EU Accession Effects on the Demand for Manufactures: the Case of Greece

Minoas Koukouritakis [*]

Department of Economics, University of Crete,

University Campus, Rethymno 74100, Greece.

Telephone: +30 2831077435, fax: +30 2831077406,

e-mail: `minoas@econ.soc.uoc.gr`

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Abstract

This paper analyzes the demand for manufactures in Greece and estimates the effects from the EU accession. An error correction specification of the Almost Ideal Demand System has been used. This formulation performs well on theoretical grounds, as the restrictions that are imposed by the demand theory are supported by the data provided. The results indicate that the domestic sales of manufactures are substitutes with imports from the EU and the rest of the world. Using the residuals approach, it is found that after the EU accession, imports from both sources substituted for a large part of the domestic sales.

JEL Classification: C30, F13, F15

Keywords: Elasticities, Error correction Almost Ideal Demand System, EU accession, Residuals approach, Trade liberalization.

1 INTRODUCTION

Greece entered the European Union (EU) as a full member in 1981. Being an associate member since 1963, the country had gradually reduced tariff protection, so that by 1981, imports of manufactures not produced domestically were totally liberalized, while tariffs on imports of products produced domestically had fallen by 60%. This fact led many researchers to argue that Greece's accession to the EU would not have substantial implications on Greek imports (Mitsos and Papageorgiou (1979)). Yet, protection by other means (financial stringencies and the indirect tax system) was very large and its abolition considerably harmed the country's trade balance from the imports side, although, of course, it improved static welfare.

A number of studies have, in the past, considered the implications of the EU accession on Greek imports, both before and after full membership, using the analytical or the residuals approach (Tsoukalis (1979), Mitsos (1983), Giannitsis (1988), Plummer (1991), Georgakopoulos (1993) and Arghyrou (2000)). These studies have, however, used either elasticity estimates coming out of single equation import demand models or ex-post indices (growth rates, income elasticities, shares in apparent consumption etc.). The former approach has a number of disadvantages, including the two-stage procedure in estimating import functions (Winters (1984a)), while the latter can provide only crude estimates of the accession effects on imports.

The present study estimates the effects of accession on Greek imports of manufactures, using an Error Correction Almost Ideal Demand System (EC AIDS). The Almost Ideal Demand System (AIDS), first developed by Deaton and Muellbauer (1980), was applied on import functions by Winters (1984a, 1984b, 1985). Its basic advantage, as pointed out by Winters (1984a), is that it avoids the separability assumption and treats both decisions in relation to the size and the structure of imports simultaneously. But the classic AIDS approach assumes that the consumers have adjusted to equilibrium in every time period. This assumption is far from real as habit persistence and incorrect

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expectations about real price changes affect short run behavior.

Additionally, Winters paid no attention to the statistical properties of the data. As seen below, the time series concerning Greek imports of manufactures and their prices are non stationary (i.e. $I(1)$). This means that the demand systems can be estimated only if their variables are cointegrated, which means that their estimated residuals are stationary (i.e. $I(0)$). The research on the estimation of cointegrated systems is quite recent (Johnson et al. (1992), Balcombe and Davis (1996), Attfield (1997), Karagiannis et al. (2000)) and follows the procedure that was developed by Engle and Granger (1987).

The above studies address the issue of error correction in a linear environment. On the other hand, it may be the case that adjustment back to equilibrium is faster when deviations from the equilibrium increase. Escribano and Granger (1998) address the possibility of non linear adjustment by including in their estimated error correction models the square and the cube of the cointegrating vector.

The present study contributes to the existing literature in several ways. First, using a sample that covers a long period, the demand for manufactures in Greece is analyzed using an EC AIDS based on the Engle-Granger cointegration methodology, allowing, thus, for non-linear adjustment back to equilibrium. In brief, the results indicate substitutability between domestic sales and imports from all sources (i.e. the EU and the rest of the world (ROW)). The results also indicate no evidence of non linear adjustment back to equilibrium.

Second, the residuals approach is implemented in order to estimate the EU accession effects on the demand for manufactures in Greece. It is found that EU imports of manufactures substituted for a large part of the domestic sales (i.e. domestic production minus total exports of manufactures). The ROW imports substituted for a smaller part of the domestic sales. The cumulative reduction in the domestic sales of manufactures for the first post accession decade amounts to about 10% of the total expenditure (i.e.

domestic production plus total imports minus total exports of manufactures) and to about 6% of GDP.

Third, the methodology used in this study is different to the methodology used by the above studies.

The rest of the paper is as follows. Section 2 outlines the model used in this paper. Section 3 describes the data and analyzes the empirical results and the elasticity estimates, while Section 4 presents the estimates of the EU accession effects on the demand for manufactures in Greece. Section 5 draws some concluding remarks.

