

The Share of Small and Medium-Sized Enterprise in Greek Manufacturing*

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ABSTRACT. This paper examines the determinants of small establishment shares in Greek manufacturing and compares the results to previous findings for U.S. small firms. Two groups of explanatory variables are used: Industry variables and small-firm performance variables. Both types of variables are found to have an impact on the determination of small firms shares, with performance variables being at least as strong as industry variables. Measures of entry barriers give mixed results. Capital intensity exercises an expected negative impact. Advertising intensity shows a trace of positive impact for medium-sized establishments in consumer goods sectors. Operating efficiency of small firms also appears as a strong influence on their shares whereas investment intensity does not appear significant. These results are in partial agreement to earlier findings for U.S. small firms. Their generality is tempered both by the fact that they come from a small country of middle level of development and by the recognition that the year of observation (1983) was at the start of Greece's industrial adjustment to entry in the EEC. Both these concerns constitute areas of future research.

A. Introduction

The resurgence of interest in small and medium-sized firms which has emerged in the recent empirical literature of industrial organization is due to the recognition that long-term evolution of industrial structures does not lead to the elimination of small firms. It has also been more effectively pursued due to the availability of new data pertaining to small firms in the United States. Moreover, the views of policymakers and the general opinion among social scientists about the nature of small firms also appear to have shifted in recent times. Instead of being viewed as a "historical vestige" of older industrial structures, the small firm population is increasingly perceived as

a pool of dynamic new economic initiatives.¹ This perception has not been subject to much testing in the case of economies at a middle level of development.² It is possible that in those economies the presence of small firms responds to different causal factors than in developed economies.

In this paper we are specifically concerned with the explanation of the share of small firms in manufacturing activity across industrial sectors in Greece. While the chief antecedents of such work are based on U.S. data, we seek to obtain the determinants of small firm share from Greek manufacturing data. The use of Greek data for this task becomes compelling for several reasons. Besides its intrinsic interest for the Greek economy in which small firms play an important role, it can lead to an assessment of the general applicability of U.S.-based conclusions across several different axes: firstly, as already mentioned, the U.S. economy is a well developed one with large firms which are endowed with technological leadership, whereas Greece is a less developed one with hardly any technological leaders among its industrial population. Secondly, the size scale of firms is very different since in a small economy like Greece, the largest firms would only qualify as medium-sized ones by U.S. standards. Thirdly, the type of policies towards small and medium-sized firms are expected to vary substantially between two such countries.³

The relevant empirical literature on the determinants of the share of small firms is highlighted by the contributions of White (1982) and Acs and Audretsch (1989, 1990ab). Although the methodologies followed and the data used by these authors are different, their basic conclusions do not conflict. In their most recent contribution, Acs and Audretsch found that indices of high entry barriers (advertising intensity, capital-labor ratios, minimum efficient size or minimum capital requirements) exert significant *negative* influence on

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small-firm shares; they also found that, on the contrary, indices of small-firm innovation intensity exert significant positive influence on the share of small firms.⁴ Their chief conclusion is that although entry barriers depress the presence of small firms, specific strategic responses by small firms can act to overcome their size-related disadvantages.

In this paper, we follow a specification of the determinants of small-firm shares which is similar in spirit to that of Acs and Audretsch. Our data has been collected from the 1983 Survey of Manufacturing conducted by the National Statistical Service of Greece (NSSG). Three main differences between Acs and Audretsch's approach and ours are noted however. The first is that the data coverage from the NSSG surveys does not allow the exact duplication of variables which these authors specified based on US Small Business Administration data. The variables specified for our analysis are described in another section. The second is that NSSG data relates to establishments. There are no available Greek data pertaining to firms. It is generally accepted however that the overwhelming majority of Greek manufacturing firms are one-establishment enterprises. We therefore claim that there exists comparability between the Greek and the US data for drawing conclusions relating to *firms*. The third difference is that we elect a more disaggregated approach by testing the influence of various factors on the shares of *distinct* subgroups of small firms arranged by employment size. Acs and Audretsch (1989, 1990ab) tested instead the influence of various factors on cumulative groups of small firms with a sliding definition of the cutoff point for what the employment of a small firm is.⁵

In section B, we present basic aggregate statistics on the presence of small establishments in Greek manufacturing. In section C we briefly present our methodology and variables. In section D we present the empirical results of cross-sectional analysis of small firm shares. In section E we offer concluding remarks.

