

# A STATIC PARTIAL EQUILIBRIUM ANALYSIS OF MALTA'S ENTRY IN THE EC: THE CASE OF AGRICULTURE

LEONARD MIZZI (\*)

Entry and participation in the EC is undoubtedly one of the main issues currently being discussed on the Maltese political scene and the gradual application of the CAP mechanism features dominantly in the debate between the two main political parties (1).

The relations between Malta and the EC find their institutional origin in the Association Agreement signed between the two parties in 1970. Since then several Financial Protocols have emerged even though these were quite detached from agricultural matters although Malta benefited from certain tariff reductions and the elimination of the fixed component element on agricultural imports. Initially the Association Agreement stipulated the passage towards a Customs Union however this option seems to have been set aside by the two political parties and since the Conservative Government applied for full membership in July 1990, the objective is full participation in the Community's institutional framework.

This paper will be subdivided into two main parts, the first providing a detailed insight into the Maltese agricultural sector and its specific characteristics, the second discussing the implications that will spill over the Maltese economy with the immediate application of the CAP. It should be stated from the outset that the model did not seek to consider the transitional period (which will largely depend on the outcome of the negotiations) and only STATIC economic effects are considered. The hypothetical year of entry is 1995.

## The agricultural sector in Malta

### Sectorial contribution

The Maltese agricultural sector has always been considered as one of the main pillars of the economy in successive Development Plans however its current role can in no way be contrasted to other Mediterranean coun-

(\*) Economic Planning Division, Ministry of Finance, Malta.

(1) There are two main political parties dominating the local scene — the Malta Labour Party (MLP) which is against full membership and favours a free trade association and the Nationalist Party (NP) which is the party in power. The next general elections will be held later this year.

(2) Lm = 2.5 ECU.

### Abstract

This paper analyses the economic effects of Malta's accession in the EEC and the implications of an eventual participation in the Common Agricultural Policy on the Maltese economy. The methodology used is a partial-equilibrium model composed of three sub-models: a demand, a supply and a trade model. Empirical evidence shows that accession is going to affect adversely both consumers and producers while the agriculture trade deficit will widen further. Both consumption patterns and production structures will undergo significant structural changes in order to adapt to the new situation. Certain fiscal and/or monetary measures will have to be gradually introduced to control a potential upsurge in the consumer price level and the trade deficit. The present agriculture policy needs to undergo a radical restructuring process if the sector is to meet the challenges as well as any opportunities that entry into such a dominant economic bloc will give rise to.

### Résumé

Ce rapport analyse les effets économiques de l'entrée de Malte dans la CEE et les conséquences de sa participation à la Politique Agricole Commune sur l'économie Maltaise. La méthodologie utilisée est un modèle d'équilibre partiel se composant de trois sous-modèles: de demande, d'offre et de commerce.

On a montré que cet accès à la CEE va influencer aussi bien les consommateurs que les producteurs, tandis que le déficit du commerce agricole sera de plus en plus accru. Les modèles de consommation aussi bien que les structures productrices subiront des changements structureaux, pour s'adapter à la nouvelle situation. Certaines mesures fiscales et/ou monétaires seront introduites pour contrôler une augmentation potentielle du niveau des prix aux consommateurs et le déficit commercial. La politique agricole actuelle doit être réorganisée, pour que le secteur fasse face aux défis et saisisse les opportunités se présentant lors de l'entrée du Pays dans ce bloc économique dominant.

Table 1 Sectorial contribution to GDP.

		1986	1987	1988	1989	1990
GDP at factor cost						
Lm million (2)	(A)	461.8	495.4	542.6	569.9	645.9
Agriculture and Fisheries	(B)	20.4	21.4	21.1	22.4	22.2*
Sectorial contribution (B)/(A)* 100		4.4	4.3	3.9	3.8	3.4
* estimated						
Source: National Accounts of the Maltese Islands (1989), Economic Survey 1990.						

tries. In accordance with planned development objectives and priorities the manufacturing industry most particularly the textile and clothing subsector (and more recently the semiconductors industry) and the services sector — tourism, transshipment and offshore — have set the pace to Malta's recent development process leaving the agriculture sector lag behind. **Table 1** shows the sectoral contribution of agriculture and fisheries to Gross Domestic Product (GDP).

### Structure of holdings and agricultural labour force

A major technical and institutional obstacle

to agricultural development in Malta centres around the structure of holdings. The traditional land tenure system which has promoted the fragmentation and dispersion of holdings resulted in an average farm size of around 1 ha.

Besides the constraints of land availability and size, the Maltese agricultural sector is also confronted with a general decline in the gainfully occupied population engaged in agriculture and fisheries, an aging working population and an industry which is becoming all the more dominated by part-timers. As at September 1991, the gainfully occupied population within this sector constituted only 2.5 per cent of the total.

## Structure of production

Agricultural production in Malta has maintained a stable upward trend over the past years particularly under the impetus of drip-irrigation techniques in vegetable production and artificial insemination in the case of animal husbandry. However unlike other Mediterranean countries, Maltese agricultural production is mainly composed (in value terms) of animal products (65 per cent) followed by vegetables (21 per cent), forage crops (8 per cent) and fruit (6 per cent).

