonseed oil was, for a long time, the only domestic source of edible oil in Egypt. Since 1975, hydrogenated oils have been important substitutes for cottonseed oil, especially in the 1980s after the decrease of cultivated area for cotton. The share of cottonseed oil and hydrogenated oils in total expenditure is about 0.7 for 1981 to 1992. There are a number of other oils, such as sunflower oil, but their share is less than 0.15 percent of total expenditure. Most coefficients were statistically significant. Parameter estimates are presented in Table 13.

Estimated own-price elasticities for cottonseed oil (-0.231) and for hydrogenated oils (-0.613) show that the price change for hydrogenated oils has a greater effect on its consumption than does the price change of cottonseed oil. As expected, the cross-price elasticities between cottonseed oil and hydrogenated oils reported in Table 14 are positive in sign, implying that they are substitutes. The consumption of hydrogenated oils increased more than the consumption of cottonseed oil with higher income.

The estimated high expenditure elasticity for cottonseed oil indicates that, after eliminating government subsidies for cottonseed oil, its consumption increases with higher incomes. The estimated expenditure elasticities for cottonseed oil (1.084) and hydrogenated oils (1.116) are close to the weighted average of their expenditure elasticities estimated from the household survey data (1.276 and 1.362).

**TABLE 13 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR OILS :
ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)**

Commodity	Cotton Seed Oil	Hydrogenated Oils	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Cottonseed Oil	0.00018	0.00017	-0.00403	0.00147	0.00026	0.847
	(0.00047)[c]	(0.00047)	(0.00787)		(0.00122)	
Hydrogenated Oils		0.00166	-0.00338	0.00154	0.00049	0.933
		(0.00060)	(0.00059)		(0.00092)	
Other Foods			-0.04737	0.05478	0.17201	0.874
		Symmetric	(0.00956)		(0.02337)	
Non Food				-0.05779	-0.17277	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 14 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR OILS

Commodity and Estimation Method		Cotton Seed Oil	Hydrogenated Oils	Non Food	Expenditure Elasticity
Cottonseed Oil	ITSUR[a]	**-0.23110**	0.05682	0.34354	**1.08448**
Hydrogenated Oils	ITSUR	0.04103	**-0.61208**	0.18246	**1.11632**

a) ITSUR indicates Iterated Seemingly Unrelated Regression.

4.8 SUGAR

Sugar was treated as a separate commodity. The share for sugar was less than 1 percent of the total expenditure for 1981 to 1992. Parameter estimates for the model are contained in Table 15. Coefficients are statistically significant. The sugar own price elasticity presented in table 16 is -0.156, indicating that the consumption of sugar is not sensitive to its price change.

Its expenditure price elasticity, 1.627, shows that the consumption of sugar increases with income. This high expenditure elasticity of sugar is also an indicator of the increased of the sweets consumption during the last 15 years, and it is comparable with the estimated expenditure elasticities for sugar from the household survey data for rural (0.381) and urban areas (1.729).

TABLE 15 - ESTIMATED PARAMETERS OF THE LAIDS MODEL FOR REFINED SUGAR : ITERATED SEEMINGLY UNRELATED REGRESSION (ITSUR)

Commodity	Refined Sugar	Other Foods[a]	Non Food[b]	Expenditure	R-Square
Refined Sugar	0.00723	-0.00832	0.00195	0.00545	0.662
	(0.00366)[c]	(0.00487)		(0.00252)	
Other Foods		-0.04542	0.05374	0.16865	0.878
	Symmetric	(0.01299)		(0.02534)	
Non Food			-0.05483	-0.17410	

a) Other foods include all other 21 food commodities b) Derived estimates
c) Standards errors in parentheses

TABLE 16 - ESTIMATED PRICE AND EXPENDITURE ELASTICITIES FOR REFINED SUGAR

Commodity and Estimation Method		Refined Sugar	Non Food	Expenditure Elasticity
Refined Sugar	ITSUR[a]	**-0.15631**	-0.82776	**1.62711**

a) ITSUR indicates Iterated Seemingly Unrelated Regression

5. THE FULL DEMAND MATRIX

The objective of constructing a full demand matrix is to provide a consistent set of own- and cross-price and expenditure elasticities for major food commodities in Egypt. This matrix, as reviewed in Section 2.2, is constructed using the Rotterdam demand system adjusted to meet the problems of data availability. The expenditure elasticities were estimated from the 1991 household survey data, and not from the Rotterdam system. The income flexibility parameter is calculated from Equation (15) using the weighted averages of the expenditure elasticities, the total expenditure shares and, the own price elasticities estimated from the LAIDS models. All restrictions of the theory, the Engel aggregation, the homogeneity condition, and the symmetry relation are satisfied by the coefficients in the system. The income flexibility parameter estimate is -0.4875.

The additional empirical information required for the full matrix are the expenditure proportions. These proportions, as mentioned in Section 3, were taken from the 1991 household survey data (the sixth column of Table 17). The expenditure elasticities used weighted averages between the expenditure elasticities for rural and urban areas, and are reported in the last column of Table 17. The first and the second columns are the estimated price and expenditure elasticities from the LAIDS as applied to this study. The fourth and the fifth columns contain the estimated expenditure elasticities for rural and urban areas from the household survey.

In many cases, the estimated own price elasticities in the full matrix seem to be more plausible than these estimated from the individual LAIDS models. The results in Table 18 can be interpreted in a straightforward manner for the food group commodities. For example, on consulting Table 18 indicates that a 10 percent increase in the wheat price reduces the estimated wheat consumption by 3.7 percent. The cross-price elasticity shows that the same 10 percent increase in red meat or other dairy prices reduces the wheat consumption by 0.28 or by 0.13 percent, while a 10 percent increase in nonfood prices decreases wheat consumption by 1.8 percent. Finally, a 10 percent increase in total expenditure is associated with an increase of the wheat consumption of 6.97 percent.

Table 17 - DIRECT PRICE ELASTICITIES, EXPENDITURE ELASTICITIES, AND EXPENDITURE PROPORTIONS FOR THE 21 FOOD COMMODITIES AND NON FOOD

Commodity	Expenditure Elasticity	Direct Price Elasticity	Household Expenditure Rural	Survey Elasticity Urban	Data Expenditure Elasticity	Expenditure Proportion	Expenditure Elasticity for Full Matrix
Wheat	0.05557	-0.12183	1.17667	0.36149	0.99616	0.06971	0.69756
Corn	0.02829	-0.23661	0.69724	0.31566	1.12159	0.00704	0.34524
Rice	0.02221	-0.44683	0.25909	0.42031	1.46131	0.02416	0.88733
Beans	0.00693	-0.26218	1.30100	0.38801	0.83627	0.04989	0.59294
Potatoes	0.00697	-0.57261	1.31067	0.38734	1.65834	0.00521	0.53073
Onion	0.00482	-0.10031	1.06953	0.37834	1.81304	0.00398	1.19476
Tomatoes	0.02977	-0.11941	1.77474	0.38389	1.62493	0.01831	1.10278
Watermelons	0.01932	-0.13858	1.50175	0.31464	1.18624	0.00297	0.83960
Other Vegetables	0.02381	-0.10207	1.32733	0.34019	1.48210	0.03129	1.11286
Dates	0.00339	-0.42625	1.45641	0.40069	0.93326	0.00131	0.70505
Citrus	0.01637	-0.18590	1.34190	0.44627	1.29338	0.00564	0.95814
Other Fruits	0.03849	-0.31379	1.51378	0.43956	0.89479	0.02110	0.75096
Red Meat	0.07046	-0.60527	1.19348	0.41309	1.25141	0.09337	0.87389
Poultry	0.02053	-0.58301	1.44075	0.38785	0.99271	0.02944	0.86019
Fish	0.02012	-0.17260	0.93565	0.41645	0.98248	0.02418	0.81004
Fresh Milk	0.04221	-0.34883	1.30102	0.38368	0.95926	0.01651	0.78796
Other Dairy	0.02835	-0.39472	1.06475	0.41833	0.81352	0.02605	0.67936
Eggs	0.00985	-1.23311	1.88307	0.40868	1.28812	0.01276	0.95576
Cottonseed Oil	0.00311	-0.23110	1.08448	0.40548	1.81868	0.00571	1.27580
Hydrogenated Oils	0.00429	-0.61208	1.11632	0.29345	2.22622	0.00872	1.36203
Refined Sugar	0.00869	-0.15631	1.62711	0.38133	1.72934	0.01552	1.15819
Non Food	0.56475	-0.67913	0.67671			0.57204	1.10251