B. The presence of small establishments in Greek manufacturing

Aggregate data on the presence of small establishments in Greek manufacturing are available both

for 1983 and 1988. In Table I we show shares in the number of establishments, in employment and in sales of establishments by employment classes for these two years.⁶

The data of Table I are highly indicative of the important role small firms play in Greek manufacturing. In 1983, almost 50 percent of employment and over 30 percent of sales came from establishments employing less than 100 persons. In comparison, U.S. data indicate that firms employing less than 100 persons accounted for about 17 percent of employment and 12 percent of sales in 1982.⁷ Clearly, the small size of the Greek economy and market places significant restrictions on the size of firms.

Moreover, it can be also observed from Table I that between 1983 and 1988, the relative weight of small firms appears to have increased in Greek manufacturing. Thus, the sales shares have increased for all establishments employing fewer than 100 persons but decreased for large ones employing more than 100 persons. Employment shares have increased for establishments employing less than 30 persons but remained virtually unchanged for those employing 30 to 99 persons. These relative gains of small establishments in the employment structure however were really more of a recessionary symptom since, in absolute terms, total employment in manufacturing declined from 1983 to 1988; in the context of that total decline, the groups of establishments employing 10 to 29 persons showed a gain in the number employed, whereas every other group exhibited decreases, with the largest establishments leading in the loss of employment. Unfortunately, the data for 1988 are not available in detail so as to examine cross-sectional determinants of the dynamic effects over this period of general contraction.

Using available detailed data on 3-digit SIC sectors for 1983, it is also of interest to see in which of these the presence of small establishments is largest and smallest, within Greek manufacturing. In Table II we show the list, the sales shares, and the numbers of establishments employing less than 50 persons for eight 3-digit sectors with the highest and lowest small establishment presence, respectively.

It is characteristic of a relatively small economy that in extreme cases we encounter sectors where either all or none of their sales activity is accounted

TABLE I
Shares by size class in 1983 and 1988 in Greek Manufacturing

Size Class	10-19	20-29	30-49	50-99	Over 100
<i>1983</i>					
No. of Establishments	4760	1250	1061	709	753
% Establishments	0.558	0.146	0.124	0.083	0.088
% Cumulative	0.558	0.704	0.828	0.911	1.000
Employment	58430	27760	38399	47720	188973
% Employment	0.162	0.077	0.106	0.132	0.523
% Cumulative	0.162	0.239	0.345	0.477	1.000
% Sales	0.087	0.056	0.076	0.109	0.673
% Cumulative	0.087	0.143	0.219	0.328	1.000
<i>1988</i>					
No. of Establishments	4866	1259	985	687	623
% Establishments	0.578	0.150	0.117	0.082	0.074
% Cumulative	0.578	0.728	0.845	0.927	1.000
Employment	62306	30585	38210	47458	178683
% Employment	0.174	0.086	0.107	0.133	0.500
% Cumulative	0.174	0.260	0.367	0.500	1.000
% Sales	0.114	0.064	0.077	0.121	0.624
% Cumulative	0.114	0.178	0.255	0.376	1.000

Source: National Statistical Service of Greece, *Surveys of Manufacturing* (1983, 1988).

for by small establishments. As Table II shows, there were in 1983 eight 3-digit sectors in which all sales came from establishments employing less than 50 persons.⁸ There were also three 3-digit sectors with no sales from such establishments. In a larger and more developed economy we expect to encounter lesser extremes. Indeed, in the U.S. the largest share reported for firms of fewer than 100 employees was 94 percent and the smallest was 0.03 percent in 1982.⁹

The sectoral dispersion of largest and smallest establishment presence is reasonably wide in Greek manufacturing. The eight sectors with largest small establishment presence belong to five 2-digit manufacturing classes, one of which is miscellaneous manufacturing, by nature a collection of heterogeneous activities. Thus, large populations of small firms are not very concentrated in a sectoral sense. This is again to be expected in a less developed economy. It is suggestive however that in four of these eight 3-digit sectors where small establishments account for 100 percent of sales, the *number* of small establishments is itself very low (from 3 in bicycle and motorcycle manu-

facturing to 13 in the manufacture of dentures). Casual observation suggests that all these sectors are import intensive. Thus, the small number of establishments is possibly a result of high import penetration which prohibits as well the growth of domestic firms in those sectors.