Total meat production in 1990 was 12.2 thousand tonnes valued at Lm10.1 million. Swine production constitutes 60 per cent of the total followed by poultry (26 per cent) and beef (14 per cent). Malta has reached a level of relative self-sufficiency for pork and chicken although the country resorts to imports of processed pigmeat and specialised fowl. Furthermore during the period 1990-91, some 800 tonnes of pork had to be imported as the pig industry cannot cope with increased domestic demand. Malta reached complete self-sufficiency in eggs and fresh milk although due to temporal deficiencies the country has to resort to temporal importation. Milk production has reached 34,650 tonnes during 1990 (valued at nearly Lm4.9 million) while egg production reached 7.4 thousand tonnes (assuming 5.8 kilogrammes per 100 eggs). Data relating to fruit and vegetable production is rather lacking and in the absence of an agricultural census (the Central Office of Statistics has recently launched one) the best proxy available is that of the quantities sold at the Pitkali i.e. the centralised wholesale market. However an important proportion of fresh fruit and vegetables is sold directly off-the-farm and all estimates remain rather subjective. Vegetable production is mainly characterised by spring potatoes — the main export crop — followed by tomatoes, cauliflowers, cabbages, carrots and onions. The main fruits produced are stone fruits particularly cherry plums and peaches, strawberries, melons and grapes. Grape production has been on the continuous decline over the past years and in effect the local wine industry has to resort to periodic importation.

## Agricultural policy

Besides the general constraints of land availability, water resources and the lack of agricultural investment (only 2 per cent of total Gross Fixed Capital Formation - GFCF is channelled in agriculture), the generally poor state of Maltese agriculture is the legacy of a long period during which there was no coherent policy for agricultural development. In spite of continued calls for a strengthened role of this sector within the national economic structure, few serious measures have been taken in hand to rectify the situation and it is only recently that experts from FAO have been brought over

to make an evaluation of the situation. As Delia (1990) highlights... «(local agricultural policies) do virtually nothing to reduce costs of inputs, support farm prices directly or induce structural reform». The only form of direct intervention is the Beef Intervention Scheme which guarantees the price of beef in order to contain any ensuing problems that a gradual fall in red meat consumption may have on the milk industry. The Scheme is supported by a levy imposed on imported catering cuts. Middlemen guarantee the minimum price of fresh beef while Government buys the forequarters of the carcass considered as inferior meat. It is important to highlight that in Malta the beef industry is actually constituted of «dairy beef».

Tripartite consultation with Government as arbiter involving also the Milk Producers' Cooperative (KPH) and the Dairy (Malta Dairy Products Co.Ltd) set the price of milk and the management of a global quota. Production quotas exist also in the case of pork and in effect this has been recently increased to take into account increased consumption levels. The national quota for Malta and Gozo is 2310 pigs per week. On recommendations of the Poultry Advisory Board, the production quota on broilers was temporarily suspended in December 1990.

There is no state regulation of prices for fresh fruit and vegetables and prices are solely determined by market forces. However Government sets maximum consumer prices for a wide range of agricultural products even though enforcement is not always effective. In effect one can find wide price differences which do not always reflect quality considerations.

Imports of agricultural produce are subject to low import duties while no form of export subsidies or intervention (except for beef) exist. Since 1989 agricultural trade has been further liberalized although special levies on processed agricultural products have been introduced in order to protect local agro-industry. There is full prohibition of import competition in the case of bread, cakes and pastries while the beverages subsector is highly protected through rather prohibitive tariffs.

The Department of Trade has been gradually liberalising trade through the further curtailment of import licensing controls and public procurement through the Bulk Buying Scheme. Several agricultural commodities are however still administered under the Scheme and they include — grains, (wheat-soft and hard, barley and maize) sugar, evaporated milk, frozen meat and soya-bean oil. Grains are imported by a parastatal company — Medigrain which has as its objective the stabilisation of wheat and feed prices. A Sugar Authority will be set up, probably on the same lines as Medigrain, in order to control the procurement of this product. Finally, the exportation of Spring potatoes is monitored by the *Agricultural Export Marketing Board*.

## Agricultural trade

Despite all efforts towards partial self-sufficiency, Malta still remains a net importer of agricultural products. The average rate of cover of imports by exports (agricultural) currently stands at around 7-9 per cent compared to 56.3 per cent for total trade (as at January-September 1991) which is very low when contrasted to other Mediterranean countries (**table 2**).

It is anticipated that the agricultural trade rate of cover ratio will decline further as a result of further pressures from the tourist industry and a growing population.

Malta's main agricultural imports are live animals and meat preparations, dairy products particularly cheese and evaporated milk, all types of grains, fruit namely apples, oranges and bananas as well as potatoes. The EC remains the main supplier of Maltese agricultural imports with the exception of certain meats, fish and fish preparations and wheat. Since 1990 Malta has been benefitting from the US undertakes to export to Malta some 50000 MT at preferential world market prices. On the other hand, both EC-originating maize and barley benefit from the CAP's export subsidies.

Agricultural exports represent just 2 per cent of total Maltese domestic exports compared to 26 per cent in the 1960-70 period. Exports of Spring potatoes to the Netherlands reached 2985 MT during April-May 1991 compared to 5500 MT during the year-earlier period although the price paid to the Maltese farmer in 1991 was the highest ever reached - Lm200.5 per MT. Other exports include cut flowers and horticultural plants (UK), fish (Italy, UK, Japan) and food preparations (Near and Middle East).

## Conclusion

Maltese agriculture is characterised by features which although prevailing in other Mediterranean countries are quite typical to island states — limited agricultural land, water problem, intensive production methods hence pressures on ecosystems. The gradual application by Malta of the different common market organisations of the CAP is certainly bound to have significant effects on the whole economy and this is the subject matter which will be tackled in the next section.