2 THE DEMAND MODEL

The AIDS model, that is employed in this paper, was originally developed by Deaton and Muellbauer (1980). It is a flexible demand system and assumes a specific class of preferences that (1) permits exact aggregation over consumers, and (2) is presented via the cost or expenditure function which defines the minimum expenditure necessary to attain a specific level of utility at given prices[1] .

The linear formation of the AIDS can be written in an expenditure-share form as

$$S_{i,t} = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \ln P_{j,t} + \beta_i \ln \left(\frac{M}{P} \right)_t + e_{i,t}, \qquad i = 1...n \qquad (1)$$

where S_i stands for the share of commodity i in total expenditure (M), P_i is the price of commodity i, e_i is the error term and P stands for the aggregate price index, which is:

$$\ln P_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \ln P_{i,t} + 0.5 \sum_{i=1}^{n} \sum_{j=1}^{n} \gamma_{ij} \ln P_{j,t} \ln P_{i,t} \qquad (2)$$

Because of the non linearity of this index, it is usually replaced by the Stone index:

[1]See Deaton and Muellbauer (1980).

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$$P_t^* = e^{\sum_{i=1}^{n} \text{Si},t \ln P_{i,t}} \cong P_t \iff \ln P_t^* = \sum_{i=1}^{n} S_{i,t} \ln P_{i,t} \cong \ln P_t \quad . \tag{3}$$

As Pashardes (1993) points out, the use of this index can bias the parameter estimates of the expenditure share equations, especially when one deals with micro data. But this bias is not serious when the expenditure share equations are estimated from aggregate data.

Demand theory imposes some linear restrictions on the parameters of equation (1). The restrictions concern additivity $\left(\sum_{i=1}^{n} \alpha_i = 1, \ \sum_{i=1}^{n} \gamma_{ij} = 0, \ \sum_{i=1}^{n} \beta_i = 0 \right)$, linear homogeneity $\left(\sum_{j=1}^{n} \gamma_{ij} = 0 \right)$ and symmetry $\left(\gamma_{ij} = \gamma_{ji}, \ i,j = 1...n \right)$.

The next step is to investigate the time series properties of the data. This is necessary for specifying the most appropriate dynamic form of the model, and for finding out if the long run demand relationships of equation (1) are economically meaningful or if they are just spurious. If all variables included in the equation (1) are $I(1)$ and their relationships are cointegrated (i.e. the estimated residuals $\widehat{e}_{i,t}$ are $I(0)$), then the EC AIDS can be expressed in the following form:

$$\Delta S_{i,t} = \sum_{j=1}^{n} \psi_{ij} \Delta S_{j,t-1} + \sum_{j=1}^{n} \gamma_{ij} \Delta \ln P_{j,t} + \beta_i \Delta \ln \left(\frac{M}{P} \right)_t + \lambda_i \widehat{e}_{i,t-1} + \mu_i \widehat{e}_{i,t-1}^2 + \xi_i \widehat{e}_{i,t-1}^3 + u_{i,t} \tag{4}$$

where Δ refers to the difference operator, $\widehat{e}_{i,t-1}$ stands for the estimated residuals from equation (1) and $u_{i,t}$ is the error term (Engle and Granger (1987)). In order to allow for the possibility of non linear adjustment back to equilibrium, the square and the cube of the cointegrating vector are included in equation (4) (Escribano and Granger (1998)). The restrictions that are imposed by the demand theory are the same as above.

Equations (1) and (4) also include two more variables: a dummy variable and an index variable. The dummy variable D refers to the 1967-1974 period when Greece was under a military regime, and the regulations of the Association Agreement with the EU

were not fully implemented. The value of the dummy variable D is unity from 1967 to 1974 and zero otherwise.

The index variable RL refers to the "regulatory levy". The indirect tax system provided a substantial protection to domestic production via both fictitious increases in the taxable base of imports and nominal rate differentiations. The Association Agreement did not provide any regulation concerning the indirect tax protection; yet after full membership in 1981, Greece had to harmonize its indirect tax system according to the provisions of the article 35 of the Treaty of Rome. In 1984, the indirect tax protection was embodied in a special levy, called the "regulatory levy", which was gradually faced out from 1984 to 1989. The structure of the index variable RL is presented in Table 1. Because of the additivity restriction, the parameters of the D and the RL sum up to zero.

(Table 1 here)

Equation (4) also embodies some linear habit formation effects. They may be referred to as short memory since last period's expenditure pattern is allowed to affect current allocation decisions. In our analysis, last period's distribution of manufactures expenditure affects current decision.