* Weighted elasticity from rural and urban households

TABLE - 18 ELASTICITY MATRIX FOR FOOD AND NON FOOD COMMODITIES

Commodity	Wheat	Corn	Rice	Beans	Potatoes	Onion	Tomatoes	Water-melons	Other Vegetables	Dates	Citrus
Wheat	**-0.36560**	-0.01640	-0.00879	-0.00344	-0.00360	-0.00140	-0.00960	-0.00796	-0.00760	-0.00155	-0.00609
Corn	-0.01270	**-0.17640**	-0.00435	-0.00170	-0.00178	-0.00070	-0.00475	-0.00394	-0.00376	-0.00077	-0.00301
Rice	-0.03250	-0.02090	**-0.44380**	-0.00437	-0.00459	-0.00179	-0.01220	-0.01010	-0.00967	-0.00197	-0.00774
Beans	-0.02170	-0.01400	-0.00747	**-0.29200**	-0.00306	-0.00119	-0.00816	-0.00677	-0.00646	-0.00132	-0.00517
Potatoes	-0.01950	-0.01250	-0.00669	-0.00262	**-0.26150**	-0.00107	-0.00731	-0.00606	-0.00578	-0.00118	-0.00463
Onion	-0.04380	-0.02810	-0.01510	-0.00589	-0.00617	**-0.58490**	-0.01640	-0.01360	-0.01300	-0.00266	-0.01040
Tomatoes	-0.04040	-0.02590	-0.01390	-0.00543	-0.00570	-0.00222	**-0.55280**	-0.01260	-0.01200	-0.00245	-0.00962
Watermelons	-0.03080	-0.01980	-0.01060	-0.00414	-0.00434	-0.00169	-0.01160	**-0.41890**	-0.00915	-0.00187	-0.00732
Other Vegetables	-0.04080	-0.02620	-0.01400	-0.00548	-0.00575	-0.00224	-0.01530	-0.01270	**-0.55460**	-0.00248	-0.00971
Dates	-0.02590	-0.01660	-0.00889	-0.00347	-0.00364	-0.00142	-0.00971	-0.00805	-0.00768	**-0.34530**	-0.00615
Citrus	-0.03510	-0.02250	-0.01210	-0.00472	-0.00495	-0.00193	-0.01320	-0.01090	-0.01040	-0.00213	**-0.47550**
Other Fruits	-0.02750	-0.01770	-0.00946	-0.00370	-0.00388	-0.00151	-0.01030	-0.00857	-0.00818	-0.00167	-0.00655
Red Meat	-0.03200	-0.02060	-0.01100	-0.00431	-0.00452	-0.00176	-0.01200	-0.00997	-0.00952	-0.00194	-0.00762
Poultry	-0.03150	-0.02020	-0.01080	-0.00424	-0.00444	-0.00173	-0.01180	-0.00982	-0.00937	-0.00191	-0.00750
Fish	-0.02970	-0.01910	-0.01020	-0.00399	-0.00419	-0.00163	-0.01120	-0.00924	-0.00882	-0.00180	-0.00707
Fresh Milk	-0.02890	-0.01850	-0.00993	-0.00388	-0.00407	-0.00159	-0.01080	-0.00899	-0.00858	-0.00175	-0.00687
Other Dairy	-0.02490	-0.01600	-0.00856	-0.00335	-0.00351	-0.00137	-0.00935	-0.00775	-0.00740	-0.00151	-0.00593
Eggs	-0.03510	-0.02250	-0.01200	-0.00471	-0.00494	-0.00192	-0.01320	-0.01090	-0.01040	-0.00213	-0.00834
Cottonseed Oil	-0.04680	-0.03000	-0.01610	-0.00629	-0.00659	-0.00257	-0.01760	-0.01460	-0.01390	-0.00284	-0.01110
Hydrogenated Oils	-0.04990	-0.03200	-0.01720	-0.00671	-0.00704	-0.00274	-0.01870	-0.01550	-0.01480	-0.00303	-0.01190
Refined sugar	-0.04250	-0.02730	-0.01460	-0.00571	-0.00598	-0.00233	-0.01590	-0.01320	-0.01260	-0.00258	-0.01010
Non Food	-0.04040	-0.02590	-0.01390	-0.00543	-0.00570	-0.00222	-0.01520	-0.01260	-0.01200	-0.00245	-0.00962

