A DIFFERENTIAL APPROACH IN ANALYZING MEAT IMPORT DEMAND IN GREECE

CHRISTOS PANTZIOS - PANAGIOTIS FOUSEKIS (*)

ABSTRACT

Meat imports have been a considerable component of Greek agricultural trade; this becomes of interest both for potential meat exporters and domestic policy makers in the context of the ongoing market globalisation. The present study utilizes the absolute version of the Rotterdam model to analyze the demand for major types of imported meat in Greece, during 1961-1992. Estimated elasticities are used to decompose actual changes into price and expenditure effects; simulations of import changes, given simultaneous import price changes are also considered. Results indicate fairly elastic expenditure elasticities and highlight the importance of cross-price effects.
Key words: meat imports, demand analysis, Greece.

RÉSUMÉ

Les importations de la viande jouent un rôle considérable dans balance commerciale agricole de la Grèce. Ceci est intéressant entre la potentialité de ceux qui veulent exporter de la viande et les planificateurs de la politique nationale dans le context de la globalisation des marchés. La présente étude utilize la version absolute du modèle de Rotterdam en vue d'analyser la demande des majeurs types de la viande importée en Grèce pour la période 1961-92. Des élasticités en estimation seront utilisées pour décomposer les changements actuelles pour les prix et effets des coûts. Des simulations pour les changements pour l'importation, avec des changements simultanés des prix des importations, sont prise en considération. Des resultats indiquent des bons élasticités en ce qui est des exportations et illuminent l'importance des effets des prix croisés.
Mot clefs: *Importations de la viande, analyses de la demande, Grèce.*

Trade in agricultural products is a major component in the trade balance of Greece; in the 1980s, agricultural imports accounted from 15 to 20% percent of total imports, while agricultural exports were about one third of total exports. The entrance of Greece into the European Community has made the country's agricultural trade balance consistently negative at an increasing rate; the Greek agricultural trade deficit was 4.68 billion drachmas in 1981, 31.61 billion drachmas in 1985 and reached 149.75 billion drachmas in 1990 (Agricultural Bank of Greece, 1994).

At the same time, domestic agricultural production is mainly composed by plant products (two thirds is plant production and only one third is animal production). This has made Greece a consistent importer of meat and dairy products mainly from the large EU producers such as Germany, the United Kingdom, France and Italy, among others.

There is little doubt that changes in the current composition of the domestic agricultural production is a rather long run perspective, which is related to a whole array of structural changes needed in the Greek agricultural sector.

Thus, trade inflows of animal products may well be expected to be a significant portion of Greek agricultural trade at least in the short and medium run.

The ongoing liberalization of the world agricultural markets becomes also an important parameter in this context. As meat prices are, in general, lower out of the European market, pressure is being put on EU by large world meat producers (mainly the US) to reduce the respective trade or domestic subsidization schemes, currently in place. In this framework, the examination of consumer demand for imported meat of a solid meat importer such as Greece becomes of interest both to the country's potential exporters but also to domestic policy makers, interested on the impact of trade flows on the domestic animal sector. The purpose of this paper is to analyze the Greek import demand for major types of meat by examining the responsiveness of meat imports to changes in import prices and consumer income. In the following section, the theoretical framework and empirical model for analyzing consumer demand meat is presented. Empirical results in elasticity form are reported and analyzed in the second section. A decomposition of the changes in demand for the major types of imported meat into a price (substitution), an income and a residual effect during the 1980s is discussed in the third section. Concluding remarks are offered in the final section.

MULTISTAGE BUDGETING AND THE ROTTERDAM MODEL

The present study adopts the multistage approach in analyzing the allocation of consumer's income on food imports (Theil 1976, Deaton and Muellbauer 1980). The consumer (in this case Greece) allocates expenditure among broad groups of goods, assumed to be separable with each other.

Expenditure allocated to each group is further allocated among the goods making up the group; within each group, goods are no longer separable with each other.