The AIDS and the EC AIDS models can also be used to derive the formulas of expenditure elasticities, compensated (Hicksian) price elasticities and uncompensated (Marshallian) price elasticities. The expenditure elasticities are given by the following formula:

$$E_{im} = 1 + \frac{\beta_i}{S_i} \quad . \tag{5}$$

The parameters β_i can be either positive, indicating luxuries, or negative, indicating necessities. The compensated (Hicksian) own and cross-price elasticities of demand are derived as following:

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$$\epsilon_{ii}^H = \left(\frac{\gamma_{ii}}{S_i}\right) + S_i - 1 \;\; \text{and} \;\; \epsilon_{ij}^H = \left(\frac{\gamma_{ij}}{S_i}\right) + S_j \;\;. \tag{6}$$

From the Slutsky equation one can obtain the formula for the uncompensated (Marshallian) own and cross-price elasticities of demand:

$$\epsilon_{ii}^M = \epsilon_{ii}^H - E_{im}S_i \;\; \text{and} \;\; \epsilon_{ij}^M = \epsilon_{ij}^H - E_{im}S_j \;\;. \tag{7}$$

Own price elasticities of demand, compensated and uncompensated, are expected to be negative if the expenditure function that is given by equation (1) is concave. Non a priori restrictions are imposed on cross-price elasticities of demand both compensated and uncompensated.

3 DATA AND EMPIRICAL RESULTS

3.1 *Data*

The sample for the present study is comprised of annual data. The period covered is from 1960 to 2000. Manufactures include categories 5-8 of the Standard International Trade Classification Rev. 3 (i.e. chemical products, manufactured goods classified by raw material, machinery and transport materials and various manufactured goods respectively).

Data for the unit value index of the EU imports of manufactures and the values of the EU imports of manufactures, the ROW imports of manufactures and the total exports of manufactures were obtained from the External Trade Statistics of the National Statistical Service of Greece. The unit value index of the ROW imports of manufactures was constructed by deflating their value with their volume. These data were also taken from the External Trade Statistics of the National Statistical Service of Greece. The above unit value indices were tariff adjusted using primary and unpublished data that were obtained from National Statistical Service of Greece[2] .

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[2]Due to the lack of quarterly data availability for the unit value indices and the tariff rates for

To construct the domestic sales of manufactures, I subtracted the total exports of manufactures from the domestic production of manufactures. Data for the domestic production of manufactures were taken from the Annual Industrial Research of the National Statistical Service of Greece. For the price of the domestic sales of manufactures the wholesale price index of manufactures produced and consumed domestically was used. This index was obtained from the Statistical Yearbook of Greece of the National Statistical Service of Greece.

3.2 *Empirical Results*

The AIDS and the EC AIDS were estimated using an iterative seemingly unrelated regression (SUR) procedure. The SUR process is very sensitive on the equation deleted when there are singular systems, as the EC AIDS and, consequently, the procedure must be iterated. The iteration process ensures that the estimates obtained asymptotically approach those of the maximum likelihood method. The AIDS and the EC AIDS in this study include the domestic sales (DS) and the EU imports expenditure shares, while the ROW imports expenditure share was dropped out.

Before estimating equations (1) and (4), all time series were tested for unit roots. The augmented Dickey-Fuller test (ADF) was performed at the 5 percent level of significance. In order to select the appropriate lag length, the Akaike's information criterion was employed. As shown in Table 2, the unit root hypothesis cannot be rejected in any case. Of course, by construction, expenditure shares are bounded between 0 and 1, thus it is expected to be stationary in the very long run. But for this specific sample of data, S_is have all the characteristics of $I(1)$ time series. In all cases the null hypothesis of a second unit root was also tested. This hypothesis was rejected in all cases.

(Table 2 here)

In order to test for cointegration, the estimated residuals of equation (1) were tested

manufactures, annual data were used in the present study.

for a unit root using the ADF test, following the Engle-Granger methodology. As Enders (2004, pp. 336-337) points out, it is not possible to use the Dickey-Fuller tables in order to obtain critical values in this case. The reason is that the estimated residuals $(\widehat{e}_{i,t})$ are generated from regression equations and we do not know the actual errors $(e_{i,t})$ but only the estimated ones $(\widehat{e}_{i,t})$. MacKinnon (1991) developed the critical values for the Engle-Granger cointegration test using the response surface methodology. They are calculated by the following formula:

$$C(p) = \varphi_\infty + \varphi_1 T^{-1} + \varphi_2 T^{-2} \tag{8}$$

where $C(p)$ is the p percent critical value, T is the number of observations φ_∞ is the estimated asymptotic critical value and φ_1, φ_2 are coefficients in the response surface regression. In our study $T = 41$ and consequently, the critical values (with 5 variables as regressors and a constant in the cointegrating vector) are $C(1) = -5.52$, $C(5) = -4.76$ and $C(10) = -4.40$. As shown in Table 2, the unit root hypothesis is rejected at the 1 percent level of significance for both cases. Thus, I claim that the estimated residuals of equation (1) are stationary, which implies evidence of cointegration between the expenditure shares and the independent variables of the model. In other words, these variables are moving together in the long run.

