



Profitability and Media Advertising in Greek Food Manufacturing Industries

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Abstract. The effect of advertising intensity in four media (television, radio, newspapers and magazines) on profitability is examined in this paper. A profitability model is tested using a unique 1993–1996 panel data set of 350 Greek food manufacturing firms. Fixed effects results for the full model show that only television advertising increases profitability significantly. The results for eight major food categories estimated separately show important differences between consumer and producer groups; television advertising effects on profitability are positive and significant only in the consumer industries where television advertising intensity is high. These findings show that television is the only media where persuasive advertising exists in Greek food manufacturing firms.

Key words: Food industries, media advertising, profitability.

I. Introduction

Many empirical studies of the structure-performance relationship in manufacturing industries have focused on the impact of advertising on industry profitability (Pagoulatos and Sorensen, 1981, pp. 728–732; Gisser, 1991, pp. 148–152; Connor and Peterson, 1992, p. 157; Oustapassidis and Vlachvei, 1999, p. 1293). A limited number of studies examined the effect of media advertising on industry profitability (Ackoff and Emshoff, 1975; Porter, 1976a, pp. 403–405). However, these studies did not use firm level data and they did not take into account the persistence of profits. The aim of this study is to examine the effects of advertising expenditures for each medium (TV, radio, magazine and newspaper) on firm profitability using panel data for a four-year period.

Each media advertising vary from each other with regard to the information it provides, the costs of placing messages before potential buyers, the number of repetition of the messages, etc. So, the question is what is the effect of each media advertising on market performance in the food industry- an industry where advertising seems to play an important role. We test here whether printed advertising is more “informative” compared to “persuasive” television advertising.

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Following Nelson (1970) it is expected that search goods be advertised more in newspapers and magazines and less on television and radio. Also advertising in both printed media (newspapers and magazines) is expected to contain a good deal of detailed information such as prices and quality characteristics. By increasing information, advertising increases the number of substitutes known to buyers, thereby increasing price elasticity of demand and reducing price-cost margins (Ornstein, 1977, pp. 2–3). On the other hand, advertising influences the demand for experience goods such as the food products, because consumers tend to believe that advertised goods will be better buys. The demand for advertised products with well-known brand names become inelastic. Potential entrants must overcome established brand loyalty and spend relatively more on advertising (Farris and Albion, 1980, p. 18). By changing consumer tastes and establishing brand loyalties among buyers of advertised products, persuasive advertising increases prices for the consumers, decreases competition in the market and increases profit margins. The implication is that experience goods will be advertised more per unit of sales than search goods (Nelson, 1974).

Porter (1976a, pp. 404–405) found out that network television advertising, and to a lesser extent advertising in large circulation magazines had the most significant impact on profitability. Porter's conclusions were proven to be very important in the case of food and beverage industries. It is worth noting that Porter examined the effect of television and magazine advertising on market power at industry level by estimating alternative profitability equations including only one variable for media advertising in each model. Ackoff and Emshoff (1975) found that television advertising is a more powerful marketing tool than radio or newspaper advertising in the brewing industry. Mueller and Rogers (1980, pp. 94–95) found that television advertising has played an especially potent role in increasing concentration in consumer goods' industries. A study by Rogers and Mather (1983) showed that television is the ideal means for advertising food in the U.S.A.

Although the interpretation of cross sectional regression estimates, as measures of long-run slopes and elasticities, is rather standard in the literature, the permanency of the profits observed in any cross section is open to question (Mueller, 1986, pp. 8–9; Oustapassidis et al., 2000). A panel data analysis can provide estimates satisfying the relevant requirements.

We use firm level panel data for the period 1993–1996 to examine the effect of each of four media advertising (television, radio, newspaper and magazines) on the profitability of 350 Greek food manufacturing firms. Further the sample is broken into 8 major food categories (5 consumer and 3 producer industries) in order to allow the examination of the differences between consumer and producer firms.