On the other hand, the eight 3-digit sectors with the lowest small establishment presence classify into seven 2-digit manufacturing classes. Thus they are also quite disperse, and they include areas of typical economies of scale which occur even at relatively limited sizes, such as sugar and petroleum refining, aircraft repair, iron processing.

These brief aggregate data on the presence of small establishments in Greek manufacturing underscore the significance of small entities for the whole manufacturing sector, the economy, and even the politics of Greece. The analysis which follows and attempts to specify the determinants of small establishment presence is thus all the more relevant to both observers of Greek economic affairs and to students of the comparative validity of small firm hypotheses in economies of different size and levels of development.

TABLE II
Industries with the Largest and Smallest Presence of Small Establishments (1983)

A. 3-digit sectors with the *largest* presence of small establishments (10–49 persons)

SIC	Name	Percent of Sales	No. of Establishments	Percent of Establishments
253	wooden containers etc.	100	63	100
335	lime, gypsum, stucco	100	49	100
365	food product machinery	100	26	100
368	office, weight machines, scales	100	6	100
385	bikes and motorbikes	100	3	100
392	photographic and optical goods	100	13	100
398	manufacture of dentures	100	13	100
399	misc. manufactures	100	42	100

B. 3-digit sectors with the smallest presence of small establishments (10–49 persons)

SIC	Name	Percent of Sales	No. of Establishments	Percent of Establishments
207	sugar factories and refineries	0	0	0
322	manufacture coal and coal fuels	0	0	0
387	aircraft repair	0	0	0
321	petroleum refining	0.0007	7	50
341	iron	0.0011	6	32
311	acids, bases, salts, fertilizers	0.0030	5	50
373	power transm. conduits	0.0240	7	44
237	dyeing, printing textiles	0.0254	47	73

Source: see Table I.

C. Methodology, variables and hypotheses

The data coverage of the NSSG relates to establishments and is complete in all the variables which we specify below for 3-digit manufacturing sectors, except for advertising expenditure. The latter is not available for establishments employing between 10 and 19 persons. The data are available for the following employment stratifications in 1983:

- Stratum 1 composed of establishments employing between 10 and 19 persons
- Stratum 2 composed of establishments employing between 20 and 29 persons
- Stratum 3 composed of establishments employing between 30 and 49 persons
- Stratum 4 composed of establishments employing between 50 and 99 persons.

We note that there is no data coverage of establishments employing less than 10 persons. As a result we have aggregated the sales of all establish-

ments employing *at least* 10 persons and computed the share of each stratum within that adjusted total. It is also noted that the inclusion of an additional stratum of establishments employing 100 to 250 or even 500 persons is not warranted in our case. In the majority of sectors the sales share of this omitted stratum is virtually always the complement of the sum of the sales shares of the other strata, since very few establishments exceed an employment size of 250 in 1983, and shares add up to unity. Thus, an equation explaining the share of this stratum would not be independent of the equations for the other strata, nor would it represent "small firms" in the Greek context.

The variable which we seek to explain is the sales share (S) of each stratum into total sales of the corresponding 3-digit sector, as specified in the previous paragraph. This is the measure of the relative weight of small firms used in all previous studies. As our dependent variable, we used two alternative transformations of the sales share: The natural logarithm (LnS) and the so-called log-odds

transform ($\ln(S/(1 - S))$). These alternatives were used in order to check whether results are sensitive to the specification of the dependent variable. It was found however, that this was not the case, and the results were practically identical in the two specifications. Consequently, we report below only results from the log-odds specification. Following several authors, we prefer this specification since it is *a priori* capable of leading to more efficient coefficient estimates.¹⁰

The proposed explanatory factors to be tested include six independent variables. Three of these are variables which describe characteristics of industrial sectors.

