Consumer Demand for Meat, Poultry and Seafood in Taiwan

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Abstract: This study provides estimates of a complete demand elasticities matrix for meat, poultry, fishery fish, aquaculture fish, as well as shrimp and shell fish in Taiwan, using the linear approximate almost ideal demand system. Estimation is based on aggregate annual consumption data complied from Taiwan Food Balance Sheets during 1970-1998. The estimated own-price elasticities indicate meat, poultry and seafood are all price inelastic. The results reveal that expenditure effects are strong for meat and fishery fish. The estimated cross-price elasticities are generally small and most products are gross complements. In addition, the effects of household size and the ratio of population aged over 64 on animal products consumption are observed to be significant. Moreover, own-price and expenditure elasticities computed at selected years reveal a possible change in pattern of consumption behavior which, however, may require further statistical analysis.

KEY WORDS: demand system, elasticity, meat, poultry, seafood

I. INTRODUCTION

Consumer demand for food is a critical component in the economic analysis of consumer well-being and food policies. Understanding the structure and pattern of food consumption is essential for designing and assessing food production program and trade policies. For example, the price and expenditure elasticities are important parameters for the formation of agricultural and other public policies. The estimated demand elasticities can be used in determining the impacts of policies changes. Furthermore, producers, marketing organizations, food processors and the food retailing industry require reliable measures of the effects of changes in food prices, changes in food expenditures, and changes in socio-demographic variables. These estimates can be employed to explain current consumption conditions in the food industry and to project future consumer food demand.

Salient growth in personal disposal income, increases in the prices of food and non-food items, and dramatic changes in lifestyle have impacts on the structure and pattern of Taiwanese food consumption. Meanwhile, socio-demograhic characteristics of the Taiwanese population which may affect food consumption have changed significantly in past decades. These changes include the declining rate of growth of population, the composition of age, and size of households, the increasing labor force participation of women.

Furthermore, increases concerns of nutrition and health may have changed food consumption patterns in Taiwan. These claims have been based on the fact that there have been substantial increases in per capita consumption of dairy products during the recent years. In addition, food safety issues have become an another critical concern for consumers. An obvious evidence for supporting these views is organic products consumption have been widely popular in Taiwan. These and other changes in food consumption pattern have implications for the food industry, especially if these changes continue into the future.

Meat, poultry and seafood are important items of Taiwanese dietary consumption. These animal products are also major sources for providing daily protein intake to Taiwanese people. Based on the Taiwan Food Balance Sheet data, per capita daily protein intake is 95.7 gram consisting of animal protein is 50.66 grams and vegetable protein is 45.04 grams in 1998. Animal protein is largely stemed from meat accounting for 32%, poultry account for 20%, and seafood accounting for 25%

The primary purpose of this paper is to apply a demand system for analyzing the demand for pork, poultry and seafood in Taiwan. The outline of the paper is as follows. First, the linear approximate almost ideal demand system with dynamic and demographic factors are specified. Second, data sources and sample description are illustrated. Third, the estimation results of demand parameters are presented. Finally, the implications of empirical results are discussed.

II. SPECIFICATION OF THE ALMOST IDEAL DEMAND SYSTEM

To provide a conceptual framework to deal with the interdependency of demand for various commodities, the complete systems approach is very effective for modeling consumption behavior (Barten, 1977). For empirical estimation of demand parameters, an explicit function form needs to be determined a priori. The almost ideal demand system (AIDS) developed by Deaton and Muellbauer

(1980) is employed in this study. The AIDS model possesses a number of desirable properties. The model satisfies the axioms of choice and it is an arbitrary first order approximation to any demand system. The system can also satisfy exact aggregation across consumers. Moreover, it can be appropriated at the estimation stage by a linear form.