The hypotheses of linear homogeneity, and symmetry and homogeneity, are also tested. Based on a Wald test, the maintenance of both homogeneity, and symmetry and homogeneity, cannot be rejected at the 5 percent level of significance. For homogeneity testing the calculated value of $\chi^2-statistic$ is 1.01 and the corresponding tabulated value is 5.99 for 2 degrees of freedom and 5 percent level of significance. For homogeneity and symmetry testing the calculated value of $\chi^2 - statistic$ is 1.39 and the corresponding tabulated value is 7.81 for 3 degrees of freedom and 5 percent level of significance. This suggests that the empirical results are theoretically consistent and valid for this functional specification.

The parameter estimates of the EC AIDS for the demand for manufactures in Greece are presented in Table 3. These estimates embody both properties of homogeneity and symmetry. The parameter estimates of the error correction term are statistically significant at the 5 percent level for both expenditure shares. The inclusion of the square and the cube of the cointegrating vector in estimating the EC AIDS gave statistically insignificant parameter estimates even at the 10 percent level for both expenditure shares. For this reason, these variables were excluded from the estimation of the model. The above results imply that there is only linear adjustment back to equilibrium. As an error correction term I used the residuals that came out from the domestic sales expenditure share[3] . The $Q-statistics$ indicate no evidence of serial correlation on the estimated residuals of the EC AIDS. The Jarque-Bera test indicates normality of the residuals.

(Table 3 here)

The estimated coefficient of the budget constraint $(\frac{M}{P})$ for the domestic sales expenditure share is negative, which implies that domestic manufactures are necessities for the Greek economy. On the contrary $\beta_{EU} > 0$, which means that the EU imports of manufactures are treated as luxuries. The estimated coefficient of the budget share for the ROW imports share has been calculated using the additivity restriction and it is negative. This implies that the ROW imports of manufactures behave as necessities in the Greek economy. This is quite a plausible result since they mainly consist of machinery and other inputs, which are necessary for domestic production. Most of the estimated price coefficients are statistically significant.

The parameter estimate of the "regulatory levy" (i.e. the gradual harmonization of the indirect tax system) is statistically significant at the 5 percent level for the domestic

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[3]Enders (2004, p. 342) points out that there is an area of ambiguity since the residuals from any of the "equilibrium" relationships could have been used in the estimation. The use of the residuals that came out from the EU imports expenditure share gives similar results. These results are not presented here but are available under request.

sales share and the EU imports share. It is positive for the former and negative for the latter. The parameter estimate for the ROW imports share has been calculated using the additivity restriction and it is also negative. The above results indicate that the gradual harmonization of indirect taxes had a negative effect on the contribution of domestic sales in total expenditure of manufactures. On the other hand, there was a positive effect on the imports shares form both sources (EU and the ROW).

The estimated coefficients of the dummy variable D are statistically insignificant for both shares. This result implies that the non-implementation of the Association Agreement by the military regime in Greece did not affect significantly the expenditure shares of manufactures.

Testing for possible habit formation effects, the hypothesis of overall habit formation is rejected at the 5 percent level of significance. The calculated value of $\chi^2 - statistic$ is 2.16 and the corresponding tabulated value is 5.99 for 2 degrees of freedom. So, it is claimed that habits seem to be of low importance in explaining the pattern of manufacturing expenditure.

3.3 *Elasticity Estimates*

Table 4 presents the mean point elasticity estimates for the demand for manufactures in Greece. They were calculated using equations (5)-(7) and the parameter estimates of equation (4). As mentioned above $\beta_{DS} < 0$ and $\beta_{ROW} < 0$, which implies that these goods are treated as necessities in Greek economy. The corresponding expenditure elasticities are, of course, below unity. On the other hand, the EU imports of manufactures behave as luxuries ($\beta_{EU} > 0$) and the respective expenditure elasticity is above unity.

(Table 4 here)

The Hicksian own price elasticities of demand are negative as expected. The magnitude of these elasticities implies that the demand for the domestic sales, the EU imports

and the ROW imports of manufactures is price inelastic. The Hicksian cross-price elasticities of demand between domestic sales and the EU imports and between domestic sales and the ROW imports are positive, which implies substitutability between the domestic manufactures and the imported ones from both sources. The results also indicate that a change in the price of domestic manufactures will have a large impact on the demand for the EU imports ($\epsilon^H_{EU,DS} = 1.13$) and the demand for the ROW imports ($\epsilon^H_{ROW,DS} = 1.09$). On the contrary, a change in the price of imported manufactures from any source will have a quite small impact on the demand for the domestic ones ($\epsilon^H_{DS,EU} = 0.33$ and $\epsilon^H_{DS,ROW} = 0.15$).

The Hicksian cross-price elasticities of demand between the EU imports and the ROW imports are negative, which implies complementarity between these trade flows. Both elasticities are between zero and unity in absolute value, which means that a price change of the one flow will have a small impact on the demand of the other.