The first two explanatory variables are measures of entry barriers. One is *advertising intensity* (AS). This is computed as the ratio of advertising expenditure to sales for each sector. Extensive theoretical arguments and empirical results verify that advertising intensity erects barriers to entry through product differentiation and the consolidation of firm-specific recognition. If a barrier to entry of this type acts more unfavorably upon small than large firm entry, then we should expect small firm shares to be lower in sectors with high advertising intensity. We should note in this respect however, that whereas Acs and Audretsch hypothesized and found a strong negative effect of advertising intensity in their equations, White's prior research had discovered a small positive effect, leading that author to conjecture that "small businesses are able to find alternative strategies which allow them to remain visible in these industries".¹¹ One such strategy, which casual observation in Greece and elsewhere reveals, is the success of small firms in mimicking brand name products, especially in areas where trademark enforcement is lax or infeasible. We therefore consider that the net effect of advertising intensity on small firm shares is *a priori* ambiguous. In order to examine this in as much detail as possible, it will be desirable to attempt a division of the sample of 3-digit sectors into consumer and capital goods subsets, since advertising generally plays a more important role in the former.¹²

The second independent variable is also a measure of entry barriers in the form of capital intensive resource use. Our data coverage does not include asset amounts unfortunately, so that neither a capital-labor ratio nor some measure of

minimum capital requirement can be attained. We therefore elect to use another proxy from available data. This is *fuel and energy use per employed person* (FE).¹³ This can be taken as an index of mechanization for each sector, i.e. as a representation of a capital intensity measure. Capital intensity implies lumpiness of machinery, and proffers a differential advantage to large firms. This is a type of entry barrier which has an unambiguous effect on small firm presence. Sector mechanization, inasmuch as it is based on the use of capital equipment, is therefore expected to affect negatively the share of small firms.

The third independent variable is the *industry growth rate* (GR). This is measured as the growth of each sector's sales over the interval 1977–83. This variable was successfully employed by White; he rationalized its use as an index of "newness" of the industry or as a proxy of "expanding possibilities", and hypothesized a positive effect on small firm shares. His results confirmed this positive effect.¹⁴ Our hypothesis is not clear cut however, because of peculiarities of the Greek economy at the time of observation. Over the period 1977–83, the average growth of all sales in our sample was only slightly higher than the growth of the CPI in Greece. Volume or price indices by 3-digit sector are not available for Greek manufacturing and it is therefore impossible to compute real growth rates. Thus, varying sales growth among sectors could be an index of either the ability of each sector to keep up with general price trends, or an index of an expanding set of real opportunities. In the first case, large firms could enjoy a differential advantage in passing through price increases to the consumer, and the share of small firms would decline in sectors with high (nominal) sales growth. In the second case, the White hypothesis that growth spurs the emergence of small firms would be more likely. Given the ambiguity of the growth measure based on nominal sales however, the predominance of one or the other explanation is largely an empirical issue.

Besides the three variables describing sector characteristics, we also introduce two variables which are direct measures of small firms' own performance. This reflects the view that industry features by themselves do not offer a complete explanation of small firm presence. Rather, there

are choices and strategies which small firms themselves can pursue to boost their presence in a given sector. These strategies might in fact be intensified precisely in industries where barriers to entry apply restrictions to the presence of small firms.

Thus, the fourth independent variable which is applied to the explanation of small-firm shares is the *index of relative efficiency* (RE). This measure was used by Acs and Audretsch (1989) with significant results. In our work, we measure (RE) separately for each stratum, as the relative of each stratum's sales-to-employment ratio to the whole sector's sales-to-employment ratio. The index of relative efficiency is generally expected to exert a positive influence on small firm shares. Yet its effect is not free of ambiguity. If all firms used the same technology, the sales to employment ratio would indicate the effectiveness of labor in producing sales. When however firms use different technologies, the sales to employment ratio will jointly reflect the "factor mix" and the effectiveness of labor. For example, more capital intensive firms will, on average, have a higher sales to employment ratio than labor intensive ones.¹⁵ It is known that firms of different size in the same sector frequently employ different techniques. It follows that our measure of *relative efficiency* is not free of this ambiguity either.