II. Model Specification

Following the relevant literature (e.g., Schmallensee, 1987, pp. 399–405) the Lerner index of market power for a firm i under the Cournot behavioral assumption is

$$\frac{p - MC_i}{p} = \frac{s_i}{\varepsilon_{QP}}, \quad (1)$$

where p is the price, MC_i is firm's marginal cost, s_i is the firm i 's market share and ε_{QP} is the price elasticity of demand.

Following Martin (1993, p. 499), assumes for the moment constant returns to scale. Then marginal cost equals average cost (c_i). Thus, average cost is the normal rate of return on investment:

$$c_i = \frac{wL_i + \lambda_i \rho K_i}{q_i}, \quad (2)$$

where q_i is firm i 's output, w can be thought of as a vector of input prices, L_i is a vector of input levels, λ_i is the rental cost of capital services and ρK is the value of firm i 's assets. Then Equation (1) yields an expression for firm i 's accounting rate of return on sales:

$$\frac{pq_i - wL_i - \lambda_i \rho K_i}{pq_i} = \frac{s_i}{\varepsilon_{QP}} \quad (3)$$

or

$$\frac{pq_i - wL_i}{pq_i} = \frac{s_i}{\varepsilon_{QP}} + \frac{\lambda_i \rho K_i}{pq_i}. \quad (4)$$

The term on the left-hand side, is the rate of return on sales gross of the cost of capital. The second term on the right-hand side is the capital-sales ratio.

Advertising can change price elasticity of demand by altering consumer preferences or by re-affirming extant preferences to a degree that makes consumer brand switching extremely difficult. Given the hypothesized differences among media advertising on profit margins we include advertising intensity variables for each media to examine the existing differences, if any, between printed and electronic media advertising. Also, market demand is expected to be less elastic in highly concentrated industries and thus a positive association between profit margins and level of concentration is expected. Finally, the industry growth rate is also included in order to filter out external changes that may affect profit rates. Thus, based on Equation (4), we specify the following empirical model:

$$\begin{aligned} \text{PRF} = & a_0 + a_1 \text{MS} + a_2 \text{AS}_1 + a_3 \text{AS}_2 + a_4 \text{AS}_3 + a_5 \text{AS}_4 \\ & + a_6 \text{KS} + a_7 \text{CR}_{4i} + a_8 \text{GR}_i, \end{aligned} \quad (5)$$

where PRF is profitability of the firm, MS is the firm market share, AS₁, AS₂, AS₃ and AS₄ are the firm television, radio, magazine and newspaper advertising intensity, respectively; KS is the firm capital over sales ratio; CR_{4i} is the concentration ratio; and GR_i is the annual rate of growth of the industry sales.

Following Shepherd (1990, p. 119) we expect that profits are higher for large firms ($a_1 > 0$). Since advertising – especially the one by national electronic media – leads to entry barriers (Porter, 1976a, p. 401; Porter, 1976b, p. 131) it is expected that both television and radio advertising increase the brand loyalty and profit margins ($a_2 > 0$ and $a_3 > 0$). Magazine advertising vary with the geographic scope and specialization of the magazine. National magazines with large circulation and specialization are expected to increase monopoly profits ($a_4 > 0$). Newspaper advertising is preponderantly informative, thus $a_5 < 0$. The capital-sales ratio is expected to have a positive effect on profits ($a_6 > 0$) (Strickland and Weiss, 1976; Ornstein, 1987, p. 64). The relevant literature (Strickland and Weiss, 1976; Pagoulatos and Sorensen, 1979, p. 122; Gisser, 1991, p. 155; Nolle, 1991, p. 68) suggests that both concentration ratio and industry growth have positive effects on profits ($a_7 > 0$ and $a_8 > 0$). To test for the nonlinear relationship of the advertising intensity we use the squared value of each of the four variables for advertising intensity in an alternative model. A considerable body of empirical evidence supports the inverted-U relationship between profitability and advertising intensity (e.g., Chintagunta and Vilcassim, 1992; Piga, 1998, pp. 512–513).

Following Mueller and Rogers (1980, pp. 90–91) radio advertising expenditures were combined with television advertising expenses to form electronic media advertising intensity (AS₅) because of the small share of radio advertising (3% of the total advertising of the sample). It is for the same reason that newspaper advertising was combined with magazine advertising to form printed media advertising intensity (AS₆).