In this theoretical framework, the study analyzes the demand for imported meat in Greece, in two stages. In the first stage, an import demand model is estimated for

(*) Researchers at the National Agricultural Research Foundation (N.AG.RE.F.) - Greece; no senior authorship is assigned.

Greek imports of food items(1) consisting of meat, dairy products and fish. In the second stage of the analysis, an import demand model is estimated for Greek imports of four major meat types (namely beef, poultry, mutton and goat meat, pork and sausages) from all destinations (i.e., countries). The reasoning here is that first the country allocates the total expenditure for imports among primary groups (in this stage, total meat imports is one composite good while dairy products and fish are other similar composite goods within a primary group, labeled here food imports). Next, the country allocates the given expenditure for total meat within a second-level group made-up from the major types of meat.

Following Theil (1980), the conditional demand equation for the ith type of imported meat within the imported meat-group is given by:

$$(w_i/W_g)d(\log q_i) = (\theta_i/\Theta_g)d(\log Q_g) + \sum_j \pi_{ij} d(\log p_j) \quad (1)$$

where w_i is expenditure share of the ith imported meat type within the imported meat-group denoted by S_g, $W_g = \sum_{i \in S_g} w_i$ is the budget share of group S_g, θ_i is the marginal budget share of the ith imported meat type, Θ_g is the marginal share of group S_g, p_j is the price of the jth type of (imported) meat, q_j is the respective import quantity, and π_{ij} are (conditional) Slutsky price parameters.

Equation (1) becomes operational by approximating expenditure shares and log-changes in prices and quantities as $w_i = 1/2\ (w_{it} + w_{i,t-1})$, $d(\log x_{it}) = \log x_{it} - \log_{i,t-1}$ where x_i denotes either p_i or q_i, and $d(\log Q_g) = \sum_{i \in S_g} (w_i/W_g)d(\log q_i)$. Furthermore, the standard properties of consumer demand functions are imposed via linear restrictions: the adding-up constraint is imposed as $\sum_{i \in S_g} \theta_i = 1$, homogeneity as $\sum_{i \in S_g} \pi_{ij} = 0$, and symmetry as $\pi_{ij} = \pi_{ji}$.

The imported food group is assumed not to belong to any broader consumption group; therefore the demand equation for each of the goods it consists of is:

$$w_k d(\log q_k) = \theta_k d(\log Q) + \sum_j \pi_{kj} d(\log p_j) \quad (2)$$

where k = meat, dairy products, fish and the same notation, approximations and linear restrictions as in (1) apply.

Within the imported meat-group, the expenditure and Slutsky (compensated) price elasticities for the ith type of imported meat can be simply calculated as $\eta_i = \theta_i/w_i$ and $\varepsilon_{ij} = \pi_{ij}/w_i$, respectively (that is, the budget and marginal shares of the group is left out of the analysis). The same elasticities for the ith type of imported meat can also be computed within the respective broader group, in our case the imported food group (i.e., meat, dairy products, fish), given estimates of the expenditure and own price elasticity of imported meat as a whole. In particular, dividing $(\theta_i/\Theta_g))$ by (w_i/W_g) it is straightforward to show that the expenditure elasticity of the ith type of meat is given by $\eta_i^* = \eta_i \eta_g$ (where η_g is the expenditure elasticity of imported meat within the imported food group).

In addition, the Slutsky price parameters π_{ij} in (1) are shown,(in their explicit derivation) to equal $\pi_{ij} = (\phi/W_g)(\theta_{ij} - \Theta_g\ \theta_i\theta_j)$, where ϕ is the income flexibility (Theil, 1980 p.14) and θ_{ij} is a parameter. Thus, by dividing the second term on the right-hand side of (1) by (w_i/W_g) it is shown that within the imported food-group the Slutsky (compensated) price elasticities of the ith type of imported meat are given by $\varepsilon_{ij}^* = \varepsilon_{ij} + (\phi\Theta_g/W_g)(\theta_i\theta_j/w_i)$, where $(\phi\Theta_g/W_g)$ is the own-price elasticity of imported meat as a whole (Lee et al, 1990).