Following Deaton and Muellbauer, the AIDS model in expenditure share form can be expressed as:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_i + \beta_i \log(M/P) \qquad (1)$$

where W_i denotes the expenditure share of *i*th commodity, p_i denotes the price of *i*th commodity, M is total expenditure, and P is a translog price index defined by

$$\log P = \alpha_0 + \sum_k \alpha_k \log p_k + \tfrac{1}{2}\sum_j \sum_k \gamma_{kj} \log p_k \log p_j \qquad (2)$$

The adding-up, homogeneity, and symmetric conditions imply the following restrictions on the parameters:

$$\sum_i \alpha_i = 1, \quad \sum_i \gamma_{ij} = 0, \quad \sum_i \beta_i = 0 \quad \text{(adding-up)} \qquad (3)$$

$$\sum_j \gamma_{ij} = 0 \quad \text{(homogeneity)} \qquad (4)$$

$$\gamma_{ij} = \gamma_{ji} \quad \text{(symmetry)} \qquad (5)$$

For empirical applications, the AIDS has often been estimated using a simple linear approximation to avoid nonlinearity of the system. This approximation essentially amount to replace eq.(2) with some mechanical price index such as the Stone index defined as log $P^* = \sum_i w_{it} * \log(p_{it})$. Deaton and Muellbauer note that in most cases the approximation is fairly close, particularly if wide variations in prices do not occur in the sample period. However, Moschini (1995) indicates that AIDS using Stone index as a linear approximation model is not invariant to changes in units of measurement, which may seriously affect the approximation properties of the model. A modification to the Stone index or use of a regular price index are suggested for empirical estimation of a linear approximate AIDS. Therefore, the study uses the Tornqvist index, which is a superlative index for the translog function (Diewert, 1976), to the eq.(2) in the original specification.

The Tornqvist index P_t^T, viewed as a discrete approximation to the Divisia index, is

$$\log(P_t^T) = \tfrac{1}{2}\sum_{i=1}(w_{it} + w_i^0)\log\left(\frac{p_{it}}{p_i^0}\right) \qquad (6)$$

where the zero superscript denotes base period values.

Moreover, in order to incorporate the impacts of demographic variables into the system, this study employs demographic translation proposed by Pollak and Wales (1981). Accordingly, the taste change parameters α_i in eq.(1) are replaced by a linear function of demographic variables, D_h:

$$\alpha_i = \alpha_{i0} + \sum_{h=1}^{m} \alpha_{ih} D_h \qquad (7)$$

where D_h is *h*th demographic variable, α_{ih} is the associated coefficient in the *i*th share equation, and m is the number of demographic variables in the system. Three demographic variables, which are household size, labor force participation of women, and the ratio of population aged over 64, are considered in this analysis. Household size is included to capture the scale effect in animal products consumption. Women in the labor force usually face the time pressure. They want to do less cooking. Convenience is, therefore, now one of most important attributes of food products. Growing convenience-oriented concern may have changed meat and fish consumption behavior. The variable of labor force participation of women is included to attempt to capture this effect. Over the past two decades, the ratio of old to young persons have been steadily increasing in Taiwan. Age affects food consumption because caloric and nutrition needs changes as people age. Preferences and choices also change with experience. Food needs for elderly group are quite different from the needs and preferences of younger persons. In this study, the ratio of population aged over 64 is included to attempt to capture the effects of aging on food consumption.

The adding-up restriction required that

$$\sum_{i=1} \alpha_{i0} = 1, \text{ and } \sum_{i=1} \alpha_{ih} = 0 \qquad \text{for h=1, 2, …, m} \quad (8)$$

Many researchers argue that demand models should incorporate or at least test for dynamic behavior of consumers. The dynamics are often assumed to reflect persistence in consumption pattern and to capture the changes in taste over time. In fact, several previous demand studies including Blanciforti, et al. (1986), Lee (1992), and Rickertsen (1998), have shown that a dynamic form of a demand system provides a better approximation to consumer behavior than a static formation.

Several alternative approaches have been used to incorporate dynamic factors of consumer behavior into specification of the demand system (Johnson et al. 1984). In empirical estimation, the model has been estimated in difference form (e.g., Deaton and Muellbauer,1980), lagged consumption has been included (e.g., Blancforti, et al.1986, Lee,1992), a general dynamic framework has been used (e.g., Anderson and Blundell, 1983), and the vector of lagged expenditure shares has been included in each equation (e.g., Rickertsen,1998). In this study, a lagged quantity variable (Q_{t-1}) is included to capture the impacts of persistence in consumption pattern and/or changes in taste over time.