III. Data and Variable Definition

In this empirical study we use firm level panel data to test for the relationship between the price/cost margin and media advertising intensity in the food and beverage industries. The food and beverage sector was chosen not only because of its importance as an area of current concern but also because of its importance relative to the manufacturing sector. The Greek food and beverage sector has recently experienced high profitability and is one of the most dynamic and advertised sectors in Greek economy. The respective profitability ratios (gross profits over sales) are 23.54 percent for the food sector and 32.24 percent for the beverage sector against 22.08 per cent for the total manufacturing for 1996 (ICAP, 1996). The food and beverage manufacturing sector spends in advertising 32.78 percent of the total amount of advertising expenditures in Greek manufacturing (Nielsen Hellas, 1996), while the share of the sector in total manufacturing output was 27.7 percent in 1996 (ICAP, 1996).

In contrast to other countries, where firm level data are considered as confidential, all Greek firms are obliged to publish their annual balance sheets and income statements which are available on an annual basis by a proprietary company (ICAP). The classification based on the principal product of the firms into the relevant three-digit industries was made by the authors who calculated all required industry and firm level variables for the study. The full sample consists of 350 Greek food and beverage firms which were classified into 8 three-digit industries (SIC classification). The sample includes all firms with 1993 sales more than 100 million Greek Drs (approximately 0.3 million ECU) for the period 1993–1996. Thus the sample includes firms with market share greater than 0.10 percent. The total number of observations is 972 due to some missing data. The estimation of annual industry variables takes into consideration all firms operating in the industry. These variables are sales weighted averages. Another proprietary company (Nielsen) provided advertising data by branded product for the study period. The available data consisted of national television, national radio, national magazine, and national newspaper advertising. The authors made aggregation of firm's advertising expenditures by media.

Profitability is measured by the ratio of firm's annual gross accounting profits over the annual firm sales (1993–1996) as in a number of other studies (e.g., Martin, 1993, pp. 429–430; Mueller, 1986, p. 17). Market share is the annual ratio of the firm's sales over the three-digit industry sales. Television advertising intensity is the annual ratio of the firm's advertising expenditures on television over sales. Accordingly radio, magazine and newspaper advertising intensity is the annual ratio of firm's advertising expenditures on radio, magazine and newspaper respectively over sales. KS is measured as the ratio of firm's total assets over sales. The four-firm concentration ratio in each 3-digit industry is the proportion of the sales of the four leading firms in each year over the total industry sales in the same year. Finally, $GR_i = [S_{i(t)} - S_{i(t-1)}] / S_{i(t-1)}$, where GR_i , $S_{i(t)}$ and $S_{i(t-1)}$ are the industry growth and industry sales (million Greek drachmas; constant prices, 1970 = 100) in year t and $t - 1$, respectively.

Table I shows the media advertising intensity for the 8 major food and beverage categories over the study period. All five-consumer categories (dairy products, chocolate, soft drinks, cereals and paste and pie products) are characterized by high TV advertising intensity, which varies between 1.44% and 5.13%. On the contrary, TV advertising intensity for the three producer goods categories (meat and poultry, olive manufacturing and canned fruits and vegetables) remains always smaller than 0.89%.

Sample means, standard deviations and minimum and maximum values of both the firm and industry variables included in the empirical model are shown in Table II. Profit margins varied from -20.7% to 239.1%, with a mean PRF of 23.3%. The independent variables present considerable variation as well. The market share ranged from 0.10% to 100% with a mean of 3.49%. Television advertising intensity varied from 0.000% to 16.630% (cereals), with a mean AS_1 of 1.005%. Radio