In order to disentangle as much as possible the joint effects of capital intensity and efficiency, we have followed a simple procedure of breaking up (RE) into two parts. For each stratum we estimate a regression:

$$RE_{jk} = a_0 + a_1 RFE_{jk} + V_{jk},$$

where j represents the 3-digit sector and k the stratum within the sector; RFE is the relative of the fuel and energy to employees ratio of the stratum to the same ratio of the sector, i.e.

$$RFE_{jk} = FE_{jk}/FE_j.$$

Since FE is the best measure of capital intensity which we can attain from our data, RFE is the necessary measure of relative capital intensity. Estimation of the regression enables the breakup of RE_{jk} into two parts. The first is RFE_{jk} and the second is the estimated residual of the regression (V_{jk}). The residual will proxy for efficiency differ-

ences after the effect of differential technique has been controlled.

The final variable which we employ is also a performance variable: *The relative of a stratum's investment-to-sales ratio to the same ratio for the whole sector* ($INVN_{jk} = (INV/S)_{jk}/(INV/S)_j$). This variable can be used as a measure of the intensity of effort by firms belonging to a particular stratum to effect modernization. During the early 1980s especially, Greek manufacturing was experiencing serious pressure for restructuring due to Greece's entry into the EEC in 1981. Modernization through investment was an appropriate response to this pressure. It is our hypothesis that small firms could expand their shares of sectoral sales, if they did not leave all modernization initiatives to large firms. We should also point out that in an economy as the Greek, where primary industrial innovation is rare, the (INVN) variable can become a reasonable substitute of the variable measuring small firm innovation rates, which Acs and Audretsch have utilized successfully in their work.¹⁶

We propose to employ a linear specification of six independent variables, and to estimate this specification separately for each stratum of establishment size. The full regression equation used is:

$$S_{jk} = b_0 + b_1(A/S)_j + b_2FE_j + b_3GR_j + b_4RFE_{jk} + b_5V_{jk} + b_6INVN_{jk} + u_{jk}.$$

This is at variance with the practice of both White and Acs and Audretsch. The former estimated his equations for the share of all firms with sales below a cutoff point. The latter employed a sliding cutoff point for the definition of small firms, varying from an employment level of 10 persons to an employment level of 500. From the vantage point of our data and our analysis such a successive aggregation of data is inferior to simply estimating the equation for separate strata. Here are our reasons. There may be a differential impact of the variables on small versus medium-size firms. Such differential impact is important both for analytical and policy-making reasons, especially in a country where small and medium sized establishments form such a large portion of the industrial population. For example it may be the case that some entry barriers affect more the smallest firms than medium-sized ones, or vice

versa. Moreover, different barriers to entry may affect different size classes more strongly. If such differentiations exist, they will appear in sharper relief with the disaggregated approach of estimating the equations stratum by stratum.

In addition, we seek to discover whether industry characteristics are a stronger determinant of small firm shares than indices of small firm performance. With disaggregated estimation, it is possible to do this for each stratum separately, since it is conceivable that industry characteristics as a whole play a more critical role for certain size classes of firms than for others. In order to implement this test, we estimate for each stratum two separate equations: one which includes only the variables describing industry characteristics and one which includes additionally the performance variables. Finally, as already mentioned, we also test the same cross-sectional equation for separate subsets of consumer and capital goods sectors.

D. Estimation results

Our sample consists of 77 3-digit sectors of Greek manufacturing. For specific strata, the actual

number of observations varies below 77 due to non-existence of firms belonging to that stratum in a particular sector, or because of missing data. Sectors containing "miscellaneous" or "not elsewhere classified" items have been excluded. In Table III we report the results using the log-odds specification of the dependent variable.