TABLE - 18 ELASTICITY MATRIX FOR FOOD AND NON - FOOD COMMODITIES

Commodity	Other Fruits	Red Meat	Poultry	Fish	Fresh Milk	Other Dairy	Eggs	Cotton-seed Oil	Hydrogenated Oils	Refined Sugar	Non Food	Expenditure
Wheat	-0.01700	-0.02820	-0.00832	-0.00849	-0.01810	-0.01320	-0.00367	-0.00082	-0.00101	-0.00264	-0.18220	**0.69756**
Corn	-0.00842	-0.01400	-0.00412	-0.00420	-0.00898	-0.00655	-0.00182	-0.00041	-0.00050	-0.00131	-0.09020	**0.34524**
Rice	-0.02170	-0.03590	-0.01060	-0.01080	-0.02310	-0.01680	-0.00467	-0.00104	-0.00128	-0.00336	-0.23180	**0.88733**
Beans	-0.01450	-0.02400	-0.00707	-0.00722	-0.01540	-0.01120	-0.00312	-0.00070	-0.00086	-0.00224	-0.15490	**0.59294**
Potatoes	-0.01290	-0.02150	-0.00633	-0.00646	-0.01380	-0.01010	-0.00279	-0.00062	-0.00077	-0.00201	-0.13860	**0.53073**
Onion	-0.02920	-0.04830	-0.01420	-0.01450	-0.03110	-0.02270	-0.00629	-0.00141	-0.00172	-0.00452	-0.31210	**1.19476**
Tomatoes	-0.02690	-0.04460	-0.01310	-0.01340	-0.02870	-0.02090	-0.00580	-0.00130	-0.00159	-0.00417	-0.28810	**1.10278**
Watermelons	-0.02050	-0.03400	-0.01000	-0.01020	-0.02180	-0.01590	-0.00442	-0.00099	-0.00121	-0.00318	-0.21930	**0.8396**
Other Vegetables	-0.02720	-0.04500	-0.01330	-0.01350	-0.02890	-0.02110	-0.00585	-0.00131	-0.00160	-0.00421	-0.29070	**1.11286**
Dates	-0.01720	-0.02850	-0.00841	-0.00858	-0.01830	-0.01340	-0.00371	-0.00083	-0.00102	-0.00267	-0.18420	**0.70505**
Citrus	-0.02340	-0.03870	-0.01140	-0.01170	-0.02490	-0.01820	-0.00504	-0.00113	-0.00138	-0.00363	-0.25030	**0.95814**
Other Fruits	**-0.38440**	-0.03040	-0.00895	-0.00914	-0.01950	-0.01420	-0.00395	-0.00088	-0.00108	-0.00284	-0.19620	**0.75096**
Red Meat	-0.02130	**-0.46140**	-0.01040	-0.01060	-0.02270	-0.01660	-0.00460	-0.00103	-0.00126	-0.00331	-0.22830	**0.87389**
Poultry	-0.02100	-0.03480	**-0.42960**	-0.01050	-0.02240	-0.01630	-0.00453	-0.00101	-0.00124	-0.00326	-0.22470	**0.86019**
Fish	-0.01980	-0.03280	-0.00966	**-0.40480**	-0.02110	-0.01540	-0.00426	-0.00095	-0.00117	-0.00307	-0.21160	**0.81004**
Fresh Milk	-0.01920	-0.03190	-0.00939	-0.00959	**-0.40460**	-0.01490	-0.00415	-0.00093	-0.00114	-0.00298	-0.20580	**0.78796**
Other Dairy	-0.01660	-0.02750	-0.00810	-0.00827	-0.01770	**-0.34410**	-0.00357	-0.00080	-0.00098	-0.00257	-0.17750	**0.67936**
Eggs	-0.02330	-0.03870	-0.01140	-0.01160	-0.02480	-0.01810	**-0.47100**	-0.00112	-0.00138	-0.00362	-0.24970	**0.95576**
Cottonseed Oil	-0.03110	-0.05160	-0.01520	-0.01550	-0.03320	-0.02420	-0.00671	**-0.62350**	-0.00184	-0.00483	-0.33330	**1.2758**
Hydrogenated Oils	-0.03320	-0.05510	-0.01620	-0.01660	-0.03540	-0.02580	-0.00717	-0.00160	**-0.66600**	-0.00515	-0.35580	**1.36203**
Refined sugar	-0.02830	-0.04680	-0.01380	-0.01410	-0.03010	-0.02200	-0.00609	-0.00136	-0.00167	**-0.56900**	-0.30250	**1.15819**
Non Food	-0.02690	-0.04460	-0.01310	-0.01340	-0.02870	-0.02090	-0.00580	-0.00130	-0.00159	-0.00417	**-0.82550**	**1.10251**

6. POLICY IMPLICATIONS

Policy implications of estimated structural relationships can be evaluated from two viewpoints. First, the estimates may be considered descriptive estimates of the economic structure. From this new structural information, changes in the macro and micro policies, can be evaluated to determine consumption results. The second policy implication of the estimated demand structure involves its contribution to more realistic policy models (Hassan and Johnson 1978).

In discussing policy models, it is important to differentiate between variables that are externally determined (exogenous) or internally determined (endogenous). The exogenous variables are further partitioned into those assumed under the control of policymakers and those are not. The uncontrolled endogenous variables simply provide the environment within which the system operates. Technically any system has three kinds of evaluation: technical, behavioral, and identity. The constructed system is complete, when the level of all endogenous variables can be generated according to the values of the exogenous variables. Demand parameters in Sections 5 and 6 are behavioral relationships.

Policy implications of the estimated system are then in terms of the more refined inputs the results represent for improved analysis. Specialized statements based on the results are difficult to make because the nature of the economic problems modeled are often different from situation to situation. Rather than evaluate models we use the results for projections, which are of value in themselves and for indicating the integrity of the demand parameter estimates.

6.1 CONSUMPTION

An effective use of the full demand matrix is for projecting the per capita consumption. The total consumption of each food commodity and in response to assumed sets of prices and incomes the total expenditure per capita for each commodity, for full set 21 commodities and a set of the nutrition indicators are estimated as well. The equations

used to calculate the per capita consumption and the total consumption estimates are (Kazlauskiene et al. 1991):

$$QC_{it} = QC_{it-(1+2)/2} * (RP_{it} / RP_{it-1})^{eii} * \prod_{j\in I_{c1}} (RP_{jt} / RP_{jt-1})^{eij} * (I_t / I_{t-1})^{\eta_i} \qquad (16)$$

$$QCT_{it} = QC_{it} * POP \qquad (17)$$

where

QC_{it} is per capita consumption of the ith commodity,

$QC_{it-(1+2)/2}$ is average per capita consumption of the last two years,

RP_{it} is retail price of ith commodity,

RP_{jt} is retail price of jth commodity,

e_{ii} is own price elasticity for demand for i^{th} commodity,

e_{ij} is cross price elasticity for demand for i^{th} commodity,

η_i is expenditure elasticity of demand for i^{th} commodity,

QCT   is total food consumption, and

POP   is population.

The prices for the years 1994 and 1995 are actual. For the period between 1995 and 2001, a set of price growth rates for food commodities, non food and total expenditure has been assumed. These estimates are:

Wheat	6.0 percent	Corn	7.5 percent	Potatoes	8.5 percent
Rice	8.0 percent	Beans	6.0 percent	Water Melons	11.0 percent
Onion	11.0 percent	Tomatoes	11.0 percent	Citrus	8.5 percent
Other Vegetables	11.0 percent	Dates	6.0 percent	Poultry	6.5 percent
Other Fruits	10.0 percent	Red Meat	9.5 percent	Other Dairy	6.5 percent
Fish	8.5 percent	Milk	5.5 percent	Non Food	9.0 percent
Cotton Seed Oil	4.5 percent	Eggs	4.0 percent	Total Expenditure	5.5 percent
Hydrogenated Oils	9.9 percent				