Table I. Media advertising^a intensity by categories, 1993–1996

Variables	Total advertising expenditures/sales (%)	Television advertising expenditures/sales (%)	Radio advertising expenditures/sales (%)	Magazines advertising expenditures/sales (%)	Newspaper advertising expenditures/sales (%)	No. ^b
<i>Food categories</i>						
Meat and poultry	0.417	0.285	0.093	0.026	0.013	133
Dairy and ice-cream products	3.862	3.585	0.142	0.086	0.032	58
Canned fruits and vegetables	0.786	0.632	0.011	0.009	0.005	199
Olive manufacturing	0.935	0.899	0.003	0.026	0.008	97
Cereals, rice and legume milling products	1.529	1.439	0.049	0.041	0.001	86
Chocolate, candy and honey products	5.513	5.128	0.179	0.176	0.024	84
Beverage and soft drinks	2.551	2.300	0.052	0.164	0.024	114
Paste, pie products, spaghetti and miscellaneous	3.415	3.268	0.064	0.044	0.018	201
All	2.277	2.099	0.058	0.074	0.017	972

^a The figures are estimated for the group as a whole, e.g., the figures of the first column show the ratio of total television advertising over sales.

^b No.: number of annual observations.

Table II. Mean values and standard deviations of variables, 1993–1996

Variables	Mean	SD	Min	Max
PRF ^a				
Firm gross profits over firm sales	23.30	16.29	-20.72	239.14
MS				
Firm sales/industry sales	3.49	8.10	0.10	100.00
AS ₁				
Firm television advertising/firm sales	1.01	2.98	0.00	16.63
AS ₂				
Firm radio advertising/firm sales	0.038	0.20	0.00	3.09
AS ₃				
Firm magazine advertising/firm sales	0.042	0.17	0.00	3.35
AS ₄				
Firm newspaper advertising/firm sales	0.01	0.07	0.00	1.50
KS				
Firm assets/firm sales	91.60	61.20	3.40	705.10
CR _{4i}				
Concentration ratio	44.39	21.29	12.00	100.00
GR _i				
$\frac{\text{industry sales in the year } (t) \text{ minus sales in the year } (t - 1)}{\text{Industry sales in the year } (t - 1)}$	102.43	19.93	39.00	136.20

^a All the variables are in percentages.

advertising intensity reached 3.092% (paste and pie products), with a mean AS₂ of 0.038%. Magazine and newspaper advertising intensity reached 3.350% (dairy and ice cream) and 1.502% (paste and pie products), with a mean of 0.042% and 0.010%, respectively. The concentration ratio varied from 12% to 100% with a mean of 44.39%.

The correlation coefficient between television, radio, magazine and newspaper advertising intensity is low.¹ These values show that the decision of a firm to advertise its product(s) in a particular medium does not dependent on its decision to advertise in another medium. Also, the correlation coefficient between market

¹ Correlation Matrix

	AS ₁	AS ₂	AS ₃	MS
AS ₂	0.21			
AS ₃	0.31	0.13		
AS ₄	0.37	0.18	0.18	
CR ₄				0.28

share and concentration ratio is small too (0.28). The low correlations indicate that multicollinearity is not a problem in our study.

IV. Model Estimation and Results

The application of Hausman-test for fixed effects (OLS-dummy variable) or random effects (error component) in our study shows that the fixed effect model is the advisable estimation method for the model.² Table III shows the results for the fixed effects model. When there are endogenous variables on the right hand side, correlation between those variables and the error term imply that estimates of the parameters of the equation are biased (Willis and Rogers, 1998, p. 497). Consistent estimates can then be obtained when instrumental variables are used. If correlation between right hand side endogenous variables and the error term are so strong then instrumental variables estimation techniques need to be used. A formal test for this hypothesis is the Hausman–Wu test (Maddala, 1992, p. 508). The test indicates whether or not an instrumental variable technique needs to be used to obtain satisfactory estimates of parameters from a particular sample, assuming those parameters are identified. Following Gujarati (1995, pp. 670–675) we estimate the relevant F statistics ($F^* = 2.56$) against the theoretical value of F ($F_{(2,964)} = 3.0$). Thus the Hausman specification test ($F^* < F_{0.1}$) shows that an endogeneity problem does not exist.