Consequently, using Tornqvist price index and incorporating demographic variables as well as the dynamic specification, the share equations, eq.(1), can be extended and written as:

$$w_i = \alpha_{i0} + \alpha_{i1} Q_{i,t-1} + \alpha_{i2} S + \alpha_{i3} L + \alpha_{i4} O + \sum_j \gamma_{ij} \log p_i + \beta_i \log\left(M/P_t^T\right) \quad (9)$$

where S denotes the household size, L denotes the rate of labor participation of women, and O denotes the ratio of population aged over 64.

The uncompensated price elasticities (η_{ij}) are computed from the estimated parameters of the LA/AIDS model (Chalfant,1987, and Hayes et al. 1990) as:

$$\eta_{ij} = -\delta_{ij} + \left[\gamma_{ij} - \beta_i w_j\right] / w_i \quad (10)$$

where δ_{ij} is the Kronecker delta, i.e., $\delta_{ij}=1$ if i=j and $\delta_{ij}=0$ if $i \neq j$.

The expenditure elasticities, η_i, are calculated as:

$$\eta_i = 1 + \left(\beta_i / w_i\right) \quad (11)$$

The compensated price elasticities(η_{ij}^*) can also be evaluated from the expenditure elasticity, expenditure share and the uncompensated price elasticities. They are expressed as :

$$\eta_{ij}^* = \eta_{ij} + w_j \eta_i \quad (12)$$

III. DATA SOURCES AND DESCRIPTION

The quantities demanded and prices variables are two major components in demand model. The characteristics of available data series for these two components and the consistency of these data series are vital for ensuring the accuracy of parameter estimates. The annual per capita consumption data for meat and poultry in Taiwan from 1970 to 1998 were collected from the *Taiwan Food Balance Sheet* compiled by Council of Agriculture.

For the purpose of this study, seafood products are classified into three categories: fishery fish, aquaculture fish, as well as shrimp and shell fish. Fishery fish originate from far-sea fishery, offshore fishery, coastal fishery, and marine culture. Major species of fishery fish include tunas, billfishes, squids, mullets, marline, pomfrets, sardines, sea breams, bonitos, mackerels, hairtail, and grouper. Aquaculture fish originate from inland water fishing fisheries and aquaculture. Major species of aquaculture fish include tilapia, carps, eel, and milkfish. Shrimp and shell fish contain shrimps, crabs, oyster and clams.

The quantity demanded data for these three seafood categories are computed using the Food Balance Sheet approach, which requires the existence of statistical data on production, imports and exports, and changes in stocks in order to determine the quantity available for human consumption. Using this approach, the availability for per capita consumption of fishery fish, aquaculture fish, and shrimp and shell fish are evaluated for the sample period.

Note that there are not actual meat, poultry and seafood intake data, we, therefore, assume that food consumption are identical to food availability in the study. However, both series would exhibit the same trends if data sources and intake behavior remained relatively the same. It is noted also that the quantity demanded data are expressed on a per capita basis in the analysis.

There exists no single consistent retail price data series for the five food commodities under this study. It is necessary to use as much as possible the available data for computing the needed retail prices for these five commodities. The retail prices of food commodities are obtained from *Taiwan Agricultural Prices and Costs* published monthly by the Department of Agriculture and Forestry, Provincial Government of Taiwan. Retail prices of meat were computed by consumption quantity weighted average of pork, beef and mutton. Retail prices of poultry were calculated by consumption quantity weighted average of chicken and duck. However, retail prices of three seafood categories were evaluated using the production quantity weighted average procedure. Demographic data, including household size, labor force participation of woman, and population aged over 64, are obtained from *Taiwan Statistical Data Book* published by Council for Economic Planning and Development, Executive Yuan, Republic of China.