TABLE 19 - ACTUAL AND PROJECTED PER CAPITA CONSUMPTION FROM THE 21 FOOD COMMODITIES

Commodity	1991 [a]	1992 [a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
						kilograms					
Wheat	155.52	154.20	155.24	154.57	153.21	152.88	152.10	151.29	150.65	149.92	149.20
Corn	93.40	91.85	92.94	91.52	91.58	90.90	90.60	90.11	89.72	89.28	88.87
Rice	59.28	60.57	59.52	56.77	56.98	55.74	55.23	54.38	53.71	52.97	52.27
Beans	7.49	8.46	8.68	8.35	8.42	8.41	8.33	8.32	8.29	8.24	8.22
Potatoes	22.29	20.40	20.65	20.89	20.37	20.37	20.27	20.07	19.97	19.84	19.70
Onion	17.03	16.82	18.38	15.82	16.47	15.55	15.41	14.90	14.59	14.20	13.86
Tomatoes	59.68	63.61	62.69	58.77	59.57	58.27	56.85	56.23	55.16	54.16	53.29
Watermelons	25.78	25.33	25.79	25.03	24.72	24.52	24.10	23.80	23.51	23.18	22.88
Other Vegetables	46.53	48.43	45.62	45.17	44.58	43.35	42.62	41.81	40.92	40.14	39.34
Dates	9.30	9.24	10.03	8.55	9.19	9.17	8.88	8.99	8.93	8.85	8.84
Citrus	36.40	35.55	35.37	33.96	34.13	33.67	33.12	32.85	32.43	32.02	31.66
Other Fruits	32.49	32.37	32.03	31.51	31.22	30.84	30.46	30.11	29.75	29.40	29.06
Red Meat	9.64	10.02	9.12	9.37	9.26	9.02	8.98	8.86	8.72	8.63	8.52
Poultry	4.08	4.74	4.65	4.60	4.55	4.49	4.44	4.39	4.34	4.29	4.24
Fish	6.58	7.32	6.83	6.79	6.84	6.68	6.63	6.58	6.50	6.44	6.38
Fresh Milk	40.02	40.12	40.33	40.49	39.96	39.90	39.76	39.52	39.38	39.20	39.02
Other Dairy	6.84	6.98	6.64	6.82	6.65	6.66	6.59	6.55	6.50	6.46	6.41
Eggs (number)	70.32	62.19	71.24	66.88	66.49	67.93	66.82	66.80	66.91	66.57	66.48
Cottonseed Oil	2.44	2.50	2.46	2.42	2.42	2.40	2.39	2.37	2.36	2.35	2.33
Hydrogenated Oils	2.11	2.04	2.23	2.09	2.03	2.03	1.97	1.93	1.89	1.85	1.81
Refined Sugar	14.25	13.06	13.14	13.08	12.61	12.22	11.84	11.47	11.12	10.77	10.44

a) Actual data.

These assumed price growth rates are based on the price growth rate for each commodity and the inflation rate from 1993 and 1994. However, these rates are optimistic in terms of price increases. The main goal is to illustrate the change in per capita consumption from each food commodity in the projection period using the elasticity matrix. Comparing the calculated per capita consumption with actual available per capita consumption for 1993 and 1994 from the CAPMS, the results of the projection seem to be very plausible. The estimated per capita consumption for wheat is 155.04 kg per year in 1993, and the projection from CAPMS is 156.0 kg.

The estimates in Table 19 show the projected per capita consumption from the 21 food commodities to the year 2001. The results suggest that the per capita consumption will decrease for all commodities. The daily per capita consumption of the 21 commodities, (Table 20) highlight the decline in consumption. The main reason for these declines is the fact that the total expenditure per capita is assumed increase with a rate less than the rate of price growth for almost all food and non food commodities. Although, the per capita consumption from each commodity decreases, the total consumption for Egypt increases. Table 21 indicates that except for refined sugar, the total consumption of the other commodities will increase. The total consumption of wheat will increase from 9419 thousands metric ton in year 1994 to 10644 in year 2001.

The projected per capita consumption and total consumption in this study should provide policy makers and producers with information, not only for policy adjustment, but also for possible changes of the market demand structure. The projected per capita consumption is based on assumption of the price changes. Of course the prices may change in other directions. Therefore, for maximum benefits of the elasticity matrix several simulations can be made. Also, using other variables in the equations for the projecting per capita consumption, such as the different patterns between the rural and urban areas and the impacts of the foreign trade (= the international prices) on the domestic prices and the

TABLE 20 - ACTUAL AND PROJECTED PER CAPITA DAILY CONSUMPTION FROM THE 21 FOOD COMMODITIES

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
						grams					
Wheat	383.47	380.23	382.78	381.13	377.77	376.97	375.05	373.04	371.48	369.66	367.89
Corn	220.07	216.41	218.99	215.63	215.77	214.18	213.46	212.32	211.39	210.36	209.39
Rice	105.57	107.86	106.00	101.09	101.47	99.26	98.36	96.84	95.65	94.32	93.09
Beans	17.45	19.69	20.20	19.44	19.62	19.59	19.39	19.38	19.30	19.20	19.14
Potatoes	51.90	47.50	48.08	48.65	47.44	47.43	47.21	46.74	46.50	46.20	45.87
Onion	43.39	42.84	46.83	40.32	41.95	39.61	39.27	37.97	37.19	36.18	35.32
Tomatoes	158.59	169.06	166.59	156.19	158.31	154.86	151.09	149.44	146.59	143.92	141.62
Watermelons	38.84	38.17	38.86	37.71	37.24	36.94	36.32	35.87	35.42	34.93	34.48
Other Vegetables	101.97	106.15	99.99	99.01	97.71	95.01	93.42	91.63	89.68	87.97	86.23
Dates	21.65	21.53	23.36	19.91	21.39	21.35	20.68	20.94	20.79	20.61	20.58
Citrus	70.81	69.15	68.79	66.07	66.39	65.50	64.43	63.89	63.08	62.29	61.59
Other Fruits	63.20	62.96	62.30	61.29	60.72	59.99	59.24	58.58	57.88	57.19	56.52
Red Meat	19.81	20.59	18.73	19.26	19.03	18.53	18.46	18.20	17.93	17.73	17.50
Poultry	9.50	11.04	10.84	10.72	10.59	10.47	10.35	10.23	10.11	9.99	9.87
Fish	16.23	18.05	16.83	16.74	16.86	16.47	16.35	16.23	16.02	15.88	15.72
Fresh Milk	109.64	109.93	110.48	110.94	109.47	109.32	108.94	108.27	107.88	107.40	106.90
Other Dairy	18.73	19.11	18.18	18.68	18.23	18.26	18.05	17.96	17.81	17.69	17.56
Eggs (number)	0.19	0.17	0.20	0.18	0.18	0.19	0.18	0.18	0.18	0.18	0.18
Cottonseed Oil	6.67	6.84	6.73	6.64	6.63	6.58	6.55	6.51	6.47	6.43	6.40
Hydrogenated Oils	5.78	5.60	6.10	5.74	5.57	5.57	5.39	5.28	5.19	5.07	4.97
Refined Sugar	39.05	35.78	36.00	35.84	34.55	33.47	32.44	31.43	30.45	29.51	28.59

a) Actual data

TABLE 21 - ACTUAL AND PROJECTED TOTAL CONSUMPTION[b] FROM THE 21 FOOD COMMODITIES

Commodity	1991 [a]	1992 [a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
					thousand	metric	tons				
Wheat	8849	8974	9239	9407	9534	9727	9893	10059	10238	10412	10589
Corn	5314	5345	5531	5570	5699	5784	5893	5991	6097	6201	6307
Rice	3373	3525	3543	3455	3546	3546	3593	3615	3650	3678	3710
Beans	426	492	516	508	524	535	542	553	563	573	583
Potatoes	1268	1187	1229	1271	1268	1296	1319	1334	1357	1378	1398
Onion	969	979	1094	963	1025	989	1002	991	992	986	984
Tomatoes	3395	3702	3731	3577	3707	3708	3698	3739	3748	3761	3782
Watermelons	1467	1474	1535	1523	1538	1560	1568	1583	1597	1610	1624
Other Vegetables	2647	2819	2715	2749	2774	2758	2772	2779	2780	2788	2792
Dates	529	538	597	520	572	583	578	598	607	615	627
Citrus	2071	2069	2105	2067	2124	2142	2154	2184	2204	2224	2247
Other Fruits	1849	1884	1906	1918	1943	1962	1981	2002	2022	2042	2062
Red Meat	548	583	543	571	576	574	584	589	593	599	604
Poultry	232	276	277	280	283	286	289	292	295	298	301
Fish	374	426	406	413	426	425	431	438	442	447	453
Fresh Milk	2277	2335	2400	2464	2486	2539	2586	2628	2676	2723	2769
Other Dairy	389	406	395	415	414	424	428	436	442	448	455
Eggs (count)[b]	4001	3619	4240	4071	4138	4322	4346	4442	4547	4623	4718
Cottonseed Oil	139	145	146	147	151	153	155	158	160	163	166
Hydrogenated Oils	120	119	133	127	127	129	128	128	129	129	129
Refined Sugar	811	760	782	796	785	777	770	763	755	748	741

a) Actual data. b) Consumption in million.

production effects on the total supply can provide more opportunity for using the estimates.