## Economic implications of the CAP on the Maltese economy

*Alternative approaches used in the quantification of the introduction of a particular agricultural policy or the liberalisation of agricultural trade.*

Various researchers within the Mediterranean region have ventured into analysing the ex-ante and ex-post effects of the introduction of the CAP mechanisms on their economy. In the case of Greece, the studies of Christou and Sarris - CS (1980), Catrivesis

and Hitiris (1982), Georgakopoulos (1986, 1988), Caraveli-Ioannidis (1987), Demousis and Sarris (1988) and Zioganas (1990) are amongst the most popular while in Portugal the authors who have contributed widely on this subject matter were Loboa (1979), Brito Soares (1985) who used the same approach as CS, and Avillez (1987). Ritson et al (1982) were commissioned by the Cypriot Government to evaluate the implications of a Customs Union between Cyprus and the EC within the context of the CAP while Mizzi (1988) utilised the same approach — based on the alignment of prices and assumed elasticities — to quantify the implications of a Customs Union between Malta and the EC on each agricultural subsector and from different viewpoints — the consumer, producer and the Exchequer.

The alternative approaches which have been designed to analyse particular aspects of economic integration and more recently the process of agricultural trade liberalisation are numerous. L. Alan Winters (1987) presents four main approaches to estimate the «deadweight loss» of agricultural support policies:

1. Computable General Equilibrium Models (CGE),
2. Intersectoral studies,
3. Multisectoral studies,
4. Single-sector studies.

The main dichotomy lies between CGE models and the other approaches which apply partial equilibrium methodology. For our analysis we have chosen the latter. Besides the fact that CGE models have been mainly developed for economies with agricultural structures far different than Malta's, building a model with the objective of estimating the resource competition and income effects of changes in agriculture on the rest of the economy and on macroeconomic variables is not viable when one considers the role of the agricultural sector within the Maltese economy. Another major constraint which has inhibited us from analysing intersectoral economy-wide effects was the unavailability of data. As yet, there does not exist an input-output matrix for the agricultural sector while few in-depth sectoral studies have been undertaken with the exception of the dairy industry.

### Model specification

The methodology used in our analysis is similar to the one used by CS and Brito Soares in the case of Greece and Portugal respectively although there are certain basic differences. In our study, *three* sub-models have been constructed — a demand, supply and a trade model. However in the case of the demand model we have estimated the price and income elasticities through the Linear Approximate Almost Ideal Demand System (LA/AIDS) instead of the Frisch method. In the absence of already-estimated supply elasticities, we have decided to utilise elasticities estimated for Greece and Portugal. It would have been more relevant to

Total trade	1986	1987	1988	1989	1990
Imports	347.9	392.9	447.4	515.8	620.5
Exports inc. re-exp.	194.6	208.6	235.9	294.4	357.9
Trade balance	-153.3	-184.3	-211.5	-221.4	-262.6
Rate of cover (%)	56.0	53.1	52.7	57.1	57.7
Agricultural Trade					
Imports	48.3	49.8	54.7	60.9	N.A.
Exports	6.5	5.6	5.8	5.4	N.A.
Trade balance	-41.8	-44.2	-48.9	-55.5	N.A.
Rate of cover (%)	13.4	11.2	10.6	8.9	

N/A not available  
Detailed trade statistics are only available until June 1990. There has been some delay in the publication of more recent data due to the transition to the Harmonised Tariff System introduced as from 1 January 1990.

Source: Economic Survey January-September 1991.

utilise elasticities estimated for Mediterranean island-economics like Madeira, Crete or Cyprus, however these were not available. Subsequently we undertook sensitivity analysis in order to ascertain whether variations in the magnitudes of the supply elasticities had an effect or otherwise on the producer

surplus/loss. For the trade model, we have utilised exactly the same methodology as CS namely taking as a base the international, the EC and Maltese prices and estimating the extent of trade diversion/creation.

An extension to CS's study was the estimate made for the Structural Funds which will be

Table 1*	Price elasticity				General model LA/AIDS				
	BC	Meat	DP	OF	FV	Sugar	Other food	No food	Income elasticity
Bread and cereals	-0.146	-0.317	0.245	-0.420	0.793	1.551	-0.198	-0.078	0.52
Meat	-0.891	-1.159	1.624	5.114	-3.306	2.821	0.704	-0.016	0.93
Dairy products	0.514	1.114	-1.367	-2.902	-1.164	-0.195	0.902	-0.056	0.77
Oil and fat products	-0.186	0.891	-0.742	-1.241	-0.495	3.663	0.267	-0.058	0.44
Fruit/vegetables	1.545	-2.194	-1.113	-1.841	-0.055	-5.631	1.634	0.186	0.70
Sugar	0.358	0.220	-0.021	1.629	-1.365	-2.331	0.402	0.018	0.96
Other food	-0.374	0.532	0.984	1.163	1.853	3.306	-4.591	-0.023	1.13
No food	-1.336	-0.022	-0.331	-1.938	3.016	-4.141	-0.253	-1.054	1.08
Table 2*	Price elasticity			Meat model LA/AIDS					
	Beef	Pork	Poultry	Income elasticity	Budget index				
Beef	-2.867	1.266	2.712	0.915	0.472				
Pork	1.037	-1.680	-1.565	0.953	0.381				
Poultry	0.915	-0.539	-2.541	1.395	0.147				
Table 3*	Price elasticity				Dairy products model LA/AIDS				
	Milk	Eggs	Cheese	Ricotta cheese	Income elasticity	Budget index			
Milk	-1.453	0.622	0.870	-1.050	1.225	0.56			
Eggs	0.129	-1.226	-0.166	0.592	0.543	0.3			
Cheese	0.153	-0.004	-1.894	0.582	1.061	0.115			
Ricotta cheese	-0.043	0.065	0.129	-1.284	1.160	0.025			
Table 4*	Price elasticity			Fruit/Vegetables model LA/AIDS					
	Potatoes	Tomatoes	Other F/V	Income elasticity	Budget index				
Potatoes	-0.418	0.070	-0.100	0.710	0.107				
Tomatoes	0.168	-0.536	-0.126	1.106	0.16				
Other F/V	-0.461	-0.640	-0.793	1.019	0.733				