Table 1 shows that per capita annual meat, poultry and seafood consumption for selected year in Taiwan. Per capita annual animal products consumption increased from 66.62 kg in 1970 to 128.52 kg in 1998 reflecting about double increase over the past three decades. Meanwhile, the composition of animal products consumption structure has also had substantial changes due to different growth rate of consumption among various animal products. For instance, poultry accounted for 8.4% of total meat, poultry, and seafood consumption in 1970 and increased to 24.5%

in 1998. Part of its popularity is due to a large market in fast-food chains and consumers spend much more money in food away from home. On the contrary, three seafood categories accounted for 61.6% of total animal products consumption in 1970 and decreased to 40% in 1998. Per capita annual consumption of meat, poultry, fishery fish, aquaculture fish, shrimp and shell fish in 1998 are: 45.67kg, 31.43kg, 38.83kg, 6.19kg, and 6.40kg, respectively.

Table 1: Per Capita Consumption of Meat, Poultry, and Seafood for Selected Year in Taiwan

Units : Kg

Commodity	1970	1980	1990	1998
Total	**66.62**	**86.45**	**120.22**	**128.52**
Meat	19.65	27.27	40.12	45.67
Poultry	5.60	11.45	21.68	31.43
Fishery fish	34.12	33.90	40.58	38.83
Aquaculture fish	3.51	6.92	10.64	6.19
Shrimp & Shell fish	3.74	6.91	7.20	6.40

Sources: Compiled from Taiwan Food Balance Sheets

To gain an insight into the pattern of animal products consumption, changes in the per capita annual consumption of meat, poultry, and seafood over sample periods are illustrated in Figure 1. Among five animal products, we can readily observe that consumption of meat and poultry have been dramatically increasing while aquaculture fish, shrimp and shell fish consumption maintains a fairly stable level. At the same time periods, fishery fish consumption have a relatively large variation.

IV. EMPIRICAL RESULTS

(I) Regression results

Before the empirical results are presented, a brief overview of the evolution of expenditure shares for the meat, poultry, and seafood may be contributed to a better understanding the estimation results. The share of poultry rise in total expenditure from 9% in 1970 to 19% in 1998 while meat expenditure share remained relatively stable at about 38%. Within three seafood products, the fishery fish expenditure shares fell from 37.8% to 33.8%, and in that of aquaculture fish fell from 5.4% to 2.8% during the sample periods. However, the shrimp and shell fish expenditure shares rose at 1970s and fell after the middle of 1980.

The empirical regression results for the linear approximate version of the almost ideal demand system are presented for five animal products in Table 2. Overall, the model specified appears to fit quite well over the sample periods, as noted by the generally high R^2 and t-statistics of the estimated parameters. The coefficients of the habit effects show that all four coefficients are positive, and half of coefficients which are meat and poultry are statistically significant at α=5%. The positive coefficient reflects persistence in expenditure share allocation.