6.2 EXPENDITURE

Expected per capita Expenditures for the 21 food commodities are projected to increase by 160 percent in 2001 relative to expenditures for 1994. The actual and projected expenditures for the 21 food commodities for 1991 through 2001 are supplied in Table 22. Also, the projected shares for these food commodities are presented in Table 23. In 2001, the total expenditures for the 21 food commodities are projected to increase by 165 percent, compared to total expenditure in 1994. The percent change of the expenditure for each commodity during 1991 through 2001 (Table 24) show that the expenditures for vegetables, fruits, and read meat are projected to increase faster than the expenditures of other commodities. However, according to Table 23, there will be no major changes in the shares for each of the commodities from the total.

More analysis will be required of expenditures projections in order to specific policy issues. This analysis, however, is best left to the policy specialists and to particular policy issues. Tables 22, 23, and 24 provide illustrations of the projected structure of the expenditures in the next years. As with consumption, the expenditures can be estimated using various assumption prices and incomes. The simulations can also be used to understand the differences between the areas in Egypt's and impacts of development in each area. To have a plausible results, the projected annual growth rate of the per capita total expenditure (= income) must exact as possible projected.

6.3 NUTRITION ASPECTS

These projections illustrate to nutrition specialists the value of the full demand matrix and accompanying scenarios. Projection and analyses of consumption of food commodities are important for producers and policymakers. The nutrition conclusions discussed here are also relevant for food security and various health and nutrition aspects.

TABLE 22 - ACTUAL AND PROJECTED PER CAPITA EXPENDITURE FOR THE 21 FOOD COMMODITIES

Commodity	1991 [a]	1992 [a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
						Egyptian	Pounds				
Wheat	134.32	150.19	183.03	190.58	200.24	211.80	223.37	235.50	248.58	262.21	276.61
Corn	58.93	63.28	64.41	69.64	74.92	79.94	85.65	91.58	98.02	104.86	112.20
Rice	69.98	75.71	77.58	87.40	94.75	100.10	107.13	113.91	121.51	129.41	137.94
Beans	14.60	17.89	14.70	13.85	14.82	15.69	16.46	17.44	18.41	19.41	20.51
Potatoes	17.07	11.83	13.24	14.46	15.30	16.60	17.93	19.26	20.79	22.41	24.14
Onion	8.89	9.25	9.01	9.65	11.05	11.47	12.51	13.31	14.34	15.35	16.48
Tomatoes	49.91	42.30	44.32	47.61	53.08	57.11	61.29	66.69	71.96	77.71	84.12
Watermelons	23.99	19.00	21.28	22.71	24.67	26.92	29.11	31.63	34.36	37.26	40.46
Other Vegetables	36.38	36.23	37.88	41.63	45.61	49.22	53.72	58.49	63.54	69.19	75.28
Dates	9.48	10.17	9.44	11.42	13.01	13.76	14.13	15.17	15.96	16.77	17.75
Citrus	32.23	33.56	35.08	39.06	42.59	45.58	48.65	52.35	56.07	60.08	64.46
Other Fruits	66.65	73.09	80.27	87.66	95.53	103.82	112.78	122.66	133.32	144.90	157.53
Red Meat	84.40	92.18	104.23	117.35	126.96	135.33	147.65	159.39	171.93	186.22	201.20
Poultry	23.67	29.64	31.24	32.92	34.49	36.14	37.86	39.66	41.55	43.53	45.61
Fish	43.46	50.51	51.10	55.13	60.26	63.88	68.82	74.10	79.38	85.34	91.68
Fresh Milk	54.76	59.79	63.51	64.75	67.40	71.01	74.66	78.28	82.29	86.43	90.75
Other Dairy	50.21	59.36	65.39	69.35	72.09	76.88	80.95	85.77	90.59	95.84	101.31
Eggs	12.90	11.82	13.82	13.91	14.38	15.28	15.63	16.26	16.93	17.52	18.20
Cottonseed Oil	3.23	3.74	3.80	4.03	4.21	4.36	4.54	4.71	4.90	5.09	5.29
Hydrogenated Oils	5.28	7.67	8.65	8.64	9.22	10.11	10.76	11.58	12.50	13.41	14.44
Refined Sugar	18.39	16.85	17.21	17.92	19.00	20.07	21.20	22.39	23.65	24.97	26.38
	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
Per Capita Expenditure for the 21 food Commodities	818.73	874.05	949.20	1019.70	1093.59	1165.11	1244.79	1330.11	1420.57	1517.93	1622.32
Total Expenditure Per Capita	1858.00	1978.77	2107.39	2244.37	2390.25	2545.62	2711.09	2887.31	3074.98	3274.86	3487.72

a) Actual data.

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
Wheat	7.229	7.590	8.685	8.492	8.377	8.320	8.239	8.156	8.084	8.007	7.931
Corn	3.172	3.198	3.056	3.103	3.134	3.140	3.159	3.172	3.188	3.202	3.217
Rice	3.766	3.826	3.681	3.894	3.964	3.932	3.952	3.945	3.952	3.952	3.955
Beans	0.786	0.904	0.698	0.617	0.620	0.616	0.607	0.604	0.599	0.593	0.588
Potatoes	0.919	0.598	0.628	0.644	0.640	0.652	0.661	0.667	0.676	0.684	0.692
Onion	0.478	0.467	0.427	0.430	0.462	0.451	0.462	0.461	0.466	0.469	0.473
Tomatoes	2.686	2.138	2.103	2.121	2.221	2.244	2.261	2.310	2.340	2.373	2.412
Watermelons	1.291	0.960	1.010	1.012	1.032	1.058	1.074	1.095	1.117	1.138	1.160
Other Vegetables	1.958	1.831	1.797	1.855	1.908	1.934	1.982	2.026	2.066	2.113	2.158
Dates	0.510	0.514	0.448	0.509	0.544	0.541	0.521	0.525	0.519	0.512	0.509
Citrus	1.735	1.696	1.665	1.740	1.782	1.791	1.794	1.813	1.824	1.835	1.848
Other Fruits	3.587	3.694	3.809	3.906	3.997	4.078	4.160	4.248	4.335	4.425	4.517
Red Meat	4.542	4.659	4.946	5.229	5.312	5.316	5.446	5.520	5.591	5.686	5.769
Poultry	1.274	1.498	1.482	1.467	1.443	1.420	1.396	1.374	1.351	1.329	1.308
Fish	2.339	2.553	2.425	2.457	2.521	2.509	2.538	2.566	2.581	2.606	2.629
Fresh Milk	2.947	3.021	3.014	2.885	2.820	2.790	2.754	2.711	2.676	2.639	2.602
Other Dairy	2.702	3.000	3.103	3.090	3.016	3.020	2.986	2.971	2.946	2.927	2.905
Eggs	0.694	0.597	0.656	0.620	0.602	0.600	0.577	0.563	0.551	0.535	0.522
Cottonseed Oil	0.174	0.189	0.181	0.180	0.176	0.171	0.167	0.163	0.159	0.155	0.152
Hydrogenated Oils	0.284	0.388	0.411	0.385	0.386	0.397	0.397	0.401	0.407	0.410	0.414
Refined Sugar	0.990	0.851	0.817	0.798	0.795	0.788	0.782	0.775	0.769	0.763	0.756
Expenditure per Capita for the 21 Food Commodities	44.065	44.172	45.041	45.434	45.752	45.769	45.915	46.067	46.198	46.351	46.515

a) Actual data.