Estimated parameters and elasticities

The data used in the respective estimations come from two major sources. Import quantities and values for meat, dairy products and fish were taken from the National Statistical Service of Greece (NSSG) accounts as reproduced in Agricultural Bank of Greece reports (Agricultural Bank of Greece 1985, 1994). These data are annual observations, expressed in metric tonnes and thousands of Greek drachmas, respectively, covering the period 1961 to 1990. Import quantities and values for the four major types of meat were taken from the FAO Trade Statistical Yearbook; they are expressed in metric tonnes and thousands of US dollars respectively, and cover the 1961-1992 period. The mean values and standard deviations of all the variables used are shown in **table 5**.

To facilitate estimation, the years 1971 and 1978 were omitted from the data matrix in the meat import model, because of zero imports of pork and poultry, respectively; in addition pork and sausage imports were aggregated into a single commodity. A dummy variable taking the value zero prior to 1981 and one after 1981 was also introduced in all estimations to account for the effect of Greece's entrance into the European Union(2). The estimation results of the meat- dairy products-fish

(1) The food and beverages section of import accounts includes besides meat, dairy products, and fish items such as cereals, fruits, vegetables, sugar and products, oils and fats, margarine, and miscellaneous food items. Preliminary estimations failed to relate any of these items to the same group with meat, dairy products, and fish. Thus, the analysis proceeds on the assumption that the in income allocation problem facing the aggregate consumer, the imported meat-dairy products-fish group is separable from the rest of food imports.

(2) In the meat-dairy products-fish group the coefficients of the dummy variable were, respectively, negative and significant for imported meat and positive and significant for imported fish. This indicates an upward (downward) shift of the demand for imported fish (meat) after 1981, within this group. In the meat group the dummy variable coefficient was positive and significant only for pork and sausage imports. This suggests that, within the meat group, pork and sausage import demand exhibited an upward shift due to Greece's entrance into the EU.

Table 1 ***Rotterdam elasticity estimates of import allocation for major Greek food imports, homogeneity and symmetry imposed, 1961-1990.***

	Price elasticities			
	Meat	Dairy	Fish	Expenditure elasticities
Meat	—0.191**	0.268	—0077	1.529*
	(0.138)	(0.107)	(0.053)	(0.061)
Dairy	0.553	—0.813*	0.261	0.162**
	(0.23	(0.190)	(0.081)	(0.102)
Fish	—0.346	0.569	—0.022**	0.438*
	(0.238)	(0.177)	(0.192)	(0.100)

Likelihood ratio test (LRT) statistics.

Log of likelihood		Likelihood of ratio test	
Model	function	(LRT)	χ^2 0,05
(a) Unrestricted	148.732	(b) vs. (a): 2.038	5.99(2)[b]
(b) Homogeneity	147.713	(c) vs. (b): 0.58	3.84(1)
(c) Homogeneity and symmetry	147.423	(c) vs. (a): 2.618	7.81(3)

* Statistically different from zero at $\alpha = 0.05$ level.
** Statistically different from zero at $\alpha = 0.10$ level.
[a] estimated standard errors, computed as var $\varepsilon_{ij} = (1/w^2_i)$ var (π_{ij}), (Rodolfo and Capps, 1994).
[b] Numbers inside the parentheses indicate number of restrictions imposed.