The Marshallian own price elasticities of demand are also negative. With no income compensation, the demand for the domestic sales and the EU imports of manufactures is price elastic, unlike the demand for the ROW imports which is price inelastic. The Marshallian cross-price elasticities of demand have the same direction with the Hicksian elasticities. They indicate substitutability between domestic manufactures and the imported ones from both sources, and complementarity between the EU imports and the ROW imports. The magnitude of the Marshallian cross-price elasticities indicates that the effects on demand due to price changes are quite small.

4 THE EU ACCESSION EFFECTS

In general, the residuals approach, which can be implemented only ex-post, estimates the effects of an economic union as the residual between an actual and an estimated variable. The estimated variable represents the "anti-monde" (i.e. what would have happened to the corresponding variable if the country had not entered the economic

union). The main assumption in the present analysis is that if Greece had not entered the EU, the pace of protection abolition would have been the same as the one prevailing in Greece before 1981 that had been scheduled in 1962 with the Association Agreement between Greece and the EU.

Tariffs and financial stringencies on the Greek imports of manufactures were gradually abolished both during the 1981-1986 period and the 1981-1984 period, respectively. These abolitions followed the schedule that had been determined by the Association Agreement, as the Accession Treaty did not change the pace of abolition of the above measures. Consequently, there was no EU accession effects on the Greek imports due to the abolition of these measures[4] .

In the case of indirect taxes on imports of manufactures (i.e. the "regulatory levy") there was no provision in the Association Agreement concerning their harmonization with the directives of the article 95 of the Treaty of Rome. As mentioned above, the abolition of the "regulatory levy" took place from 1984 and 1989. Thus, it is suggested that if Greece had not entered the EU in 1981, the trade protection through the indirect tax system would have remained the same as the 1980 level[5] . Consequently, in the present study the "anti-monde" begins in 1984.

In this paper, the actual expenditure shares on manufactures are the actual variables. The expenditure shares under the above assumption are the estimated variables. Therefore, the residual between the two variables (i.e. the actual and the estimated one) represents the effects of the accession. Using the EC AIDS in equation (4) I estimate the effects of the accession on the differences of the expenditure shares. Since the abolition of the "regulatory levy" began in 1984, the estimated expenditure shares in 1983 are the same as the actual ones. Finally, using the estimated differences of the expenditure

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[4] For more details, see Katsos and Spanakis (1983).

[5] The EU accession effects on the demand for manufactures were estimated only for the 1984-1989 period. The reason is that given the global relaxation in all trade barriers that has occurred since early 1990s, this hypothesis is unrealistic for the post-1993 period and leads to an overestimation of the EU accession effects.

shares and the 1983 as the base year, the effects of the EU accession on the expenditure shares of manufactures are calculated. The residuals approach allows the estimation both income and substitution effects, which means that the above results are very close to the actual ones that were caused by the accession.

The cumulative effects on the demand for manufactures are presented in Table 5 and in Figures 1 to 3, in 1989 prices. They indicate that the EU accession led to a reduction of the domestic sales expenditure share. This effect amounts to about 10% of the total expenditure of manufactures in Greece and to 6% of the Greek GDP. The EU imports of manufactures substituted for the largest part of the domestic sales reduction. The cumulative increase of the EU imports expenditure share amounts to 8% of the total expenditure and to 5% of GDP. The ROW imports of manufactures also substituted for domestic sales, but to a lesser extent. This effect amounts to about 2% of the total expenditure and to 1% of GDP. In terms of static welfare, the above effects can be explained as trade creation since lower cost imports from both sources substituted for a large part of the higher cost domestic production of manufactures.

(Table 5 here)

(Figures 1 to 3 here)

5 CONCLUDING REMARKS

In this study an error correction specification of the AIDS model was used in order to analyze the demand for manufactures in Greece and to estimate the effects that were caused by the EU accession. The EC AIDS is based on the Engle-Granger cointegration methodology and is used so as to correct the disequilibrium problem that comes out of the existence of a unit root in the variables. The results show evidence of linear adjustment back to equilibrium only.

Using this specification, the restrictions that are imposed by the demand theory, such as linear homogeneity and symmetry, cannot be rejected. Confirmation of the

demand theory implies that the parameter estimates are valid and accurate. The results also showed that habits seem to be of low importance in explaining the pattern of the expenditure shares in manufactures. The elasticity estimates indicate that the domestic sales and the ROW imports of manufactures behave as necessities in Greek economy, while the EU imports are treated as luxuries. The domestic sales of manufactures are substitutes with imports from both sources, while there is complementarity between the EU imports and the ROW imports of manufactures in Greek economy.

Our results also indicate that the EU imports and the ROW imports of manufactures substituted for a large part of the domestic sales. Using the residuals approach, it is found that the EU accession and the consequent trade liberalization have led to a cumulative reduction of the domestic sales of manufactures that amounts to about 10% of the total expenditure of manufactures in Greece and to 6% of the Greek GDP. The EU imports of manufactures substituted for the largest part of the domestic sales reduction, while the ROW imports of manufactures substituted for a smaller part.