TABLE 24 - ACTUAL AND PROJECTED PERCENTAGE CHANGE OF EXPENDITURE FOR THE 21 FOOD COMMODITIES

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001	2001/1994
					Percentage		Change					
Wheat	100	111.82	136.26	141.89	149.08	157.69	166.29	175.33	185.07	195.22	205.94	145.14
Corn	100	107.38	109.29	118.17	127.12	135.65	145.33	155.39	166.32	177.92	190.39	161.10
Rice	100	108.19	110.86	124.89	135.40	143.04	153.08	162.77	173.63	184.92	197.10	157.82
Beans	100	122.53	100.74	94.91	101.55	107.50	112.78	119.46	126.11	133.00	140.51	148.05
Potatoes	100	69.31	77.54	84.74	89.66	97.25	105.03	112.81	121.79	131.28	141.42	166.88
Onion	100	104.05	101.31	108.60	124.30	129.09	140.77	149.74	161.30	172.65	185.40	170.72
Tomatoes	100	84.76	88.80	95.38	106.35	114.43	122.81	133.62	144.17	155.71	168.53	176.69
Watermelons	100	79.18	88.69	94.66	102.84	112.21	121.35	131.83	143.21	155.33	168.66	178.16
Other Vegetables	100	99.58	104.12	114.44	125.36	135.30	147.67	160.77	174.66	190.18	206.91	180.81
Dates	100	107.28	99.57	120.51	137.24	145.18	149.10	160.00	168.39	176.91	187.29	155.41
Citrus	100	104.11	108.84	121.18	132.13	141.43	150.93	162.41	173.97	186.40	199.98	165.03
Other Fruits	100	109.67	120.45	131.52	143.34	155.78	169.21	184.04	200.03	217.42	236.37	179.71
Red Meat	100	109.22	123.49	139.04	150.43	160.34	174.94	188.85	203.71	220.64	238.39	171.45
Poultry	100	125.24	131.99	139.10	145.73	152.68	159.95	167.58	175.57	183.93	192.70	138.53
Fish	100	116.23	117.59	126.86	138.67	146.99	158.35	170.50	182.65	196.36	210.97	166.29
Fresh Milk	100	109.17	115.98	118.23	123.08	129.67	136.32	142.95	150.26	157.82	165.72	140.17
Other Dairy	100	118.22	130.23	138.12	143.58	153.12	161.21	170.83	180.43	190.88	201.77	146.08
Eggs	100	91.63	107.18	107.88	111.54	118.50	121.25	126.06	131.30	135.86	141.12	130.81
Cottonseed Oil	100	115.74	117.64	124.64	130.08	134.87	140.30	145.70	151.44	157.33	163.50	131.17
Hydrogenated Oils	100	145.18	163.84	163.58	174.55	191.45	203.80	219.30	236.67	253.97	273.30	167.08
Refined Sugar	100	91.62	93.62	97.47	103.35	109.15	115.28	121.76	128.60	135.82	143.45	147.18
Per Capita Expenditure for the 21 Food Commodities	100	106.76	115.94	124.55	133.57	142.31	152.04	162.46	173.51	185.40	198.15	159.10

a) Actual data.

TABLE 25 - ACTUAL AND PROJECTED PER CAPITA DAILY CALORIES CONSUMPTION FROM THE 21 FOOD COMMODITIES

Commodity	1991 [a)]	1992 [a)]	1993	1994	1995	1996	1997	1998	1999	2000	2001
						Calories	Per	Day			
Wheat	1227.10	1216.73	1224.90	1219.61	1208.86	1206.29	1200.15	1193.72	1188.72	1182.92	1177.23
Corn	627.19	616.78	624.12	614.54	614.96	610.42	608.37	605.10	602.46	599.53	596.76
Rice	358.93	366.74	360.40	343.71	345.01	337.48	334.43	329.25	325.21	320.70	316.50
Beans	60.19	67.94	69.70	67.05	67.68	67.60	66.90	66.85	66.58	66.24	66.02
Potatoes	42.56	38.95	39.43	39.89	38.90	38.89	38.71	38.32	38.13	37.88	37.61
Onion	17.35	17.14	18.73	16.13	16.78	15.84	15.71	15.19	14.87	14.47	14.13
Tomatoes	22.20	23.67	23.32	21.87	22.16	21.68	21.15	20.92	20.52	20.15	19.83
Watermelons	9.71	9.54	9.72	9.43	9.31	9.24	9.08	8.97	8.86	8.73	8.62
Other Vegetables	29.57	30.78	29.00	28.71	28.34	27.55	27.09	26.57	26.01	25.51	25.01
Dates	45.47	45.21	49.05	41.82	44.92	44.83	43.44	43.97	43.66	43.27	43.22
Citrus	33.28	32.50	32.33	31.05	31.20	30.78	30.28	30.03	29.65	29.28	28.95
Other Fruits	37.92	37.78	37.38	36.77	36.43	36.00	35.55	35.15	34.73	34.31	33.91
Red Meat	42.59	44.27	40.28	41.41	40.92	39.83	39.69	39.13	38.54	38.13	37.62
Poultry	13.20	15.35	15.06	14.89	14.72	14.55	14.38	14.21	14.05	13.88	13.72
Fish	13.30	14.80	13.80	13.72	13.83	13.51	13.41	13.31	13.14	13.02	12.89
Fresh Milk	93.19	93.44	93.91	94.30	93.05	92.92	92.60	92.03	91.70	91.29	90.86
Other Dairy	14.98	15.29	14.55	14.94	14.58	14.60	14.44	14.36	14.25	14.15	14.05
Eggs	11.56	10.22	11.71	10.99	10.93	11.17	10.98	10.98	11.00	10.94	10.93
Cottonseed Oil	59.00	60.43	59.52	58.66	58.59	58.13	57.86	57.50	57.19	56.86	56.55
Hydrogenated Oils	51.08	49.53	53.96	50.73	49.28	49.20	47.68	46.71	45.88	44.82	43.91
Refined Sugar	151.13	138.47	139.32	138.70	133.70	129.55	125.53	121.63	117.86	114.20	110.66
Total	2961.51	2945.56	2960.19	2908.94	2894.16	2870.06	2847.42	2823.91	2803.01	2780.30	2758.97

a) Actual data.