Table 2 ***Rotterdam elasticity estimates of import allocation for major Greek meat imports, homogeneity and symmetry imposed, 1961-1992.***

	Price elasticities				
	Beef & Veal	Poultry	Mutton & Goat	Pork & Sausages	Expenditure elasticities
Beef &	—0.449*	0.034	0.456*	—0.040	1.067*
Veal	(0.189)[a]	(0.046)	(0.145)	(0.094)	(0.063)
Poultry	0.639	—0.722*	0.639	—0.556	0.894*
	(0.861)	(0.375)	(0.761)	(0.541)	(0.358)
Mutton &	1.770*	0.132	—2.408*	0.500**	1.076*
Goat	(0.562)	(0.157)	(0.600)	(0.310)	(0.186)
Pork &	—0.233	—0.172	0.750**	—0.336	0.516
Sausages	(0.546)	(0.168)	(0.470)	(0.474)	(0.213)

Likelihood ratio test (LRT) statistics

	Long of likelihood	Likelihood ratio test	
Model	function	(LRT)	χ^2 0.05
(a) Unrestricted	157.212	(b) vs. (a): 1.126	7.81(3)[b]
(b) Homogeneity	156.649	(c) vs. (b): 5.364	7.81(3)
(c) Homogeneity and symmetry	153.967	(c) vs. (a): 6.42	12.59(6)

* Statistically different from zero at $\alpha = 0.05$ level.
** Statistically different from zero at $\alpha = 0.10$ level.
[a] Stimates of the standard errors associated with the variolus elasticities are computed as var $\varepsilon_{ij} = (1/w^2_i)$ var (π_{ij}), (Rodolfo and Capps, 1994).
[b] Numbers inside the parentheses indicate number of restrictions imposed.

model (called henceforth, the 'food model') are presented, in elasticity form, in **table 1**; the standard restrictions of homogeneity and symmetry, implied by the consumer theory have been imposed. The validity of these restrictions is further tested by means of a likelihood ratio test (LRT), (Judge et al, 1988) and the results are reported in the lower part of **table 1**.

Both the homogeneity, and the homogeneity and symmetry restrictions could not be rejected at the $\alpha = 0.05$ level. In addition, the negativity condition of the price coefficient matrix was tested by checking the matrix's semidefiniteness. Of the three eigen values of the matrix two are negative and the third is virtually zero thus implying that the second derivative matrix of the examined demand equation system is indeed, negative semidefinite. Thus, both tests show that the estimated imported food model conforms with standard consumption theory postulates.

The reported price and expenditure elasticities are computed at the sample means and as already noted, they are conditional on the income allocated by the consumer to the imported food group. The expenditure elasticities of meat and fish are statistically significant at the $\alpha = 0.05$ level while that of imported dairy is significant at the $\alpha = 0.10$ level; all three of them are positive implying that imported meat, dairy products, and fish are normal goods in the consumer's budget. All three own-price elasticities are negative and statistically significant at the $\alpha = 0.10$ level for imported meat, at the $\alpha = 0.05$ level for dairy products and at the $\alpha = 0.10$ level for imported fish.

The elasticity estimates for the meat import model (also computed at the sample means) are reported in **table 2**. The respective parameters were estimated as earlier with the symmetry and homogeneity restrictions imposed; again, both restrictions could not be rejected at the $\alpha = 0.05$ level as shown in the lower part of **table 2**. Furthermore inspection of the price coefficient matrix showed that the negativity condition is essentially satisfied as three of the matrix's eigen values are negative while the forth is virtually zero.

All own-price elasticity estimates are negative and statistically different from zero at the $\alpha = 0.05$ level except of the estimate for pork and sausages. This elasticity is significant only at the $\alpha = 0.25$ level implying that imported pork and sausages are insensitive to own-price changes.

With respect to cross-price effects in the context of the Rotterdam model, a negative cross-price elasticity indicates complementary goods while a positive cross-price elasticity indicates substitutes. Of the six cross-price elasticities estimated in the meat model, statistically significant are the beef-to-mutton and goat meat, price elasticity (different from zero at the $\alpha = 0.05$ level) and the mutton and goat meat-to-pork and sausage, price elasticity (different from zero at the $\alpha = 0.10$ level). The respective estimates are both positive indicating that imported mutton and goat meat is a strong substitute for imported beef while imported pork and sausages are a substitute for imported mutton and goat meat (and vice versa). Complementarity relationships (which, admittedly are difficult to explain) are indicated in the cases of beef-to-pork and sausages, and poultry-to-pork and sausages; however, both these cross elas-

ticities are not statistically different from zero at any acceptable level.