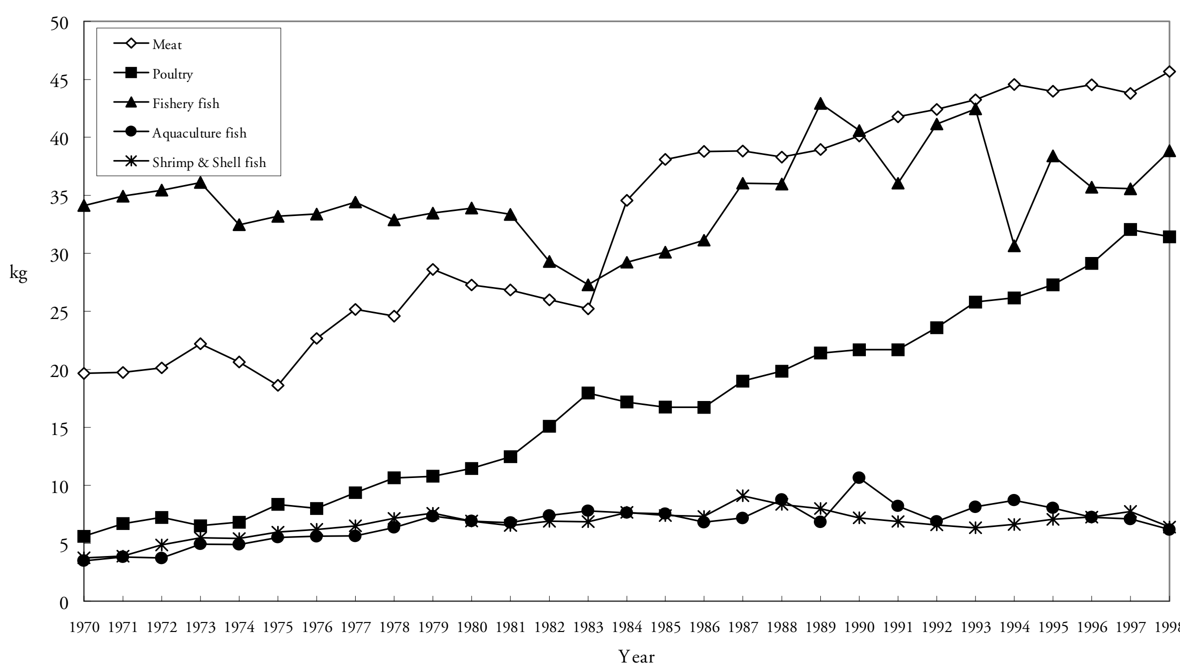

Figure 1 : Per Capita Annual Consumption of Meat, Poultry, and Seafood in Taiwan

The coefficients of α_{i2}, the ratio of population aged over 64, measure the effect of age affect animal products consumption. These coefficients are significant and negative for poultry and aquaculture fish, and is significant but positive for fishery fish. These results reveal that elderly person is likely to allocate more budget in purchasing fishery fish but less in poultry and aquaculture fish. The effects of household size on expenditure allocation are measured by α_{i3}. The estimates of this coefficient show that three out of four coefficients are significant at α=5%. The coefficients for poultry and aquaculture fish are negative while fishery fish has a positive sign. The coefficients of α_{i4} reflect the effects of labor force participation of women affecting animal products consumption. Among five estimates, all coefficients are insignificant at α=5%.

The estimated coefficient of expenditure effect, βi, for poultry is highly significant with a negative sign. Other animal products in the system with an insignificant real expenditure effect. It is noted that the sign of estimated coefficient for meat and fishery fish is positive, indicating a luxury for these food categories.

Consider next the price effects, four own price coefficients have the expected positive sign and all are statistically significant at α=5%. For cross price effects only two out of six of cross price coefficients are significant at α=10%. Generally speaking, for a demand system, this is a common result that the estimates of parameters are not always statistically significant.

Table 2: Parameter Estimates of LA/AIDS for Meat, Poultry, and Seafood in Taiwan

Parameter$_a$	Meat	Poultry	Fishery Fish	Aquaculture fish	Shrimp & Shell fish
α_{i0}	-0.193	1.94	-2.25	0.79	0.706
	(-0.19)$_b$	(4.24)	(-1.83)	(2.47)	
$\alpha_{i1}(10^{-2})$	0.180	0.393	0.106	0.055	-0.734
	(2.29)	(3.12)	(1.84)	(0.52)	
$\alpha_{i2}(10^{-2})$	-0.448	-2.183	4.619	-1.414	-0.574
	(-0.31)	(-2.77)	(2.49)	(-2.80)	
$\alpha_{i3}(10^{-2})$	-0.235	-11.535	23.410	-4.581	-7.059
	(-0.05)	(-4.86)	(3.98)	(-2.67)	
$\alpha_{i4}(10^{-2})$	0.162	-0.027	-0.461	0.033	0.293
	(0.52)	(-0.18)	(-1.22)	(0.31)	
β_i	0.058	-0.155	0.189	-0.060	-0.032
	(0.47)	(-2.80)	(1.23)	(-1.53)	
γ_{i1}	0.163	-0.001	-0.097	-0.023	-0.042
	(3.40)	(-0.06)	(-1.98)	(-1.47)	
γ_{i2}	-0.001	0.090	-0.051	-0.014	-0.024
	(-0.06)	(3.94)	(-1.95)	(-1.15)	
γ_{i3}	-0.097	-0.051	0.200	-0.013	-0.039
	(-1.98)	(-1.95)	(2.75)	(-0.64)	
γ_{i4}	-0.023	-0.014	-0.013	0.044	0.006
	(-1.47)	(-1.15)	(-0.64)	(2.93)	
γ_{i5}	-0.042	-0.024	-0.039	0.006	0.099
R^2	0.601	0.938	0.654	0.843	

a/ estimates for α_{5i} ,β_5 , γ_{ij} (i>j) are computed from parameters restrictions.
b/ figures in parentheses are approximate t-ratio.