TABLE 26 - ACTUAL AND PROJECTED SHARE OF EACH ONE OF THE 21 FOOD COMMODITIES FROM THEIR TOTAL CALORIES CONSUMPTION

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
Wheat	41.44	41.31	41.38	41.93	41.77	42.03	42.15	42.27	42.41	42.55	42.67
Corn	21.18	20.94	21.08	21.13	21.25	21.27	21.37	21.43	21.49	21.56	21.63
Rice	12.12	12.45	12.17	11.82	11.92	11.76	11.75	11.66	11.60	11.53	11.47
Beans	2.03	2.31	2.35	2.31	2.34	2.36	2.35	2.37	2.38	2.38	2.39
Potatoes	1.44	1.32	1.33	1.37	1.34	1.35	1.36	1.36	1.36	1.36	1.36
Onion	0.59	0.58	0.63	0.55	0.58	0.55	0.55	0.54	0.53	0.52	0.51
Tomatoes	0.75	0.80	0.79	0.75	0.77	0.76	0.74	0.74	0.73	0.72	0.72
Watermelons	0.33	0.32	0.33	0.32	0.32	0.32	0.32	0.32	0.32	0.31	0.31
Other Vegetables	1.00	1.05	0.98	0.99	0.98	0.96	0.95	0.94	0.93	0.92	0.91
Dates	1.54	1.53	1.66	1.44	1.55	1.56	1.53	1.56	1.56	1.56	1.57
Citrus	1.12	1.10	1.09	1.07	1.08	1.07	1.06	1.06	1.06	1.05	1.05
Other Fruits	1.28	1.28	1.26	1.26	1.26	1.25	1.25	1.24	1.24	1.23	1.23
Red Meat	1.44	1.50	1.36	1.42	1.41	1.39	1.39	1.39	1.38	1.37	1.36
Poultry	0.45	0.52	0.51	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50
Fish	0.45	0.50	0.47	0.47	0.48	0.47	0.47	0.47	0.47	0.47	0.47
Fresh Milk	3.15	3.17	3.17	3.24	3.22	3.24	3.25	3.26	3.27	3.28	3.29
Other Dairy	0.51	0.52	0.49	0.51	0.50	0.51	0.51	0.51	0.51	0.51	0.51
Eggs	0.39	0.35	0.40	0.38	0.38	0.39	0.39	0.39	0.39	0.39	0.40
Cottonseed Oil	1.99	2.05	2.01	2.02	2.02	2.03	2.03	2.04	2.04	2.05	2.05
Hydrogenated Oils	1.72	1.68	1.82	1.74	1.70	1.71	1.67	1.65	1.64	1.61	1.59
Refined Sugar	5.10	4.70	4.71	4.77	4.62	4.51	4.41	4.31	4.20	4.11	4.01
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

a) Actual data.

TABLE 27 - ACTUAL AND PROJECTED PER CAPITA DAILY PROTEIN CONSUMPTION FROM THE 21 FOOD COMMODITIES

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
					grams						
Wheat	30.68	30.42	30.62	30.49	30.22	30.16	30.00	29.84	29.72	29.57	29.43
Corn	18.71	18.40	18.61	18.33	18.34	18.21	18.14	18.05	17.97	17.88	17.80
Rice	6.33	6.47	6.36	6.07	6.09	5.96	5.90	5.81	5.74	5.66	5.59
Beans	3.87	4.37	4.49	4.31	4.36	4.35	4.30	4.30	4.28	4.26	4.25
Potatoes	1.04	0.95	0.96	0.97	0.95	0.95	0.94	0.93	0.93	0.92	0.92
Onion	0.61	0.60	0.66	0.56	0.59	0.55	0.55	0.53	0.52	0.51	0.49
Tomatoes	0.48	0.51	0.50	0.47	0.47	0.46	0.45	0.45	0.44	0.43	0.42
Watermelons	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.21	0.21	0.21
Other Vegetables	0.11	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.09
Dates	0.52	0.52	0.56	0.48	0.51	0.51	0.50	0.50	0.50	0.49	0.49
Citrus	0.64	0.63	0.63	0.60	0.60	0.60	0.59	0.58	0.57	0.57	0.56
Other Fruits	0.54	0.54	0.53	0.52	0.52	0.51	0.50	0.50	0.49	0.49	0.48
Red Meat	2.77	2.88	2.62	2.70	2.66	2.59	2.58	2.55	2.51	2.48	2.45
Poultry	1.14	1.33	1.30	1.29	1.27	1.26	1.24	1.23	1.21	1.20	1.18
Fish	1.95	2.17	2.02	2.01	2.02	1.98	1.96	1.95	1.92	1.91	1.89
Fresh Milk	4.17	4.18	4.20	4.22	4.16	4.15	4.14	4.11	4.10	4.08	4.06
Other Dairy	0.62	0.63	0.60	0.62	0.60	0.60	0.60	0.59	0.59	0.58	0.58
Eggs	0.85	0.75	0.86	0.81	0.80	0.82	0.81	0.81	0.81	0.80	0.80
Cottonseed Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogenated Oils	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refined Sugar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	75.25	75.67	75.86	74.77	74.50	73.98	73.54	73.05	72.61	72.15	71.70

a) Actual data.

TABLE 28 - ACTUAL AND PROJECTED SHARE OF EACH ONE OF THE 21 FOOD COMMODITIES FROM THEIR TOTAL PROTEIN CONSUMPTION

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
Wheat	40.77	40.20	40.37	40.78	40.56	40.76	40.80	40.85	40.93	40.99	41.05
Maize	24.86	24.31	24.54	24.51	24.62	24.61	24.67	24.71	24.74	24.78	24.82
Rice	8.42	8.55	8.38	8.11	8.17	8.05	8.03	7.95	7.90	7.84	7.79
Beans	5.15	5.78	5.91	5.77	5.85	5.88	5.85	5.89	5.90	5.91	5.92
Potatoes	1.38	1.26	1.27	1.30	1.27	1.28	1.28	1.28	1.28	1.28	1.28
Onion	0.81	0.79	0.86	0.75	0.79	0.75	0.75	0.73	0.72	0.70	0.69
Tomatoes	0.63	0.67	0.66	0.63	0.64	0.63	0.62	0.61	0.61	0.60	0.59
Watermelons	0.31	0.30	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29
Other Vegetables	0.15	0.15	0.14	0.15	0.14	0.14	0.14	0.14	0.14	0.13	0.13
Dates	0.69	0.68	0.74	0.64	0.69	0.69	0.68	0.69	0.69	0.69	0.69
Citrus	0.86	0.83	0.83	0.80	0.81	0.81	0.80	0.80	0.79	0.79	0.78
Other Fruits	0.71	0.71	0.70	0.70	0.69	0.69	0.68	0.68	0.68	0.67	0.67
Red Meat	3.69	3.81	3.46	3.61	3.58	3.51	3.51	3.49	3.46	3.44	3.42
Poultry	1.51	1.75	1.71	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65
Fish	2.59	2.86	2.66	2.69	2.72	2.67	2.67	2.67	2.65	2.64	2.63
Fresh Milk	5.54	5.52	5.53	5.64	5.58	5.62	5.63	5.63	5.65	5.66	5.67
Other Dairy	0.82	0.83	0.79	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Eggs	1.13	0.99	1.13	1.08	1.08	1.11	1.10	1.10	1.11	1.11	1.12
Cottonseed Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogenated Oils	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refined Sugar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

a) Actual data.