BC=Bread and cereals- DP=Dairy products - OF=Oil and fat - FV=Fruit and vegetables.

channelled to Malta prior and after EC entry on the basis of the forecasts made until the end of 1992 (over 14 billion Ecu's available for the 12 EC Member states) and a time trend analysis. The Maltese Government gives priority to the potential utilisation of such funds and although most of the funds would be channelled into infrastructure and industrial development, an important portion will also benefit the Maltese agricultural and agro-industrial sectors.

### The Demand Model

The demand model is based on Deaton and Muellbauer's Almost Ideal Demand System (1980). The AIDS or LA/AIDS (due to the utilisation of Stone's price index as a proxy for the real price index) has become quite popular in recent years in the domain of applied demand analysis. One can mention for example the studies of Blanciforti and Green (1986), Eales and Unnevehr (1988), Fulponi (1989), Mergos and Donatos (1989), Haden (1990), Green and Alston (1990) and Ingeo (1990). Referring to Green and Alston's article about the formulas used for the LA/AIDS variant, we have made use of Chalfant's formula for the estimation of the uncompensated price elasticities which assumes that:

$$\delta \ln P^* / \delta \ln P_j = W_j$$

where  $W_j$  is the budget share.

The category of products for which the elasticities were estimated are: (a) bread and cereals, (b) meat, (c) dairy products, (d) oils and fats, (e) fruits and vegetables, (f) sugar, (g) other food and (h) non food. The analysis also employed a two-stage budgeting procedure by assuming direct weak separability in order to disaggregate the group elasticities of meat, dairy products and fruit and vegetables. We could have either chosen the Amington approach i.e. assuming a Constant Elasticity of Substitution (CES) or else construct three sub-models within the general LA/AIDS using AIDS once again. We have decided to choose the latter methodology and we imposed the usual restrictions of homogeneity and symmetry. **Table 3** shows the matrix of estimated price and income elasticities (evaluated at the sample means) for the general LA/AIDS model and disaggregated models.

It is beyond the scope of this paper to discuss the results and the ensuing implications on consumption patterns. For an exhaustive discussion on the elasticities and the methodology see Mizzi (1991). The parameter estimates are at the base for calculating the new quantities to be consumed and the consumer surplus/loss.

We made use of the concept of compensating variation. The integral in the Taylor series is the standard Marshallian consumer surplus which we have approximated as follows:

$$\text{Consumer surplus} = -C^* (\text{Pec} - \text{Pmalta}) - (-1/2 E_{ii} t 2V)$$

where  $C^*$  is the new quantity consumed,

**Table 4** Consumer surplus/loss.

Product	New Qty tonnes	ECUU/tonne		Lm million
		Pmalta	Pec	
wheat	51413	135.4	292	-2.83
maize	64266	113	236	-2.78
barley	35017	106	223	-1.44
beef	5363	2520*	5285*	-3.26
pork	9400	1756	1308*	+2.63
chicken	4800	2010	1400*	+2.76
eggs	8024	1460	1096*	+1.04
milk	31092	357	300	+0.72
sugar	20000	324	661	-2.70
potatoes	27314	157	205	-0.58
tomatoes	8710	202	300*	-0.39
grapes	830	450	352*	+0.03
oranges	8846	374	226	+0.54
peaches	1857	335	489*	-0.12
NET LOSS				-6.32

\* weighted between base price and reference price.

**Table 5** Retail price index.

	Vital items (62.1)	Other items (37.9)	All items (100.0)
1983	100.0	100.0	100.0
1984	99.41	99.93	99.56
1985	98.89	100.03	99.32
1986	101.15	101.65	101.34
1987	101.92	101.50	101.76
1988	102.78	102.63	102.73
1989	102.54	105.37	103.61
1990	105.98	107.76	106.70
1991 September	108.04	113.11	109.93

Source: Economic Survey January-September 1991.

$E_{ii}$  = own price elasticity,  
 $t$  = tariff,

$V$  = consumption at 1988-90 average\* inter. price.

Given that within a Customs Union the prevailing rates of duty are zero (except for the CET - Common External Tariff) we have set  $t = 0$ . The estimated consumer loss/gain by product is shown in **table 4**.