As mentioned earlier, these elasticities are conditional on the total imported meat expenditure of the aggregate consumer. That is, in a multistage allocation of the consumers' budget among goods, these elasticities refer to allocation of income among four types of imported meat, after the consumer has made his decision on the portion of income he wishes to allocate on imported meat, in general. The estimated own-price elasticities indicate that the consumer demand for imported beef, poultry or pork and sausages is inelastic: a 1% increase in the import price of beef, poultry or pork and sausages would decrease the respective imports by 0.45%, 0.72% and 0.33%, respectively. In contrast, demand for imported mutton and goat meat is fairly elastic: a 1% increase in its import price would, on the average, decrease its import volume by 2.4%.

The corresponding expenditure elasticities are all positive and statistically different from zero at the $\alpha = 0.05$ level. These elasticities show the effect of a change in the consumption volumes of the four imported meats group, given the budget share allocated to this group. Thus, if the consumer's budget for imported meat increases by 1%, imports of beef or mutton and goat would increase roughly by the same amount, that is, by 1.07% and 1.08%, respectively. Poultry imports would increase by 0.9% while pork and sausages imports would increase by half, e.g., by 0.5%.

Table 3 presents the price and expenditure elasticities for the same types of meat, now conditional on the consume expenditure allocated on the imported food group(3). All own price elasticities are now slightly higher suggesting that given the expenditure allocated to imported meat, dairy, and fish, a 1% drop in the import price of beef would raise its imported quantity by 0.6% while a 1% drop in the import price of mutton and goat meat would increase respective imports by 2.5%. More interestingly, the meat expenditure elasticities in this context become more elastic. If consumer expenditure allocated to the imported 'meat-dairy-fish' group increased by 1%, beef imports would rise by 1.63%. The same change would increase mutton and goat meat imports by 1.64% and poultry imports by 1.37%; it would increase however pork and sausage imports only by 0.79%.

Table 3 *Rotterdam elasticity estimates of allocating demand for imported types of meat within the group of major food imports, 1961-1992.*

	Price elasticities				
	Beef & Veal	Poultry	Mutton & Goat	Pork & Sausages	Expenditure elasticities
Beef & Veal	-0.596	0.027	0.418	-0.052	1.631
Poultry	0.516	-0.728	0.607	-0.566	1.367
Mutton & Goat	1.622	0.125	-2.447	0.488	1.645
Pork & Sausages	-0.304	-0.175	0.731	-0.342	0.789

Table 4 *Decomposition of the average change in imported meat quantities by type, 1980-1992.*

Item substitution	total effect	Income effect	Residual effect	Averageser obved growth rate of imported quantity
Beef	—0.0153	0.09378	0.0125	0.091
	(—16.8)	(103%)	(13.8%)	(100%)
Poultry(1)	—0.0189	0.126	0.163	0.270
	(—7%)	(47%)	(60%)	(100%)
Mutton & goat	0.073	0.0946	—0.0076	0.16
	(45.6%)	(59.1%	(—4.7%)	(100%)
Pork & sausage	—0.0198	0.0453	0.2855	0.311
	(—6.4%)	(14.6%)	(91.8%)	(100%)

(1) Due to the abrupt changes of poultry imports in the begining of 1980s the average growth rates in the case of poultry refer to the 1981 period.

Decomposition analysis of meat import demand

An analytical framework for decomposing demand functions into a total substitution, an income, and a residual effect has been recently introduced in the literature (Karagiannis and Velentzas 1996, 1997). It is straightforward to show that this decomposition is a rewriting of the Rotterdam demand equation (2) in growth rates rather than log-differences.

The estimated meat import model is tested below in the context of this decomposition, that is, the estimated meat elasticities are used to decompose actual changes in the imported volumes of the four meats examined here, expressed in first difference rates rather than log-changes.