Overall, the above findings indicate that the EU accession and the consequent trade liberalization have led to an increase of the Greek imports, especially from the EU, which substituted for a large part of the domestic sales of manufactures. These developments improved resource allocation and have led to trade creation, since lower cost imports from both sources substituted for the higher cost domestic production.

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Table 1

The index variable RL

Year	1960-1983	1984	1985	1986	1987	1988	1989-2000
Value	1	0.9	0.8	0.65	0.45	0.25	0

Table 2

Unit root and cointegration tests

Unit root test			Cointegration test	
Variable	Level	First difference	Residuals	Level
S_{DS}	-1.83	-5.49***	$\widehat{e}_{DS}$	-5.96***
S_{EU}	-1.97	-4.98***	$\widehat{e}_{EU}$	-5.53***
S_{ROW}	-2.13	-6.03***		
$\ln P_{DS}$	-2.37	-2.73*		
$\ln P_{EU}$	-2.19	-4.62***		
$\ln P_{ROW}$	-0.60	-4.43***		
$\ln(M/P)$	-2.12	-4.93***		
RL	-1.02	-2.15**		

The entry in each cell is the ADF test statistic. The critical values for the cointegration test (with 5 variables as regressors and a constant in the cointegrating vector) are -5.52 (1%), -4.76 (5%) and -4.40 (10%). *** denotes rejection of the unit root hypothesis at the 1% level of significance. ** denotes rejection of the unit root hypothesis at the 5% significance level. * denotes rejection of the unit root hypothesis at the 10% significance level. The sample size is 41.

Table 3

Parameter estimates of the EC AIDS

Variables	$\Delta S_{DS,t}$	$\Delta S_{EU,t}$	$\Delta S_{ROW,t}$
$\Delta S_{i,t-1}$	0.1773 (1.46)	0.0991 (0.85)	-0.2764
$\Delta \ln P_{DS,t}$	-0.1268 (-2.11*)	0.0882 (2.24*)	0.0386
$\Delta \ln P_{EU,t}$	0.0882 (2.24*)	-0.0333 (-1.05)	-0.0549
$\Delta \ln P_{ROW,t}$	0.0386 (1.22)	-0.0549 (-2.95**)	0.0163
$\Delta \ln(M/P)_t$	-0.0505 (-1.11)	0.0552 (1.55)	-0.0047
ΔRL_t	0.1121 (2.28*)	-0.0880 (-2.28*)	-0.0241
D_t	-0.0056 (-0.70)	0.0078 (1.25)	-0.0022
$\widehat{e}_{DS,t-1}$	-0.6924 (-4.16**)	0.5487 (4.36**)	-
R^2	0.42	0.42	-
σ	0.023	0.018	-
$DW-stat.$	1.99	1.93	-
$Q-stat.\ (1\ lag)$	0.00 (0.98)	0.01 (0.93)	-
$Q-stat.\ (2\ lags)$	3.80 (0.15)	2.91 (0.23)	-
$Q-stat.\ (3\ lags)$	5.00 (0.17)	6.30 (0.10)	-
$Q-stat.\ (4\ lags)$	5.51 (0.24)	6.54 (0.16)	-
$\chi^2_{normality}$	2.44 (0.30)	2.41 (0.30)	-

Numbers in parentheses are $t-statistics$ in the first panel and probability values
in the second panel. ** denotes rejection of the null hypothesis at the 1% level of
significance. * denotes rejection of the null hypothesis at the 5% level of
significance.

Table 4

Mean point elasticity estimates

of the EC AIDS

Expenditure elasticities			
$E_{DS,m}$	0.93		
$E_{EU,m}$	1.27		
$E_{ROW,m}$	0.95		
Hicksian elasticities			
$\epsilon^{H}_{DS,j}$	-0.48	0.33	0.15
$\epsilon^{H}_{EU,j}$	1.13	-0.96	-0.17
$\epsilon^{H}_{ROW,j}$	1.09	-0.35	-0.74
Marshallian elasticities			
$\epsilon^{M}_{DS,j}$	-1.13	0.14	0.06
$\epsilon^{M}_{EU,j}$	0.25	-1.22	-0.30
$\epsilon^{M}_{ROW,j}$	0.43	-0.55	-0.83

Table 5

Cumulative effects on manufactures due to the EU accession (in 1989 prices)