In the case of tomatoes and grapes, we have only analysed that part of the produce used for direct consumption. It should be highlighted that the loss of Lm6.32 million is expected and the main categories which have been negatively affected are cereals, sugar and beefmeat although there is a partial compensation from other animal products namely pork and chicken as well as oranges. Malta will have to confront the EC's high threshold prices in the case of cereals and sugar while the current subsidised frozen beefmeat from EC sources or S. America will have to be replaced by the highly protective beefmeat regime which currently prevails within the EC. The loss in potatoes may be debatable as there is no common market organisation for this product while in the case of oranges, EC reference prices are lower than current c.i.f. import prices.

It was subsequently important to translate this consumer loss into an «equivalence effect» on the consumer price level. The trend which has set in since the trade liberalisation process was embarked upon risks to persist with Community entry at least in the short-medium term. **Table 5** shows the evolution of the Retail Price Index since 1983.

The approach used is quite simple. We have taken the price index which appears in the National Accounts of the Maltese Islands (which was also used in the LA/AIDS models), the weighting of each product category in the calculation of the retail price index (as per Household Budgetary Survey 1983) and the weight of food consumption in overall total private consumption expenditure, the latter averaging 29.1 per cent during the period 1986-89. Price increases offsetted price reductions so that the overall food prices increased by 12 per cent causing a first-round increase in the rate of inflation of about 3.5 per cent. The evolution of prices after 1995 will largely depend on the economic policies followed at that time and the fiscal and/or monetary measures introduced to contain any potential inflationary pressures. It should be pointed

out that the prevailing rate of inflation in Malta is below 3 per cent.

The effective control of inflationary pressures is imperative given that the Incomes Policy Agreement decided between the three social partners in December 1990 Government, the Employers' Association and Unions is based on what is known as the «cost-of-living adjustment» (COLA). In 1992, a new Index based on a Household Budgetary Survey carried out in 1988-89 will be launched.

### The Supply Model

The adoption of the CAP mechanisms by Maltese agricultural producers will imply, amongst others, that Maltese agriculture will have to adapt itself to a new price determination system and market regulation. The CAP will affect present production structures and farmers' incomes particularly very small producers and those engaged in animal husbandry.

At present the CAP is oriented towards the protection of the so-called «northern» products as contrasted to southern Mediterranean products. Although the first signals of the proposed CAP reform point towards a gradual reduction of protection levels for products like cereals, beef and sugar and more emphasis is being given to the «accompanying measures» — the agrinvironmental action programme, the afforestation of agricultural land and the early-retirement scheme coupled with direct aid payments, the future of Maltese farmers is rather bleak.

A main assumption in our analysis is that the available land in 1995 — the hypothetical year of entry in the EC — will remain the same as in 1991. One does not anticipate any major reductions over a five-year term though the risk of further urban sprawl and land marginalisation will probably become more urgent issues.

The supply model has three main objectives:

- the estimation of the new quantities which will be produced with the adoption of the CAP.
- the estimation of the variation in producer surplus and,
- the identification of the agricultural sub-sectors which are the most fragile and those having a certain degree of potential development.

We are knowledgeable of the inherent difficulties existing in the estimation of the parameters on the supply side particularly within the Maltese context where data is very lacking. Our decision to resort to the supply elasticities estimated for countries like Greece and Portugal can also be criticised on the basis that their agricultural sectors are more dominant in the overall economic structure, the average size of agricultural holdings is 4 ha (this is the size in Greece wherein agricultural holdings are the smallest within the whole EC) and production is more oriented towards fruit and vegetables rather than animal products.

Products	Elasticity	Area (ha)	Yield MT/ha	ECU/MT	Tonnes
Potatoes (spring)	1.57	1300	17.6	- 60	- 7800
Tomatoes	0.81	570	35.1	- 30	- 1800
Onions	1.0	200	17.0	- 107	- 1200
Cauliflw	0.5	230	37.4	138	2580
Grapes	1.5	350	10.0	- 155	- 1628
Peaches	0.9	150	10.0	- 448	- 680
Oranges	0.2	70	13.0	- 180	- 60
Forage Crops	0.5	5500		NOTE	
Cabbages	0.53	150	40.3	- 57	- 812
Melons	N/A	400	13.0	N/A	

Note: N/A not available  
In the case of forage crops, prices are not comparable because in Malta these are transformed into hay. The cost of hay is 156 ECU/t. The actual yield of cereals in Malta is around 2 MT/ha.

Products	Production (MT)	Elasticity	ECU/T	O <sub>i</sub> (MT)
Milk	33000 38000*	0.7	- 50	- 3300 - 3800
Beef	1536	0.7	- 185	- 55
Pork	7828	1.6	- 375	- 2723
Chicken	3150	1.6	- 460	- 1160
Eggs**	7600	2.5	- 250	- 3520

Notes: \* assuming an increase in the yield  
\*\* 100 eggs = 5.8 kgs

However we have already highlighted earlier on the specificities of Maltese agriculture and it is impossible to find a resemblance with any other Mediterranean or EC country.

As in the case of CS, the construction of a multi-product transformation function from which one could estimate (via the elasticities of Substitution) the new product mix was impossible due to data constraints. In a fully-fledged study concentrating on the supply side, one can envisage the utilisation of Nerlovian models, normalised quadratic profit functions or linear programming techniques. Nerlovian models which remain quite popular in empirical applications do not have a solid theoretical and empirical base and one of the best approaches in supply analysis remains that designed for the Turkish Agricultural Sector Model (1988). One has also to distinguish between short and long-run supply elasticities. We have employed long-run full adjustment responses in our analysis because (a) in empirical analysis these are more readily available and (b) we are interested in evaluating Maltese producers' responses after a relatively long adjustment period of 8-10 years — a period during which the Maltese agricultural sector would have benefitted from EC structural aid and undergone a radical restructuring process.