(II) The estimated demand elasticities

One of the important objectives of a parametric demand analysis is to summarize the observed data by important demand elasticities. It is important that own-price, cross-price, expenditure, and demographic elasticities are evaluated. Note that all demand elasticities presented in Table 3 and Table 4 are computed using the estimated structural parameters and sample mean of the associated variables.

Table 3 gives a complete matrix of price and expenditure elasticities for five animal products. Five commodities have all expected signs for uncompensated own-price elasticities. Moreover, the estimated uncompensated own-price elasticities reveal that these are all price-inelastic. Thus the normally expected reaction of consumers to meat, poultry and seafood price changes was verified. In examining the cross-price elasticities of Table 3. As we can observe cross-price elasticities are generally small and most products are classified as gross complements except for the gross substitution exhibited between meat and poultry, fishery fish and aquaculture fish, as well as shrimp and aquaculture fish. Note that the compensated price elasticities are also reported in the Table 3. The compensated price elasticities are computed from uncompensated price elasticities, expenditure elasticities and expenditure shares following eq.(12).

Table 3: Price and Expenditure elasticities of Meat, Poultry, and Seafood in Taiwan

Commodity	Price of					Expenditure Elasticities
	Meat	Poultry	Fishery Fish	Aquaculture fish	Shrimp & Shell fish	
Meat	-0.63[a]	-0.02	-0.31	-0.07	-0.13	1.15
	(-0.19)[b]	(-0.12)	(0.01)	(-0.05)	(-0.06)	
Poultry	0.46	-0.12	0.01	-0.05	-0.06	-0.25
	(0.37)	(-0.15)	(-0.07)	(-0.06)	(-0.09)	
Fishery fish	-0.50	-0.22	-0.60	-0.07	-0.18	1.56
	(0.09)	(-0.03)	(-0.07)	(0.02)	(-0.01)	
Aquaculture fish	-0.01	-0.13	0.14	-0.11	0.23	-0.12
	(-0.05)	(-0.14)	(0.10)	(-0.12)	(0.22)	
Shrimp &	-0.27	-0.18	-0.26	0.07	-0.05	0.70
Shell fish	(-0.01)	(-0.10)	(-0.03)	(0.11)	(0.02)	

a/ All elasticities are computed at sample mean.

b/ Figures in parentheses are compensated price elasticities.

Estimated expenditure elasticities indicate that the fishery fish is the most elastic with an expenditure elasticity of 1.56, while for the remaining commodities are 1.15 for meat, 0.70 for shrimp and shell fish, -0.25 for poultry and -0.12 for aquaculture fish. The very high expenditure elasticity of fishery fish demand implies that further increase in fishery fish consumption should be expected in the future as consumer increase in total animal products expenditure.

Consider demographic variables elasticities, the results show that estimated elasticities for labor force participation of women are positive for meat, aquaculture fish, and shrimp and shell fish while fishery fish has a negative sign. Among the five commodities, shrimp and shell fish appear to have a higher labor force participation elasticity than other commodities. Most of the animal products have an negative sign of elasticities for population aged over 64 and household size with the exception of fishery fish. This results suggest that the more aged population and the larger household size, the more likely consumer would consume fishery fish. The estimated demographic variables elasticities are presented in Table 4.