The estimations which appear in Table III show several interesting results. When industry variables only are employed in a partial specification, the most consistently significant variable is FE with a negative coefficient in three out of four strata. This confirms the hypothesis that small establishment presence is restricted in more capital intensive sectors. The growth variable (GR) also obtains a consistently negative coefficient but is significant only in two cases. The weak performance of the growth variable indicates a possible conflict between the effects of underlying real growth which would boost small establishment presence and the effects of inflationary growth which would suppress small establishment presence in terms of sales shares. Negativity indicates that the latter effect is probably the stronger one, in the particular sample and at the particular time.

Finally, the effect of advertising intensity (A/S)

TABLE III
Regression Results on $\ln(S/(1-S))$ (t-statistics in parenthesis)

Stratum	Const.	A/S	FE	GR	RFE	V	INVN	Adj. R ²	n
1	-1.584 ^a	-13.311	-0.002 ^a	-0.0006				0.195	75
	(-6.911)	(-1.296)	(-4.546)	(-0.505)					
	-3.445 ^a	-4.129	-0.001 ^a	-0.0009	2.476 ^a	2.012 ^a	-0.131	0.557	68
	(-8.887)	(-0.501)	(-2.652)	(-1.039)	(5.858)	(4.156)	(-1.221)		
2	-2.618 ^a	10.634	-0.0009	-0.003 ^a				0.146	70
	(-13.937)	(1.357)	(-1.412)	(-3.162)					
	-2.940 ^a	10.535 ^c	-0.0005	-0.013	0.409	2.223 ^a	-0.068	0.504	64
	(-8.493)	(1.832)	(-1.021)	(-0.545)	(1.269)	(7.073)	(-1.509)		
3	-1.998 ^a	-3.037	-0.002 ^a	-0.001 ^c				0.117	70
	(-12.11)	(-0.435)	(-3.117)	(-1.754)					
	-2.324 ^a	5.740	-0.001 ^c	-0.002 ^a	0.273	1.846 ^a	-0.033	0.518	63
	(-8.782)	(1.069)	(-1.752)	(-3.699)	(1.392)	(5.976)	(-0.600)		
4	-1.659 ^a	12.109 ^c	-0.001 ^b	-0.002				0.127	65
	(-9.514)	(1.929)	(-2.508)	(-0.079)					
	-2.318 ^a	8.072	-0.001	-0.013	0.589 ^a	1.218 ^a	0.039	0.463	65
	(-8.732)	(1.607)	(-1.563)	(-0.655)	(3.022)	(5.460)	(0.340)		

^a, ^b, ^c indicate significance at 1%, 5% and 10% levels respectively.

is highly ambiguous. Its coefficients alternate between negative and positive signs as we move from smaller to larger establishment strata, but become significant and positive only in the case of stratum 4 (which includes those establishments employing 50–99 persons). *Prima facie* this indicates that advertising intensity is not an effective barrier to the presence of establishments of employment size below 50 persons, but enhances the presence of “medium sized” establishments in stratum 4. Before finalizing this conclusion however, it is noted that (A/S) becomes also *positive* and significant for stratum 2 when the full equation is estimated, and this creates more questions than answers. Further discussion of this must therefore be deferred until the estimation of subsamples of consumer and capital good sectors is undertaken subsequently.

When the three variables of performance are added to the industry variables, the result is a large increase in the explanatory power of *all* the equations. Whereas adjusted R^2 range from 12 to 20 percent when only industry variables are employed, they increase to a range between 46 and 56 percent when performance variables are added. This leads to an important conclusion, namely that across the population of small establishments, their performance is at least as important a determinant of their position as the characteristics of the sector in which they operate.