We have utilised four main sources for our supply elasticities — Askari and Cummings (1976), CS (1980), Brito Soares (1985) and Baltas (1990) although the estimates reproduced by Baltas are more appropriate

as 34 different products classified in 7 broad categories were analysed.

The total change in the quantities produced is approximated by the following equation in the case of *animal* products:

$$\delta Q_i = \eta_i \frac{Q_i}{P_i} (\delta S_i + \delta p_i)$$

and for crop products (occupying land) it is:

$$\delta Q_i = \eta_i \frac{A_i Y_i}{P_i} (\delta S_i + \delta p_i)$$

- where  $\delta S_i$  = change in factor subsidy,  
 $Q_i$  = new quantity produced,  
 $\eta_i$  = price elasticity of supply,  
 $A_i$  = area under production (ha),  
 $Y_i$  = yield per ha,  
 $P_i$  = current producer price,  
 $p_i$  = price after entry,  
 $\delta p_i$  =  $p_i - p_i$ .

In the case of crop products, we assumed an amelioration in yields by projecting past yields via linear time trends. We undertook a similar analysis in the case of milk yields. **Tables 6** and **7** show the new quantities produced of crop products and animal products respectively.

The products analysed cover more than 80 per cent of total agricultural production. The main exclusions are cabbages and melons and watermelons which however do not fall under the EC's common market organisation of fruit and vegetables. The sig-

nificant reduction in production is immediately noticeable particularly in the case of animal products thus reflecting the major constraints of the local agricultural sector — the inexistence of scale economies and high input costs due to the very intensive modes of production.

In order to translate these reductions in changes in producer rents, we will use the following general formula:

$$\delta PR_i = Q_i \left[ 1 + \frac{1}{2} \eta_i \frac{(\delta S_i + \delta P_i)}{P_i} \right] (\delta S_i + \delta P_i)$$

where PR = producer rent.

The total change in producer welfare  $\delta PR$  is found by summing  $\delta PR_i$  over all products  $i$  (table 8).

The selected fruit and vegetables cover 32 per cent of the total fruit and vegetable production. If we were to include also onions and cabbages the loss would have been greater although this would have been compensated by the gain registered on off-season products and cauliflowers.

In our main study we have also discussed the issue of the potential evolution of input prices after entry. Although the price of maize and barley is currently low (75 per cent of that prevailing in Greece), these prices will eventually have to increase after the application of the EC threshold prices with further negative implications on local farmers' incomes. In the case of concentrated feeds, prices prevailing in Malta are at the same level or even higher than in Greece (where the cost of inputs are amongst the lowest within the EC). This subject matter however requires a further in-depth analysis as the spillover effects of an increase in input prices may have considerable implications on production as well as consumption patterns.

The results of the sensitivity analysis showed that changes in the elasticity magnitudes do not have major implications on the producer rent. The loss in agricultural revenue ranged from Lm 3.9 million to Lm 4.8 million, the latter representing over 21 per cent of total current farmers' incomes. These estimates are more conservative than those estimated by Mizzi (1988) when the producer loss was estimated at 25 per cent of total farmers revenues.

The implications of membership on agricultural producers are quite negative. Entry will gradually ensue in a reallocation of resources from animal to vegetable production within which there seems to exist more scope of specialisation particularly within niche markets. No reference has been given to the dynamic positive implications that entry will give rise to — investment in new agricultural structures, irrigation schemes and direct aid. Vegetable production will also be positively affected by the Solid Waste Composting Plant which will come into operation by early 1992. This Project financed, through an EIB loan, will not only bring into production more agricultural land but will also serve as a partial solution to the question of domestic waste disposal.

**Table 8** *Change in producer welfare - all products.*

Animal Production		Lm 000
milk		- 658
eggs		- 580
beef		- 240 (includes the dismantlement of the Beef Intervention Scheme)
pork		- 962
chicken		- 470
Vegetable production		
potatoes		- 460
tomatoes		- 216
grapes		- 165
oranges		- 56
peaches		- 206
Net effect		- 3983
% of agricultural revenue =		18

**Table 9** *Distribution of fund by objective (millions ECUs).*

	Total	Objective			Scenario 2
		1	5	2+3+4	
		Scenario 1			
1995	83.6	53.3	4.2	26.1	
1996	87.5	55.8	4.4	27.3	Pre-entry aid 1993-97
1997	91.4	58.3	4.6	28.5	47.5
1998	95.3	60.8	4.8	29.7	
1999	99.2	63.2	5.0	31.0	1998-2000
2000	103.1	65.7	5.2	32.2	(same as Scenario 1)

The priority over the short-term will be to identify those markets particularly in the horticultural subsector (this task has been undertaken in 1991 by FAO experts) and the introduction of a standardisation regime for fresh fruit and vegetables on the same lines as the OECD or the ECE/UN regime. Furthermore, the Ministry for Agriculture has to step up efforts to promote the exportation of horticultural products not only through the setting up of Export Marketing/Promotion Boards but also through the provision of subsidies on certain government-induced costs most notably freight charges.

Before discussing the trade effects of the CAP on the Maltese economy, it is worth briefly analysing the effects of entry on the Exchequer and the amount of Structural Funds which will be channelled assuming that the momentum to give a certain degree of priority to the «*economic and social cohesion*» aspects of the Single European Act persists.