The results (Table III) of the estimated model show that TV advertising has a positive and statistically significant effect on profitability whereas its squared value has a negative and statistically significant one. These results show that as the television advertising increases the profit-sales ratio increases too, up to a point, and after that point any increase of advertising expenditures leads to a reduction of the firm's profit margin. This point is when $AS_1 = 17.84\%$. Given that television advertising intensity in our sample is always smaller than 17.84% this result shows that, in practice, the profit sales ratio always increases as advertising intensity rises. These results are expected because food and beverage are experience goods and thus the expensive persuasive advertising on television seeks to establish a brand identity and raises barriers to entry making their demand less elastic and increasing the monopolistic firm's profits. The evidence suggests also that magazines have some positive impact on profitability but the respective coefficient is not statistically significant. Also, the newspaper reduces profits per unit of product but its effect is insignificant too. Both the printed media advertising do not create a brand identity, as there are many national newspapers that advertisers must cover so that an

² The specification test devised by Hausman (1978, pp. 1261–1265) is based on the idea that under the hypothesis of no correlation, both ordinary least squares (OLS) in the least squares dummy variable model and generalised least squares (GLS) are consistent, but OLS is inefficient, whereas under the alternative, OLS is consistent, but GLS is not. Therefore, under the null hypothesis, the two estimates should not differ systematically, and a test can be based on the difference (Greene, 1997, p. 633; Judge et al., 1988, pp. 489–490).

Table III. Estimates of profit margins^a of Greek food manufacturing firms, 1993–1996

Variables	Model I	Model II	Model III
	Fixed effects	Fixed effects	Fixed effects
MS ^b	−0.39	−0.27	−0.30
Firm sales/industry sales	(−0.91)	(−0.63) ^c	(−0.69)
AS ₁	1.82		
Firm television advertising/firm sales	(3.59) ^{*d}		
AS ₁ ²	−5.10		
The square of AS ₁	(−4.51) [*]		
AS ₂	−9.22		
Firm radio advertising/firm sales	(−1.42)		
AS ₂ ²	114.52		
The square of AS ₂	(0.43)		
AS ₃	11.63		
Firm magazine advertising/firm sales	(1.81)		
AS ₃ ²	−282.23		
The square of AS ₃	(−1.19)		
AS ₄	10.50		
Firm newspaper advertising/firm sales	(0.57)		
AS ₄ ²	−413.57		
the square of AS ₄	(−0.28)		
AS ₅			1.44
Firm television and radio advertising/firm sales			(2.91) [*]
AS ₅ ²			−4.21
The square of AS ₅			(−3.85) [*]
AS ₆			9.95
Firm magazine and newspaper advertising/firm sales			(1.75)
AS ₆ ²			−229.87
The square of AS ₆			(−1.05)
AS		1.61	
Firm total advertising/firm sales		(3.64) [*]	
AS ²		−4.16	
The square of AS		(−4.11) [*]	
KS	−0.008	−0.007	−0.007
Firm assets/firm sales	(−0.53)	(−0.46)	(−0.48)
CR _{4i}	0.003	0.003	0.003
Concentration ratio	(2.83) [*]	(2.58) [*]	(2.68) [*]
GR _i	−0.06	−0.06	−0.03
Industry growth	(−0.32)	(−0.17)	(−0.16)
R ²	0.73	0.73	0.73
Number of observations	972	972	972
Hausman test	12 df/26.67	6 df/19.42	8df/21.24

^a Profit margins are calculated as the ratio of firms gross profits over sales.

^b All the variables are proportions.

^c *t*-ratios in parentheses.

^d* Denotes statistical significant at 1% level.

Table IV. Estimates of profit margins of Greek manufacturing firms by food categories, 1993–1996

Categories	Meat	Dairy	Canned fruits	Olive products	Cereals	Candy products	Beverage	Miscellaneous
<i>Variables^a</i>								
MS	– ^d	–	–	–	–	✓ ^b	–	–
AS ₁	–	✓	–	–	✓	✓	✓	✓
AS ₁ ²	–	–	–	–	(✓) ^c	–	–	(✓)
AS ₂	–	–	–	–	–	–	–	–
AS ₂ ²	–	–	–	–	–	–	–	–
AS ₃	–	–	–	–	✓	–	–	–
AS ₃ ²	–	–	(✓)	–	–	–	–	–
AS ₄	–	–	–	–	(✓)	–	–	–
AS ₄ ²	–	–	–	–	–	–	–	–
KS	–	–	✓	–	–	–	–	–
CR _{4i}	–	–	✓	–	✓	–	–	✓
GR _i	–	–	(✓)	–	✓	–	✓	–
R ²	0.10	0.24	0.35	0.19	0.93	0.31	0.16	0.15
No. ^e	133	58	199	97	86	84	114	201

^a See Table IV for variable definition.