In particular, the growth rate of import volume of the ith meat is decomposed as:

$$G(q_i) = \sum_{j=1}^{n} \varepsilon_{ij} G(p_j) + \eta_i \left[G(M) - \sum_{j=1}^{n} w_j G(p_j) \right] \qquad (3)$$

where G(•) is the growth rate of the respective variable and M is total expenditure on all four types of imported meat.

Table 4 presents the results of such decomposition for the 1980-1992 period. Columns 1, 2 and 3 report the total substitution, expenditure and residual effects, respectively. The substitution and expenditure effects are computed by using the mean price and expenditure elasticities of the meat model; the residual effect is then

(3) One could, in principle approximate the variance of elasticities e^*_{ij} and η^*_{ij} following results shown in Kmenta (1986, pp 485-87). The large number of parameters however, and the non-linearities involved in this study led us not to pursue this matter further.

Table 5 ***Means and standard deviations of the variables used in the econometric estimations.***

Variable	Mean deviation	Standard	Variable deviation	Mean	Standard
Meat Q	128017.3	71537.1	Beef Q	77725.7	44962.9
Meat P	130.4	161.2	Beef P	1988.5	1227.3
Dairy Q	111744.4	68066.7	Poultry Q	4951.4	4189.8
Dairy P	77.7	105.7	Poultry P	1353.3	986.7
Fish Q	35955.9	98.9	Mutton & goat Q	19306.1	11673.4
Fish P	12435.6	130.2	Mutton & goat P	1407.8	773.6
			Pork & Sausage Q	24134.8	1628.5
			Pork & Sausage P	27931.9	694.3

Q = imported quantity; P = import unit value.

obtained as the difference between the actual growth rates of imported quantities (shown in column 4) and the sum of the estimated substitution and expenditure effects. The numbers in parentheses express the same effects as percentages of the actual import growth rates. Except for mutton and goat meat, meat imports show a common pattern characterized by (a) a negative total substitution effect, and (b) a much larger positive expenditure effect. Furthermore in the cases of poultry and pork and sausage imports, the residual effect (accounting for habit formation and disturbance errors) is especially strong suggesting that habits and/or other factors may play a role in the preference of Greek consumers for these type of meat imports.

Inspection of **table 4** shows that the average growth rate of demand for imported beef rose by about 9% per year, over the 1980-1992 period. During the same period, the estimated change in imported meat prices affecting the demand for imported beef (i.e., the total substitution effect) declined by about 16.8%; on the other hand, the estimated change in consumer's expenditure for imported beef more than doubled, rising by 103%. Thus the combined effect of price and expenditure changes associated with imported beef is responsible for about 86.2% of the actual change in demand for imported beef; the rest 13.8% of the actual import growth may be attributed to residual factors (habit formation).