As percentages of the total expenditure of manufactures in Greece								
	Actual variables			Estimated variables			Residual		
Year	DS	EU	ROW	$\widehat{DS}$	$\widehat{EU}$	$\widehat{ROW}$	$DS-\widehat{DS}$	$EU-\widehat{EU}$	$ROW-\widehat{ROW}$
1984	72.03	17.15	10.83	72.63	17.42	9.96	-0.60	-0.27	0.87
1985	72.85	19.02	8.13	74.13	17.30	8.56	-1.28	1.72	-0.44
1986	68.28	22.73	8.99	72.70	18.51	8.79	-4.42	4.22	0.20
1987	66.07	23.89	10.03	73.09	17.81	9.09	-7.02	6.08	0.94
1988	68.81	21.76	9.43	73.30	17.10	9.60	-4.48	4.66	-0.18
1989	63.17	25.91	10.91	72.92	17.94	9.15	-9.75	7.98	1.77
As percentages of the Greek GDP								
	Actual variables			Estimated variables			Residual		
Year	DS	EU	ROW	$\widehat{DS}$	$\widehat{EU}$	$\widehat{ROW}$	$DS-\widehat{DS}$	$EU-\widehat{EU}$	$ROW-\widehat{ROW}$
1984	45.91	10.93	6.90	46.29	11.10	6.35	-0.38	-0.17	0.56
1985	50.27	13.13	5.61	51.16	11.94	5.91	-0.89	1.18	-0.30
1986	40.68	13.54	5.36	43.31	11.03	5.24	-2.63	2.51	0.12
1987	37.92	13.71	5.76	41.95	10.22	5.22	-4.03	3.49	0.54
1988	39.08	12.36	5.36	41.63	9.71	5.45	-2.55	2.65	-0.10
1989	38.84	15.93	6.71	44.83	11.03	5.62	-5.99	4.90	1.09

DS is for the domestic sales expenditure share, EU is for the EU imports expenditure share and ROW is for the ROW imports expenditure share.

Figure 1
Cumulative effects on the expenditure share of the domestic sales of manufactures
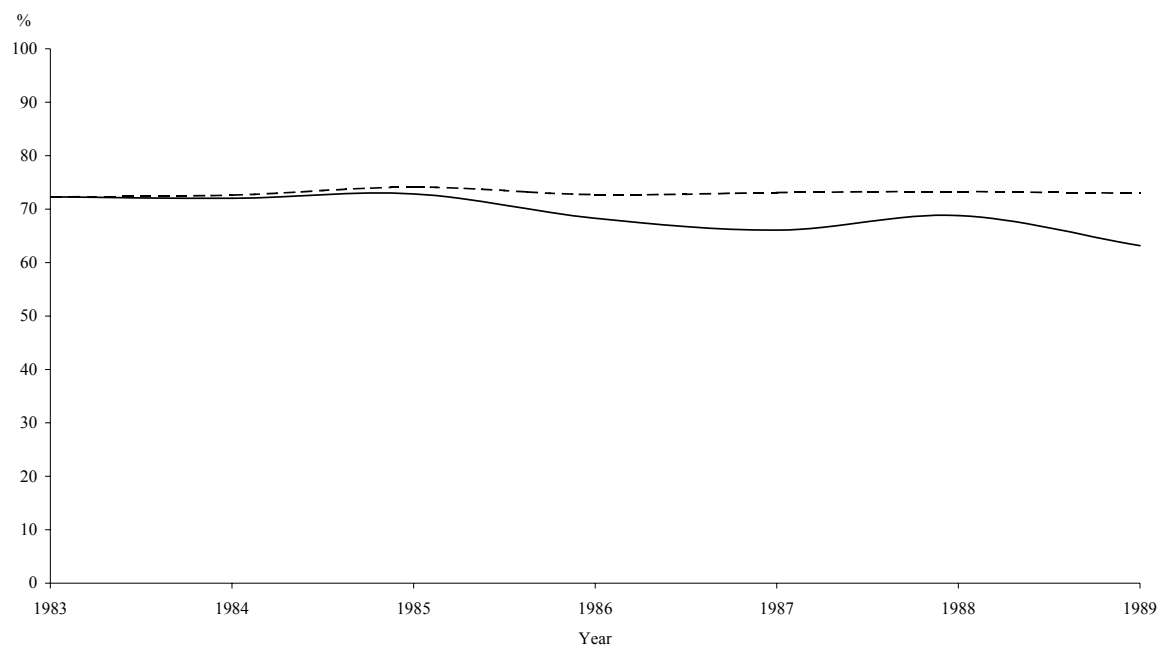(in 1989 prices)