#### *The exchequer and structural funds*

Given that the Maltese Government does not subsidise in any form the local agricultural sector, no savings from subsidy expenditures will be forthcoming after entry except on the Beef Intervention Scheme. The loss registered from the customs duties (the majority of which are imposed on EC sources) will be compensated by the gradual adoption of the value added tax (VAT). It is beyond the scope of this analysis to discuss in detail the VAT base and that VAT rate

to be imposed on agricultural products. However our estimate is that a VAT rate of 4-6 per cent on food will be both revenue-neutral as well as neutral on the consumer's well-being. The Report published by the EC Directorate (1990) also provides that «...those who are negatively affected (by the introduction of VAT) can be always compensated through income tax reductions or the social security system».

Regarding structural funds, Malta will undoubtedly be considered a less-favoured region similar to Greece, Portugal, the South of Italy and Ireland. Moreover the specific handicaps of an island-economy — limited available land, water-resource constraints and a fragile environment - are all additional considerations for special aid schemes to Malta.

The main assumptions made in order to forecast the amount of structural aid until the year 2000 are the following:

(a) In the light of the announced commitments by the EC Commission to strengthen structural and regional policies over the coming years, we have projected the available funds since 1989 until the year 2000 through a time trend analysis.

(b) The distribution of the Funds will be as follows:

*Regional Fund* (ERDF) — 75 per cent of which Objective 1 (85 per cent)

*Social Fund* (ESF) — 20 per cent

*European Agricultural Guarantee and Guidance Fund* (EAGGF) — Guidance Section — 5 per cent

We have also taken into account the

amounts received by Greece and Portugal, two countries which have GDP per capita levels which are broadly similar to the Maltese level. **Table 9** also demonstrates two different scenarios — one assuming that Malta will become a full member by 1995 (this is also the «expected date of entry» of the Swedish Government) and the other, more realistic, is that full membership will take place in 1998 and Malta will benefit from pre-entry aid between 1993 and 1997, 1993 being the year when negotiations will most probably commence.

After having analysed the effects of entry on each of the economic actors, the final section will analyse the extent of trade diversion/trade creation that a Customs Union between Malta and the EC entails.

### The Trade Model

The degree of commerce between the EC and Malta and Malta and the rest of the world over the coming decade has to be viewed within the context of several factors: a stable level of agricultural production, an increase in population (+ 0.9 per cent per annum), higher expectations by locals for quality products (particularly imported ones) and a tourist industry which remains the main moving force of the Maltese economy and which necessarily has significant pressures on both local food production as well as the trade balance.

These factors give rise to a certain degree of concern namely the risk of a widening of the trade gap due to increased imports and the gradual alignment of Maltese prices to EC threshold and reference prices in the case of products for which Malta is a net importer. A priori one expects a trade diversion effect in the case of cereals and imported frozen meat. The difference between the world price and the EC prices will be channelled to FEOGA or to EC producers in the case of products which already originate from EC sources but which currently benefit from the EC's export subsidies. The change in the balance on trade on each product will be calculated using the following formula:

$$\delta BT_i = p'_i(Q'_i - X_i) - p w_i (Q_i - X_i)$$

where  $p'_i$  = new EC price,  
 $Q'_i$  = new quantity produced,  
 $X_i$  = new quantity consumed,  
 $p w_i$  = world price,  
 $Q_i$  = current quantity produced,  
 $X_i$  = current quantity consumed.

A positive (negative) aggregate  $\delta BT$  indicates an improvement (deterioration) in the balance of Maltese agricultural trade. As in CS's study, a difficult part in the application of the model was to estimate the average prices for the various products. In the case where Malta is a 100 per cent net importer, the EC price used was the threshold or the reference price depending on the regime. In the case of products where there is a certain degree of self-

**Table 10** Balance on trade effect.

Product	EC price Ecu/t	Production	Consumption	World prices ECU/+		Loss/Gain (Lm000)
		1995	1995			
		in tonnes		Imports		
wheat	292	0	51413	131	49920	-3362
maize	236	0	64366	143	62400	-3221
barley	223	0	35017	106	34000	-1669
beef	2396	1390	5360	2570	6178	-2171
pork	1100	4900	9400	no imports		-1964
chicken	1150	2000	4800	no imports		-1278
eggs	910	4100	8024	no imports		-1417
milk	300	31300	31092	no imports		+25
sugar	661	0	20000	324	19380	-2754
potatoes	205	13800	27314	157	3400	-888
tomatoes	776	6020	8710	no imports		-828
grapes	490	470	830	450	(90)	-86
oranges	226	850	8846	374	7200	+352
peaches	716	820	1857	335	200	-268
Global loss						-19529

Notes: M=Imports averaged over 1987-89  
 Marginal quantities of imports are not considered.  
 In the case of tomatoes, these are only "tomatoes for fresh consumption". In the case of grapes, the data refers to products destined for fresh consumption.

sufficiency a weighted average was estimated to take account of the amounts imported and those produced locally. Thus for example in the case of beefmeat, the EC price was arrived at by weighting the intervention and reference prices (as well as the variable levy) in the proportion of 25 per cent and 75 per cent respectively.