^b Positive and significant variable.

^c Negative and significant variable.

^d A variable included in the regression but found to be insignificant.

^e Number of annual observations.

advertisement will be seen by a large portion of the readership. Radio advertising has a negative but statistically insignificant effect on firm's profitability. The sign of the concentration ratio shows that only firms that operate in highly concentrated industries have a positive association with the profits. Therefore, firms that operate in concentrated industries are more profitable than firms in non-concentrated industries. Model III provides consistent results showing that electronic media advertising is the most effective media for the increase of firm's profits.

Some interesting differences among the 8 product categories are shown in Table IV; television advertising seems to have significant effects on profitability only in the case of consumer good categories. This is expected as television advertising is persuasive advertising so it is the ideal method of differentiating these experience products. At the same time, expensive television advertising is able to establish, brand loyalty and entry barriers in these food markets. On the other hand, no media advertising has statistically significant effects on the producers' goods categories (meat-poultry and olive products). Magazine advertising seems to have some significant effect on cereals and rice. As in other (Porter, 1974, pp. 428–430) empirical studies the standard model does not explain performance for the

producer industries satisfactorily. In contrast to Table III's results Table IV shows that the positive association between advertising and profitability does not hold up consistently when samples are subdivided into smaller subsets. According to Scherer and Ross (1990, pp. 437–438) when advertising reflects product differentiation barriers to entry, it is the differences among industries that primarily matter; the closer one comes to analyzing purely intra-industry differences, the more any positive inter-industry effects will be attenuated.

V. Conclusions

Previous IO empirical work examined the effects of national television and other media advertising on profitability using industry level data. We use firm level panel data for 350 large firms in Greek food manufacturing to examine the effects of each of the television, radio, newspapers and magazine advertising on firm profitability in the period 1993–1996.

The results show, in general, that only television advertising increases profitability. Results for the five consumer groups are similar to those of the full sample. In the case of the producer groups none of the media affects profitability significantly. Television is the only media in Greek food market where persuasive advertising exists. The latter is most likely to establish brand loyalty and entry barriers in food markets where advertising intensity is high.

In contrast to our expectation the results show that the other electronic medium (radio) cannot play any important role in increasing profit margins. As we expected newspapers and magazines be, in general, more informative media and they do not increase profitability.

References

- Ackoff, R., and J. Emshoff (1975) 'Advertising Research at Anheuser-Busch, Inc. (1963–1968)', *Sloan Management Review*, **16**, 1–15.
- Chintagunta, P. K., and N. J. Vilcassim (1992) 'An Empirical Investigation of Advertising Strategies in a Dynamic Duopoly', *Marketing Science*, **38**, 1230–1244.
- Connor, J. M., and E. Peterson (1992) 'Market-Structure Determinants of National Brand-Private Label Price Differences of Manufactured Food Products', *The Journal of Industrial Economics*, **40**, 157–171.
- Farris, P. W., and M. S. Albion (1980) 'The Impact of Advertising on the Price of Consumer Products', *Journal of Marketing*, **44**, 17–35.
- Gisser, M. (1991) 'Advertising, Concentration and Profitability in Manufacturing' *Economic Inquiry*, **29**, 148–165.
- Greene, W. H. (1997) *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall.
- Gujerati, D. N. (1995) *Basic Econometrics*. McGraw Hill International Editions.
- Hausman, J. (1978) 'Specification Tests in Econometrics', *Econometrica*, **46**, 1251–1271.
- ICAP, (1993–1996) *Annual Balance Sheet Data of the Greek Manufacturing Companies*, Athens (Series).
- Judge, G., C. Hill, W. Griffiths, H. Lutkepohl, and T. Lee (1988) *Introduction to the Theory and Practice of Econometrics*. New York: John Wiley and Sons.