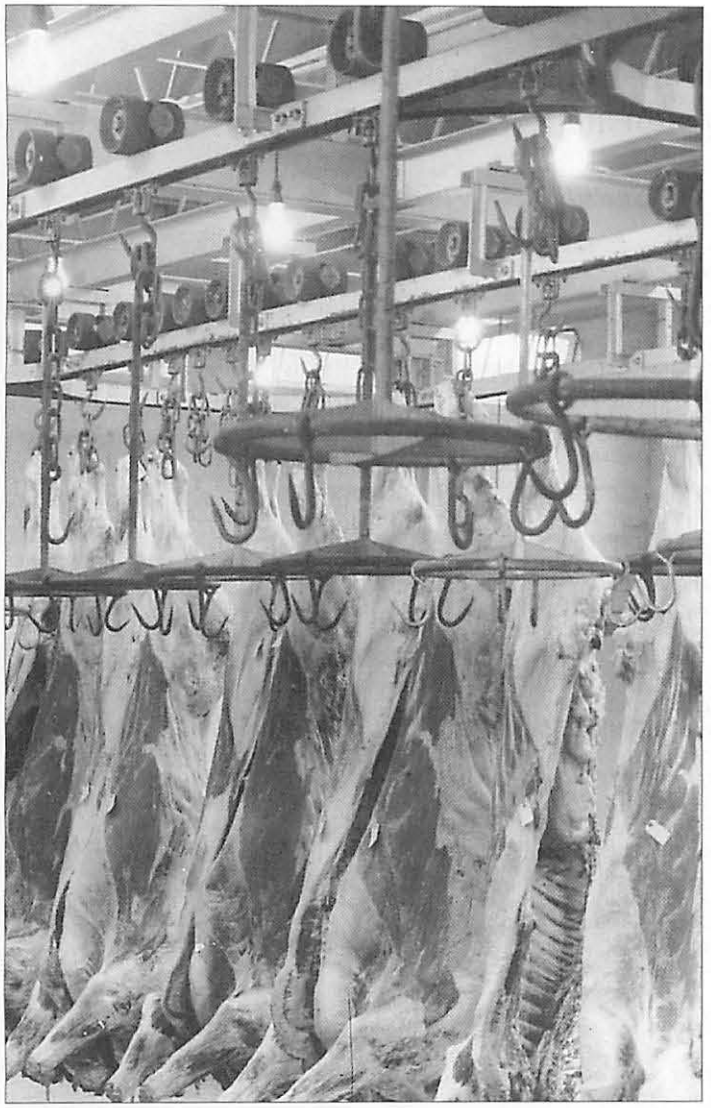
In the case of mutton and goat meat imports, the total substitution effect is considerably high accounting for 45.6% of the actual average growth of the respective imports. This is due to the estimated own and cross-price elasticitites all of which are particularly elastic. Furthermore, the high substitutability of beef to mutton and goat meat imports renders the total substitution effect positive. At the same time, the change in consumer expenditure for imported mutton and goat meat is estimated to have grown by 59%. Given the actual 16% increase of mutton and goat meat imports, it may be inferred that there has been a 4.6% decline in the consumers' habit formation for this type of imported meat. Finally, the price and expenditure effects seem to have a relatively small contribution in explaining the actual growth rates of poultry, and pork and sausage imports. In both cases, low own and cross price elasticities and the relatively small average expenditure shares result in particularly low total substitution effects; total substitution effect declined by a mere 0.8% in poultry imports and by 6.4% in pork and sausage imports. On the other hand, the expenditure change was estimated to account for 29% and 14.5% of the respective actual import increase; thus the combined price and expenditure effect are 28.2% and 8.1% of the actual import increase of poultry and pork and sausages, respectively.

Thus, for these two types of imported meat, the average consumer behavior seem to be governed least by price and expenditure changes and largely by habit formation. However, one may note that the high residual effects include not only habit formation but other residual factors as well. Despite the liberalization of the Greek market with respect to the rest of EU economies in the 1980s, structural market imperfections still in place may also be responsible for the estimated low price and expenditure effects. Regulation of import flows by importing firms, controlling large market shares may implicitly ration the consumer and the respective quantities, actually imported may be disassociated from import prices.

An additional interesting feature of decomposition analysis is its ability to account for simultaneous changes in more than on variable. In this respect, it has a definite advantage over elasticities which measure the percentage change of a variable, ceteris paribus. In the present analysis the decomposition framework shown in (3) is used to simulate the effect of simultaneous price changes on imported meat quantities.

First, a 1% increase in the mutton and goat meat import price is considered along with a simultaneous 1% drop in the beef import price. Using (3) and the elasticities of Table 1, it is found that given the expenditure allocated on imported meat, the aforementioned price changes would increase beef imports by 1.61%, pork and sausage imports by 1.32% and poultry imports by 0.59%; at the same time. mutton and goat meat imports would fall by 3.46%. In other words, there would a redistribution of imports towards pork and beef, a considerable drop in mutton and goat meat imports and only a moderate rise in poultry imports.