Among the three performance variables, the strongest and consistently most significant across strata is the residual (V). It should be recalled that this measures the differential efficiency of non-capital factors of production in establishments of a particular stratum. Its strong positive effect in every stratum testifies to the importance of efficiency in the formation of small firm shares. The second most significant performance variable is the measure of relative capital intensity (RFE). This obtains a positive coefficient in all cases but is significant only for two strata, that of the smallest and that of the largest establishments in the sample. Thus, the evidence is not very strong that by choosing a relatively higher capital intensity, small firms can always ameliorate their shares. Finally, the measure of relative investment intensity (INVN) is never statistically significant. Thus, from this evidence it is not possible to conclude that investment effort contributes to increased

shares, or as we hypothesized, that it ameliorates the position of small firms by the introduction of innovations. Naturally, one must be cognizant of the limitations in the measure itself as a proxy for innovation, since a good deal of investment could be either devoted to simple replacement, or to the purchase of land and buildings, without really embracing innovative choices. Jointly, the consistent significance of (V) and the complete insignificance of (INVN) signify that, within the particular sample, small establishment shares are much more sensitive to current management of available factors of production than to renewal and expansion of fixed capital. This seems to suggest that the presence of small firms is more a result of current efficiencies than of strategic choices.

Due to the ambiguity about the role of advertising intensity we have tested the equation in the two separate subsamples which were mentioned earlier: consumer and capital goods groups. The results are shown in Table IV.

The results of estimations shown in Table IV are not very illuminating about the role of advertising intensity. The separation of the sample into consumer and non-consumer good subsets was expected to show more clearly the role of advertising as a barrier to entry in consumer good sectors, where product differentiation is more important. Indeed, as the results in Table IV show, advertising intensity is an insignificant variable in the case of non-consumer goods sectors. In consumer goods sectors, advertising obtains a more consistent *positive* sign for strata 2–4, with t-statistics which are higher than in the non-consumer goods sectors, and with one coefficient (for stratum 3) crossing the 10 percent borderline of significance. This admittedly constitutes a weak finding, but its meaning is clear: Even in consumer good sectors where advertising can become a strong barrier to entry, there is no evidence that it acts as a restriction in the presence of small establishments in the case of Greece. If anything, there is a weak indication that it enhances the presence of medium-sized establishments. This conclusion is not unreasonable if we consider the possibility that *domestic* product differentiation has not advanced much in Greece to operate as an entry barrier for small firms.

One final observation from the estimations of

TABLE IV
Regression Results on $\ln(S/(1 - S))$ for Subsamples of Consumer and Capital Goods Sectors (t-statistics in parenthesis)

A. Consumer Goods Sectors									
Stratum	Const.	A/S	FE	GR	RFE	V	INVN	Adj. R ²	n
1	-2.316 ^b (-2.329)	-5.714 (-0.657)	-0.004 (-1.317)	-0.013 (-0.052)	1.445 ^b (2.424)	0.701 (0.881)	-0.216 (-1.469)	0.278	31
2	-2.239 ^b (-2.551)	7.560 (1.142)	-0.004 (-1.396)	0.075 (0.375)	-0.382 (-0.494)	1.501 ^b (2.360)	0.056 (0.494)	0.294	31
3	-1.865 ^b (-2.431)	10.352 ^c (1.682)	-0.002 (-0.894)	-0.126 (-0.680)	-0.100 (-0.308)	1.570 ^b (2.488)	-0.151 ^c (-1.687)	0.352	30
4	-2.267 ^a (-3.449)	8.506 (1.447)	0.0004 (0.175)	0.012 (0.062)	0.230 (0.718)	1.012 ^a (3.030)	0.231 (0.719)	0.307	31
B. Capital and Intermediate Goods Sectors									
Stratum	Const.	A/S	FE	GR	RFE	V	INVN	Adj. R ²	n
1	-4.085 ^a (-6.977)	21.588 (0.314)	-0.001 ^c (-1.807)	-0.001 (-0.990)	3.362 ^a (5.241)	2.568 ^a (3.591)	-0.083 (-0.389)	0.621	37
2	-3.057 ^a (-6.965)	-23.773 (-0.640)	-0.001 (-1.126)	0.031 (0.885)	0.725 ^c (1.775)	2.451 ^a (6.152)	-0.089 ^c (-1.694)	0.603	31
3	-2.403 ^a (-5.962)	-0.863 (-0.035)	-0.002 ^b (-2.150)	-0.002 ^a (-3.428)	0.519 ^c (1.850)	1.867 ^a (4.737)	0.035 (0.428)	0.590	33
4	-2.391 ^a (-6.810)	17.162 (0.561)	-0.001 (-1.308)	-0.031 (-1.049)	0.871 ^a (3.220)	1.491 ^a (4.223)	-0.094 (-0.627)	0.541	34

^a, ^b, ^c indicate significance at 1%, 5% and 10% levels respectively.