Figure 2
Cumulative effects on the expenditure share of the EU imports of manufactures
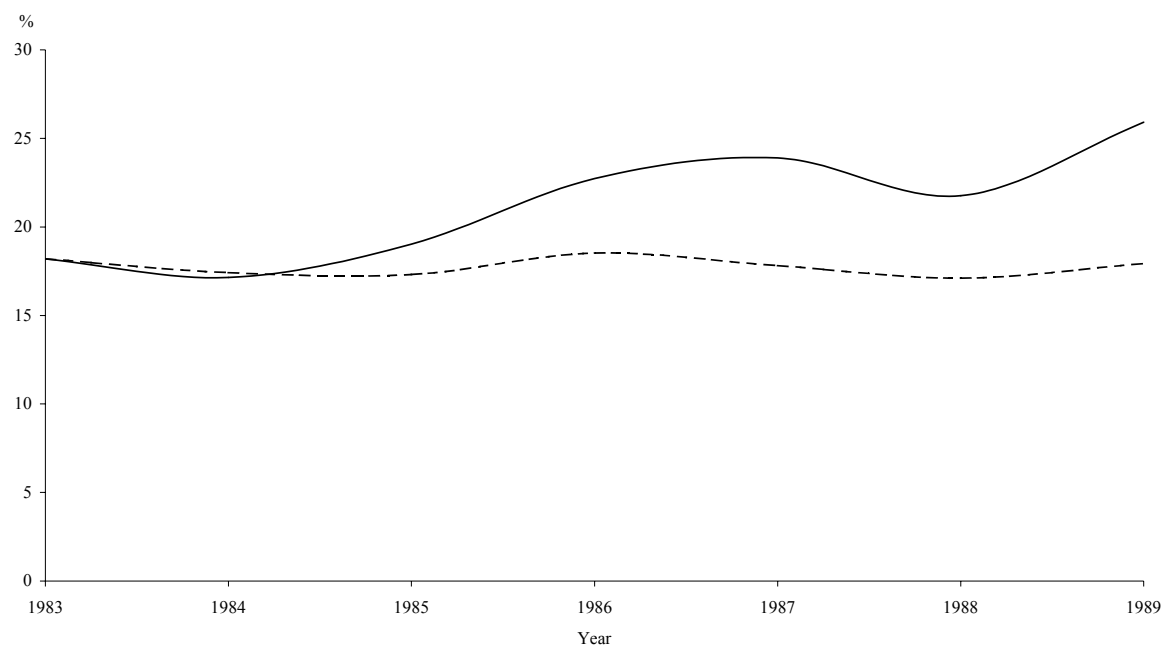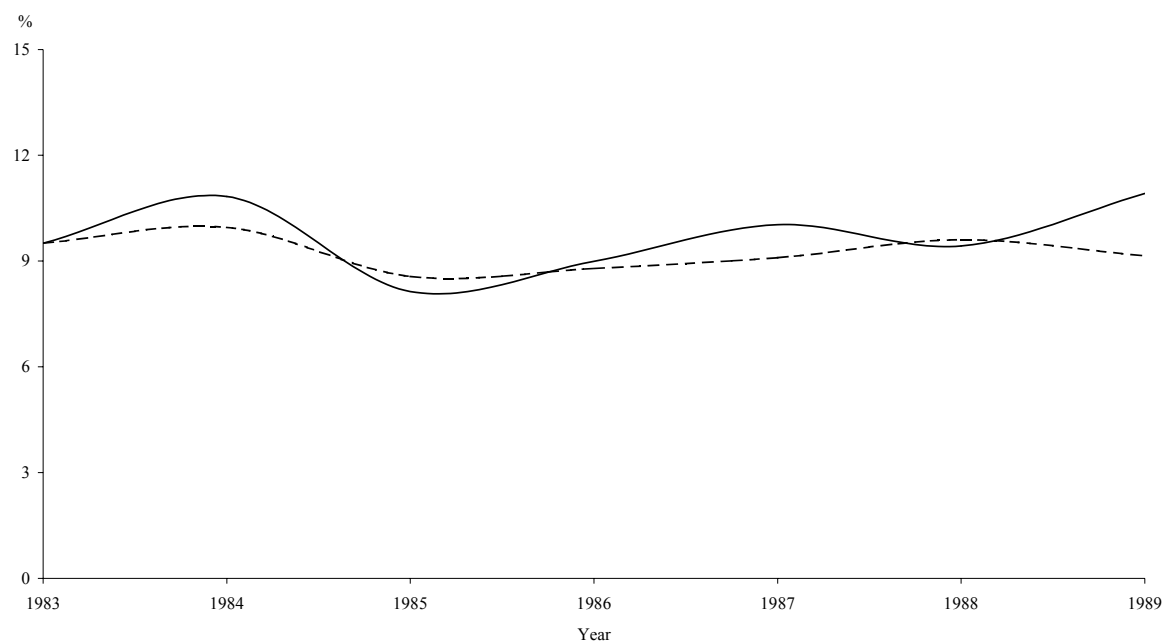(in 1989 prices)

Figure 3
Cumulative effects on the expenditure share of the ROW imports of manufactures
(in 1989 prices)

Figures legends

Figure 1

continuous line: Actual domestic sales

discontinuous line: Domestic sales in the "anti-monde"

Figure 2

continuous line: Actual EU imports

discontinuous line: EU imports in the "anti-monde"

Figure 3

continuous line: Actual ROW imports

discontinuous line: ROW imports in the "anti-monde"