Second, a 1% increase in the import price of pork and sausages is considered. Again, equation (3) and the elasticities of Table 1 indicate that this would result in 0.27% increase in mutton and goat meat imports while beef imports would drop by 0.27%, poultry imports by 0.74%, and pork and sausage imports by 0.45%. Thus



there would be a single, slight redistribution of imports towards mutton and goat meat.

Conclusions

The present analysis suggests that if Greece was to import more meat this would be mainly beef and mutton and goat meat; poultry imports would follow slightly behind while pork and sausage imports would follow at a much slower pace. Beef, mutton and goat, and poultry imports would also expand considerably, if (given a rise in aggregate disposable income) more consumer expenditure was allocated to basic imported food items, such as meat, dairy products, and fish. Thus exporters of beef, and mutton and goat meat to Greece (followed by poultry exporters) stand to primarily gain from any rise of consumer expenditure allocated to imported meat (or to imported basic food items, in general).

The analysis also indicates that imports of mutton and goat meat are a substitute for beef imports while pork and sausage imports are a substitute for mutton and goat meat imports (and vice versa). Thus in the absence of considerable expenditure changes (i.e., income effects), these substitutability relationships would be the major forces for redistribution of imported quantities among the four types of meat, examined here. Mutton and goat meat exporters to Greece would have to compete both against beef and pork and sausage exporters. Finally, the decomposition analysis of changes in consumer's demand for imported meats into a total substitution, an income and a residual effect shows that during the 1980s the major source of change in demand for beef, and mutton and goat meat imports (and to a lesser extend for poultry imports) has been the income effect. In contrast, prices and expenditure appear to have little effect on the growth rate of pork and sausage imports, during the same period. The importance of cross price effects, is also highlighted when considering simulations of simultaneous price changes within the imported meat group. ●

References

Agricultural Bank of Greece (1985) - Evolution of Agricultural Economy Aggregates, Agricultural Bank of Greece: Dept. of Studies and Programming, Athens.

Agricultural Bank of Greece (1994) - Evolution of Agricultural Economy Aggregates, Agricultural Bank of Greece: Dept. of Studies and Programming, Athens.

Clements K.W. and H. Theil (1978) - "A Simple Method of Estimating Price Elasticities in International Trade", Economic Letters, 1, 133-137.

Deaton A. and J. Muellbauer (1980) - Economics and Consumer Behavior, Cambridge University Press, Cambridge.

Food and Agriculture Organization (FAO), Trade Statistical Yearbook, various issues.

Judge G.G., R.C. Hill, W.E. Griffiths, H. Lutkepohl and T.C. Lee (1988) - Introduction to the Theory and Practice of Econometrics, Second Edition, John Wiley & Sons.

Karagiannis G. and K. Velentzas (1996) - "Decomposition Analysis and Consumer Behavior" Working Paper, University of Macedonia: Dept of Economics.

Karagiannis G. And K. Velentzas (1997) - "Explaining Food Consumption Patterns in Greece", Journal of Agricultural Economics, 48 (1), 83-92.

Kmenta J. (1986) - "Elements of Econometrics" Second Edition, McMillan Publishing Company, New York - New York.

Lee Jong-Ying, J.L. Seale Jr., and P.A. Jierwiriyapant (1990) - "Do Trade Agreements Help U.S. Exports? A Study of the Japanese Citrus Industry", Agribusiness, 6 (5), 505-514.

Rodolfo M. N. Jr. And O. Capps Jr. (1994) - "Tests of Weak Separability in dissagregated Meat Products" American Journal of Agricultural Economics, 76 (4), 800-808.

Theil H. (1980) - The System-Wide Approach in Microeconomics, Chicago: University of Chicago Press.

Theil H. and K.W. Clements (1978) - "A Differential Approach to U.S. Import Demand", Economic Letters, 1, 249-252.

Weatherspoon D.D. and J.L. Seale Jr. (1992) - "Do the Japanese Discriminate against Australian Beef Imports? Evidence from the Differential Approach" selected paper presented at the AAEA Annual Meeting, Baltimore, Maryland.