TABLE 29 - ACTUAL AND PROJECTED PER CAPITA DAILY FATS CONSUMPTION FROM THE 21 FOOD COMMODITIES

Commodity	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
						grams					
Wheat	4.22	4.18	4.21	4.19	4.16	4.15	4.13	4.10	4.09	4.07	4.05
Corn	8.36	8.22	8.32	8.19	8.20	8.14	8.11	8.07	8.03	7.99	7.96
Rice	0.74	0.76	0.74	0.71	0.71	0.69	0.69	0.68	0.67	0.66	0.65
Beans	0.17	0.20	0.20	0.19	0.20	0.20	0.19	0.19	0.19	0.19	0.19
Potatoes	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Onion	0.13	0.13	0.14	0.12	0.13	0.12	0.12	0.11	0.11	0.11	0.11
Tomatoes	0.23	0.25	0.24	0.23	0.23	0.23	0.22	0.22	0.22	0.21	0.21
Watermelons	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Other Vegetables	0.15	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13
Dates	0.13	0.13	0.14	0.12	0.13	0.13	0.12	0.13	0.12	0.12	0.12
Citrus	0.21	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.18
Other Fruits	0.38	0.38	0.37	0.37	0.36	0.36	0.36	0.35	0.35	0.34	0.34
Red Meat	2.69	2.80	2.55	2.62	2.59	2.52	2.51	2.47	2.44	2.41	2.38
Poultry	0.71	0.83	0.81	0.80	0.79	0.79	0.78	0.77	0.76	0.75	0.74
Fish	0.65	0.72	0.67	0.67	0.67	0.66	0.65	0.65	0.64	0.64	0.63
Fresh Milk	6.58	6.60	6.63	6.66	6.57	6.56	6.54	6.50	6.47	6.44	6.41
Other Dairy	1.03	1.05	1.00	1.03	1.00	1.00	0.99	0.99	0.98	0.97	0.97
Eggs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cottonseed Oil	6.67	6.84	6.73	6.64	6.63	6.58	6.55	6.51	6.47	6.43	6.40
Hydrogenated Oils	5.78	5.60	6.10	5.74	5.57	5.57	5.39	5.28	5.19	5.07	4.97
Refined Sugar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	38.98	39.17	39.36	38.75	38.41	38.14	37.80	37.47	37.17	36.85	36.55

a) Actual data.

TABLE 30 - ACTUAL AND PROJECTED SHARE OF EACH ONE OF THE 21 FOOD COMMODITIES FROM THEIR TOTAL FATS CONSUMPTION

Commodity	1991[a]	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001
Wheat	10.82	10.68	10.70	10.82	10.82	10.87	10.91	10.95	10.99	11.03	11.07
Corn	21.45	20.99	21.14	21.14	21.35	21.34	21.46	21.53	21.61	21.69	21.77
Rice	1.90	1.93	1.89	1.83	1.85	1.82	1.82	1.81	1.80	1.79	1.78
Beans	0.45	0.50	0.51	0.50	0.51	0.51	0.51	0.52	0.52	0.52	0.52
Potatoes	0.13	0.12	0.12	0.13	0.12	0.12	0.12	0.12	0.13	0.13	0.13
Onion	0.33	0.33	0.36	0.31	0.33	0.31	0.31	0.30	0.30	0.29	0.29
Tomatoes	0.60	0.63	0.62	0.59	0.61	0.60	0.59	0.59	0.58	0.57	0.57
Watermelons	0.20	0.19	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Other Vegetables	0.39	0.41	0.38	0.38	0.38	0.37	0.37	0.37	0.36	0.36	0.35
Dates	0.33	0.33	0.36	0.31	0.33	0.34	0.33	0.34	0.34	0.34	0.34
Citrus	0.54	0.53	0.52	0.51	0.52	0.52	0.51	0.51	0.51	0.51	0.51
Other Fruits	0.97	0.96	0.95	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93
Red Meat	6.91	7.15	6.47	6.76	6.74	6.61	6.64	6.61	6.56	6.54	6.51
Poultry	1.83	2.11	2.06	2.07	2.07	2.06	2.05	2.05	2.04	2.03	2.03
Fish	1.66	1.84	1.71	1.73	1.76	1.73	1.73	1.73	1.72	1.72	1.72
Fresh Milk	16.88	16.84	16.84	17.18	17.10	17.20	17.29	17.34	17.41	17.49	17.55
Other Dairy	2.64	2.68	2.54	2.65	2.61	2.63	2.63	2.64	2.63	2.64	2.64
Eggs	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cottonseed Oil	17.12	17.45	17.11	17.13	17.25	17.24	17.31	17.36	17.40	17.45	17.50
Hydrogenated Oils	14.82	14.30	15.51	14.81	14.51	14.59	14.27	14.10	13.96	13.76	13.59
Refined Sugar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

a) Actual data.

Tables 25, 27, and 29 show the actual and projected calorie, protein and fat consumption from the 21 food commodities, and are based on projected consumption. The projections suggest that the daily per capita calories, protein, and fats consumption will decline in the projection period. Actual and projected consumption suggest that wheat will be the main source for calories and protein during 1991 through 2001. Tables 26, 28 and 30 show that there will be no significant change; shares of each commodity's total calorie, protein, and fat consumption.

7. CONCLUDING OBSERVATIONS

The main objective of this study is to provide policy and decision makers, producers and other agents of the economy with basic information about the structure of consumer demand for major food commodities. These results focus attenuation on the impact of economic changes in the economic transformation. These estimates of the own-, cross-price and expenditure elasticities area valuable resource for anticipating impacts of the reform.

The study provides estimates for price and expenditure elasticities for 21 food commodities using LAIDS and 8 submodels for groups of commodities, and a full demand system or full matrix. Although the results represent newly available information on the final demand for food in Egypt, they are not without limitations. Some of these limitations are particularly fertile areas of future research. Those mentioned here help to illustrate the advantages and disadvantages of the present results and to recommend areas for future work.

The estimated price elasticities from the LAIDS models and the estimated expenditure elasticities from the household survey data were used to construct the full matrix. Using the full matrix and a set of assumed prices for the projection period, the per capita consumption, total consumption, expenditures, and various nutrition values were estimated. The projected results can evaluated by decision makers and economic specialists in more specific contexts to reach conclusions about impacts of economic

change. This study has provides with the required structure for this work. Structural implications from the estimated elasticities derived work LAIDS models, from the full matrix and from the household survey data, are important. Many economic changes affect prices as well as consumption and expenditures.

Several areas are specifically recommended for additional research. Using various simulations, it is easy to make some projections about changes in the structure of food consumption, after explaining the price and expenditure elasticities for each commodity. Generally, implications of the demand structure at the farm or wholesale level are much the same as those of the final demand system. This study provides a basis for future detailed analyses of the structural implications in more detail.

Also, the set of commodities used in this study should be extended to all food commodities. On the other hand, the elasticities for meats, vegetables, fruits, and oils could be reestimated by commodity bias and not as an aggregated group.

The differences between the rural and urban areas in Egypt is significant and it is difficult to estimate plausible demand systems for both together. The problem of this study was a lack of price and consumption information for both rural and urban areas. Specializing the demand systems to rural and urban areas will allow improved analysis of consumption patterns.

The effect of quality change was also not addressed. If there is quality change, then we must adjust demand estimates accordingly to reflect these different features of the food supply.

Finally, other studies would complement the analyses of prices and projections. These studies are not presently available for Egypt. Various simulations using projected prices and expenditures can test the robustness of the results and evaluate implications for estimated consumption, expenditure, and nutrition.

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