- Maddala, G. S. (1992) *Introduction to Econometrics*. Englewood Cliffs, NJ: Prentice Hall.
- Martin, S. (1993) *Advanced Industrial Economics*. Oxford, U.K.: Blackwell Publishers.
- Mueller, D. (1986) *Profits in the Long Run*. Cambridge, U.K.: Cambridge University Press.
- Mueller, W., and R. Rogers (1980) 'The Role of Advertising in Changing Concentration of Manufacturing Industries', *Review of Economics and Statistics*, **62**, 89–96.
- Nelson, Ph. (1970) 'Information and Consumer Behavior', *Journal of Political Economy*, **78**, 311–329.
- Nelson, Ph. (1974) 'Advertising as Information', *Journal of Political Economy*, **82**, 729–754.
- Nielsen Hellas (1993–1996) *Annual Data on Advertising Expenditures of the Greek Companies*, Athens.
- Nolle, D. (1991) 'An Empirical Analysis of Market Structure and Import and Export Performance for US Manufacturing Industries', *Quarterly Review of Economics and Business*, **31**, 59–78.
- Ornstein, S. (1977) *Industrial Concentration and Advertising Intensity*. Washington, DC: American Enterprise Institute for Public Policy Research.
- Ornstein, S. (1987) 'An Analysis of Advertising, Concentration, Profit Studies', in T. Copeland, ed., *Modern Finance and Industrial Economics*, Oxford: Basil Blackwell Inc.
- Oustapassidis, K., and A. Vlachvei (1999) 'Profitability and Product Differentiation in Greek Food Industries', *Applied Economics*, **31**, 1293–1298.
- Oustapassidis, K., A. Vlachvei, and O. Notta (2000) 'Efficiency and Market Power in Greek Food Industries', *American Journal of Agricultural Economics* (forthcoming).
- Pagoulatos, E., and R. Sorensen (1979) 'Foreign Trade, Protection, and Multinational Activity in U.S. Food Processing Industries', *Southern Journal of Agricultural Economics*, 119–125.
- Pagoulatos, E., and R. Sorensen (1981) 'A Simultaneous Equation Analysis of Advertising, Concentration and Profitability', *Southern Economic Journal*, **47**, 728–741.
- Piga, C. A. G. (1998) 'A Dynamic Model of Advertising and Product Differentiation', *Review of Industrial Organization*, **13**, 509–522.
- Porter, M. E. (1974) 'Consumer Behavior, Retailer Power, and Market Performance in Consumer Good Industries', *Review of Economics and Statistics*, **56**, 419–436.
- Porter, M. E. (1976a) 'Interbrand Choice, Media Mix and Market Performance', *American Economic Review*, **66**, 398–406.
- Porter, M. E. (1976b) *Interbrand Choice, Strategy, and Bilateral Market Power*. Cambridge, MA: Harvard University Press.
- Rogers, R. T., and L. Mather (1983) 'Food Advertising, 1954 to 1979', in John M. Connor and Ronald Ward, eds., *Advertising and the Food System*. Madison, WI: NC-117, pp. 75–94.
- Scherer, F. M., and D. Ross (1990) *Industrial Market Structure and Economic Performance*. Boston: Houghton Mifflin Company.
- Schmalensee, R. (1987) 'Collusion versus Differential Efficiency: Testing Alternative Hypotheses', *Journal of Industrial Economics*, **35**, 399–425.
- Shepherd, W. G. (1990) *The Economics of Industrial Organisation*. Englewood Cliffs, NJ: Prentice Hall.
- Strickland, A. D., and L. W. Weiss (1976) 'Advertising, Competition and Price-Cost Margins', *Journal of Political Economy*, **84**, 1109–1121.
- Willis, M. S., and R. T. Rogers (1998) 'Market Share Dispersion among Leading Firms', *Review of Industrial Organization*, **13**, 495–508.