**Table 10** shows the balance on trade effect on each individual product.

The loss of Lm 19.5 million is quite considerable however this is expected in the case of a net importer like Malta which has to bear the brunt of higher EC prices on the one hand while on the other the full exploitation of the benefits that the CAP gives rise to are very limited due to low production and export potential. Furthermore, any from high protection levels. It is pertinent to point out that even in the case of major agricultural producers like Portugal and Greece entry had several negative implications on the agricultural balance on trade. As Georgakopoulos (1986) demonstrates in his article. Greece's accession to the EC produced a serious deterioration in the balance of agricultural trade with the EC with the surplus prior to 1981 turning into a deficit after entry.

The balance on trade loss registered by Malta represents more than 30 per cent of total Maltese agricultural imports (1989) and 15 per cent of the total consumer goods imported in 1990. This loss will reduce further the rate of import cover and it is estimated that ceteris paribus, this rate will fall to 5-6 per cent after full membership.

A sectoral analysis of the balance on trade effect shows that the sectors which will be most adversely affected by entry will be cereals, meats and sugar. The loss on meat products will be to the tune of Lm 5.4 mil-

lion i.e 29 per cent of the total loss. Notwithstanding reduced beef consumption levels, the loss is still significant due to the imposition of the variable levy. The loss on eggs is due to the substitution of local production by imports while the effect on milk is negligible.

The loss registered on refined white sugar of Lm 2.8 million will be practically entirely channelled to EC's beet producers who supply more than 90 per cent of Malta's sugar requirements. In the case of other vegetable products, the main losses will be registered on tomatoes and potatoes although the loss on the latter should be partially compensated by the benefits accruing from duty-free exports of spring potatoes to the Netherlands.

The exclusion of other agricultural products from the above analysis - bananas, apples, pears, cheese, skimmed milk powder and oils and fats (margarine, sunflower and soya bean oil, butter) will probably ensue in a further widening of the trade gap. The products which will mostly affect adversely the Maltese balance on trade will be butter, cheese and other milk products. In the case of tropical fruits and beverages, trade is regulated by the Lomé Convention and the quantities and values imported should not be significantly different from present levels.

The magnitude of the balance on trade loss will vary with the outcome of the Uruguay Round negotiations or if the Community itself decides to reform radically its CAP. The indications show that in the medium-term, EC prices will fall and hence the «potential» balance on trade loss will be lower than the estimated Lm 19.5 million. Conversely, an unreformed CAP will have serious macro-economic repercussions on Malta. In the

light that it would be very difficult to obtain significant general derogations such as trade at «special» or «reduced» prices, the next best alternative would be maintaining Medigrain as well as the constitution of a Sugar Authority.

## Conclusion

The general application of the CAP and its related measures will undoubtedly have significant implications on the Maltese economy in general and the agricultural sector in particular. The results ensuing from our model demonstrate that no economic actor is going to benefit from entry with the exception of Government (if one were to include the inflow of structural funds). The balance on agricultural trade is expected to continue worsening with the gradual application of Community threshold and reference prices.

Even consumers are expected to be worse off notwithstanding price declines on several animal products. Maltese agricultural producers risk to bear the brunt of mounting competition from their Mediterranean counterparts and the only option available is the identification of quality, out-of-season products suitable for export together with some form of rural tourism. A further decline in the gainfully occupied population engaged in agriculture will have severe negative repercussions on the environment. Two main limitations of the study are the static and partial nature of the model. On the demand side, the incorporation of rationing in the LA/AIDS may affect the magnitude of the estimated elasticities while in the supply sub-model it is suggested that a linear programming model be undertaken on the same lines as TASM-MAFRA to estimate own price elasticities.

What are the options open to Malta and how will the above results differ under a reformed CAP? Full membership with no specific derogations is bound to destructure the local economy in the short to medium-term however the options available hardly imply brighter prospects. A Customs Union available hardly imply brighter prospects. A Customs Union will mean that Malta will have to confront the costs of full membership without either benefiting from the Structural Funds or from the participation in the Community's decision-making process. Participation in the European Economic Space (EES), culminating in the establishment of an industrial free trade area with the EC, may be quite an interesting option however countries like Sweden and Austria have not been that enthusiastic due to the limited degree of participation in policy-making. Maintaining the status quo or the «further strengthening of the present Association Agreement» risk Malta's marginalisation on the international scene and are probably the worse of all options. The present Government is determined to proceed with its efforts — both political and

economic — so that Malta becomes a full member of the EC. However this is a long process and if during the current year the Commission pronounces (as in the case of Austria) a positive opinion on Malta's application, full entry is not expected to be achieved prior to 1997-2000.

Until that date the CAP would probably have been «partially» reformed. The EC Commission anticipates that the announced reductions on cereals, milk, beefmeat as well as pork, sugar, eggs and processed goods will start coming into effect from 1996. This will imply a reduction in the «potential» Maltese national welfare loss. As a net importer, Malta has an interest (if it is to become a full member) for a reduction in EC protection levels and a gradual alignment of EC prices with international price levels.

Notwithstanding the inherent limitations of micro-states, entry into the EC and full participation in the common organisation of markets will be a challenge to the entire Maltese community. The difficulties and problems which will be encountered by the local agricultural sector as well as Maltese agro-industry are not insignificant and their future viability will largely depend on their resilience to adapt to the new situation. ●

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*This article is an abridged version of the M.Sc. thesis «L'Adhésion de Malte à la Communauté Européenne — Ses effets sur l'économie maltaise suite à l'application de la Politique Agricole Commune», Institut Agronomique Méditerranéen, CIHEAM, Montpellier, France, October 1991.*