Table 4: Elasticities of Demographic variables of Meat, Poultry, and Seafood in Taiwan

Commodity	L[a]	O[b]	S[c]
Meat	0.18[d]	-0.06	-0.03
Poultry	-0.09	-0.92	-4.19
Fishery fish	-0.57	0.71	3.13
Aquaculture fish	0.26	-1.38	-3.87
Shrimp & Shell fish	1.14	-0.28	-2.95

a/ L: Labor force Participation of women

b/ O: The ratio of people age over 64

c/ S: Household size

d/ All elasticities are computed at sample means

The estatenated demand elasticities in Table 3 and 4 are computed at the sample mean, it is also worthwhile to examine their value at specific time to note possible changes in preferences not accounted for by prices, expenditure and demographic variables of the model specification. Table 5 reports own-price and expenditure elasticities for five commodities at selected year. The own-price and expenditure elasticities for fishery fish have remained fairly stable while those of poultry and aquaculture fish have relatively large fluctuation over the sample periods. The increase in the expenditure elasticities of demand was most marked for poultry, rising from -0.641 in 1970 to 0.169 by

1998, implying that with increase total animal products expenditure the poultry expenditure share is becoming elastic. In addition the own price elasticity of poultry changes from 0.11 in 1970 to -0.36 by 1998. This indicates the impact of other factors on poultry preferences of some significance. In case of meat, the expenditure elasticity becomes declining with a decreasing expenditure shares.

Table 5: Own-Price and Expenditure Elasticities of Meat, Poultry, and Seafood for Selected Year in Taiwan

Commodity Year	Own-Price Elasticity	Expenditure Elasticity
Meat		
1970	-0.643	1.492
1980	-0.577	1.173
1990	-0.597	1.166
1998	-0.628	1.155
1970/1998	-0.627	1.155
Poultry		
1970	0.110	-0.641
1980	0.071	-0.573
1990	-0.068	-0.336
1998	-0.361	0.169
1970/1998	-0.118	-0.249
Fishery fish		
1970	-0.659	1.501
1980	-0.627	1.532
1990	-0.683	1.479
1998	-0.599	1.559
1970/1998	-0.596	1.561
Aquaculture fish		
1970	-0.132	-0.100
1980	-0.284	0.107
1990	-0.096	-0.150
1998	0.617	-1.120
1970/1998	-0.115	-0.124
Shrimp & Shell fish		
1970	0.243	0.599
1980	-0.263	0.767
1990	0.210	0.610
1998	0.478	0.521
1970/1998	-0.052	0.697

V. CONCLUSIONS

This study applied a linear approximate version of the almost ideal demand system incorporating dynamic and demographic factors to analyze aggregate annual consumption of meat, poultry and seafood for the periods from 1970 to 1998. The quantity demanded data were directly obtained from *Taiwan Food Balance* or calculated indirectly from production, imports and exports and changes in stocks. For ensuring the accuracy of parameter estimates, we pay much more attention to obtain the consistency of quantity demand and retail price data series.

The results of empirical estimation for structural parameters of the demand system are quite plausible. Meat, poultry and seafood are found to be all price inelastic. The cross-price elasticities are generally small. Most commodities are identified as gross complements except for the gross substitution exhibited between meat and poultry, fishery fish and aquaculture fish. Among five commodities, fishery fish has the largest positive elasticity with respect to expenditure while shrimp and shell fish have negative expenditure elasticity. Estimated elasticities for household size and population aged over 64 are negative for all commodities expect fishery fish. Poultry and aquaculture fish appear to have higher negative household size elasticities than other commodities.

Own-price and expenditure elasticities are also evaluated at selected year to investigate possible changes in consumption pattern. The results indicate that estimated elasticities have a significant change for poultry and aquaculture while fishery fish remains fairly stable. These evidences imply a change of demand structure in animal products which, however, may require further statistical analysis.

The structure and pattern of animal products demand emerged from the empirical analysis show that the presence of significant price effects on meat, poultry and seafood demand. This evidence points to price policy as an important policy instrument. The results also indicate meat and fishery fish demand is expected to increase further as long as consumer incomes keep rising. The limited possibilities of substitution exist among animal products because of small negative cross-price elasticities. Demographic variables are found to have significant impacts on animal products consumption pattern. The declining of household size may have contributed to the growth of the demand for poultry and acquaculture fish. The increasing ratio of population aged over 64 would be contributed to further increase of fishery fish demand.

This study provide a complete matrix of demand elasticities for five animal products which are critical policy-relevant parameters. These interrelationships information would be useful to policy-makers, food industry managers, marketers, and producers for an understanding of consumer meat, poultry and fish consumption behavior in Taiwan.

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