Table IV is of interest, mainly with a view to future research. The explanatory power of the model is much higher in the case of non-consumer goods than consumer goods sectors, as evidenced by the much higher levels of adjusted R² in the former subsample. This indicates that there may exist other factors which affect small establishment shares in consumer goods sectors and which are not captured by the variables in the equation of Table IV. Naturally, the variables in equation 4 are the only ones which could be formed from available Greek data. Yet, this incidental finding underlines the need to search for improved data which will also allow more complete specifications.

E. Concluding remarks

The analysis of determinants of small establishment shares in Greek manufacturing leads to results which do not contradict parallel analyses in

more developed economies. Four main findings are noted. First, that capital intensity appears to be a significant barrier to the presence of small and medium-sized establishments. Second, that advertising is not a significant barrier, but may in fact be a weak source of enhancement to the presence of medium-sized firms. Third, that small establishment performance variables are significant determinants of shares. Fourth, that among performance variables, a measure of efficiency in use of non-capital factors is by far the stronger determinant, as opposed to investment intensity which is not a significant determinant.

These findings are quite consistent with economic conditions in a small country of medium level development. For example, if domestic product differentiation is not advanced enough, it is sensible that advertising intensity will not appear as a barrier to entry. Moreover, if technological innovation has not been inscribed into the strategies of most industrial firms, it is sensible that

small firm shares will depend more on their ability to use efficiently current factors of production than on initiatives which attempt renewal through investment.

One general note of caution should also be mentioned. Data availability constraints made this study possible for the year 1983, which was only the second year after Greece's full accession to EC membership. Several analysts of Greek manufacturing industries have noted, albeit at a more macroscopic level, that Greek industry has been undergoing significant adjustments ever since, mainly due to pressure from liberalizations of imports originating from the EC. This has no doubt had implications for small and medium-sized firm shares in Greek manufacturing which cannot be gauged from present data. The question which arises is not so much whether shares themselves have changed but whether the *model of determinants of small firm shares* has changed. Definitive answers to that question must obviously await more recent data to become available.

Notes

* We thank two anonymous referees for valuable comments on an earlier draft of this paper. All errors are of course our responsibility.

¹ The most coherent alternative view of the role of small firms can be found in Piore and Sabel [1984]. See also Acs and Audretsch [1990a] for a comprehensive review of small firm issues.

² An interesting recent exception is Mata (1990). We thank Zoltan Acs for bringing this paper to our attention.

³ As an obvious example of the difference in public policies, we point out that Greece instituted in 1982 a policy of preferential credit quotas and subsidized interest rates for loans to small firms.

⁴ See Acs and Audretsch [1990b], pp. 73–7.

⁵ See for example Acs and Audretsch [1989] pp. 400–1.

⁶ The surveys of the NSSG for 1983 and 1988 do not offer data for establishments employing less than 10 persons. The

analysis which follows is unfortunately forced to exclude these smallest establishments.

⁷ See Acs and Audretsch, *ibid.* Table 4-1, p. 62.

⁸ Given the generally small size of establishments, we chose 50 employees as a more descriptive cutoff point for the extreme cases of presence of small establishments.

⁹ Acs and Audretsch, *ibid.* Tables 4-2, 4-3, pp. 64–7.

¹⁰ Both White [1982] and Acs and Audretsch, *ibid.*, use this specification.

¹¹ White, *ibid.* p. 48.

¹² White, *ibid.* also made this distinction with some success.

¹³ As an alternative, we also tried the ratio of fuel and energy use over sales but the results were similar, and need not be reported here.

¹⁴ White, *ibid.* pp. 45–7.

¹⁵ We thank an anonymous referee for bringing to our attention the ambiguity of this measure as an index of efficiency.

¹⁶ Acs and Audretsch, *ibid.* pp. 73–7. Schwalbach [1990] makes successful use of a measure of "investment intensity" in his study of small firms in Germany.

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