

HOW MUCH DO STRATEGIC GROUPS MATTER?

Eduardo González-Fidalgo*

Juan Ventura-Victoria

Universidad de Oviedo

Abstract

One of the main statements of the Resource Based View of the firm contends that performance differences among firms are driven by heterogeneity in resources and capabilities. This paper proposes a framework that distinguishes three sources of competitiveness related to three levels of firm heterogeneity. Resource heterogeneity gives rise to industry competencies, strategy specific competencies and firm specific competencies. Using data from a Spanish survey we estimate the relative importance of these three sources of heterogeneity. We show that taking the group effect into account significantly alters our results from those obtained in previous research. We provide new evidence about the existence of a significant group effect and also an estimate of its relative importance vis a vis firm and industry effects. JEL classification: L10, L60, C23.

Key words: strategic groups, variance components analysis, firm performance.

* The authors are grateful to *Fundación Empresa Pública* for providing the ESEE database.

Departamento de Administración de Empresas y Contabilidad, Universidad de Oviedo, Av. Cristo s/n 33071, Oviedo (Spain). Comments are welcome at: fidalgo@econo.uniovi.es

1.- INTRODUCTION

Studying the sources of performance differences among firms is at the heart of the strategic management field. Given that observed performance differences would not arise under a perfect competition framework, research has focused on market imperfections and interfirm heterogeneity. Two main sources of competitiveness have been extensively analysed in the literature. First, industry drivers generate systematic differences in the performance of firms competing in different industries (Mason, 1939; Porter, 1980). Second, the firm itself may have a competitive advantage or disadvantage with respect to other firms in its industry (Barney, 1991; Peteraf, 1993).

The industrial organisation tradition emphasises industry structure as the main determinant of firm performance, ignoring the importance of intraindustry heterogeneity. On the other hand, the emphasis of the resource-based view in firm level heterogeneity neglects the fact that some competitors are extremely similar. Strategic group analysis provides an intermediate level that reconciles intraindustry heterogeneity with the internal homogeneity of group member firms. Although some research has estimated the relative importance of firm and industry drivers (Schmalensee, 1985; Rumelt, 1991; McGahan and Porter, 1997), the relative importance of the strategic group construct has not been empirically examined. This paper tries to fill this gap, providing evidence about the relative importance of industry, group and firm effects as determinants of firm accounting profitability.

2.- INDUSTRY AND FIRM EFFECTS

Industrial organisation (IO) has stressed the importance of industry structure as the main determinant of performance differences among firms. The Structure-Conduct-Performance (SCP) paradigm highlights the importance of industry concentration, product differentiation, entry and exit barriers, and the growth of demand. Since Bain's (1951; 1956) pioneering work a large body of

research has empirically confirmed the predictions of the SCP paradigm¹. Despite this evidence, the SCP paradigm has received numerous criticisms. Among the most prominent, Stigler (1968) and Demsetz (1973, 1974) have suggested that industry structure is just the endogenous result of efficiency seeking by competitors and stochastic events. Then, instead of industry structure determining firm conduct and profits, firm conduct and profits would determine industry structure².

Sharing a similar perspective, the resource-based view of the firm (RBV) proposes firm heterogeneity as the main determinant of intraindustry performance differences (Barney, 1991). The internal analysis of the firm is considered the most important strategic issue, in deep contrast with the industrial organisation tradition, which is more concerned with the analysis of the competitive landscape. The RBV has focused on the identification of the conditions under which a firm can attain a sustained competitive advantage. Peteraf (1993) summarises the basic set of requirements: resource heterogeneity, ex post limits to competition, imperfect mobility, and ex ante limits to competition.

Therefore, these two schools of thought (IO and RBV) point to external and internal factors as main drivers of firm performance. Which of these is more influential is an empirical question. On the empirical arena, some researchers have tried to provide an answer, which has generated a very interesting debate about the relative importance of both industry and firm effects. Summarising the current state of the discussion, the findings reported so far suggest that firm level drivers explain a much larger proportion of the variance in firm profitability than do industry drivers. Notable exceptions to this rule are Schmalensee (1985), Wernelfelt and Montgomery (1988), Kessides (1990), and McGahan and Porter (1997). A list of the most relevant studies that have empirically

¹ See Weiss (1973) and Hay and Morris (1991: Ch.8) for a detailed revision of the most relevant empirical findings.

² See also Hill and Deeds (1996) for a neo-austrian critic of the SCP paradigm.

estimated the relative importance of industry and firm effects is provided in Table 1³.

Table 1.- Industry versus firm effects. Empirical evidence

Author	Profitability measure	Dominant effect
Schmalensee (1985)	ROA	Industry
Wernerfelt and Montgomery (1988)	Tobin's q	Industry
Hansen and Wernerfelt (1989)	ROA	Firm
Kessides (1990)	Income/sales	(—)*
Rumelt (1991)	ROA	Firm
Amel and Froeb (1991)	ROA	Firm
Roquebert, Phillips, and Westfall (1996)	ROA	Firm
Fernández, Montes, and Vázquez (1997)	ROA	Firm
Galán and Vecino (1997)	ROA	Firm
McGahan and Porter (1997)	Income/assets	(—)**
Mauri and Michaels (1998)	ROA	Firm
McGahan (1999)	ROA/Tobin's q	Firm
Claver, Molina, and Quer (1999)	ROA	Firm

* This paper finds that both firm and industry effects are important, but neither of them appears to be dominant.

** The dominant effect in this paper depends on the sector being analysed. Firm effects are dominant in manufacturing industries, but industry effects are dominant in the rest of the sectors (transportation, services, lodging & entertainment, agriculture and mining).

3.- THE STRATEGIC GROUP EFFECT

Firm and industry are the main but not the only levels of analysis that have received attention in the strategic management literature. In between, the strategic group construct has emerged as a useful intermediate level of

³ Although not included in the table, a related paper by Powell (1996) evaluates the proportion

analysis. This was the main point raised on the early research on strategic groups (Hunt, 1972; Caves and Porter, 1977; Newman, 1978; Porter, 1979; Hatten and Schendel, 1977). Since then, it has been recognised that some of the variance in firm performance unexplained by industry and firm factors can be attributed to “shared generic strategies, strategic group membership, other shared resources, or chance” (Powell, 1996: 331).

A strategic group is a set of firms in an industry, which follow a similar strategy along the relevant strategic dimensions (Porter, 1980: 129). Firms in the best positioned groups obtain higher than average results. However, for those differences to be durable, firms in the worst positioned groups must not be able to invade the other groups. The mechanisms that preclude movement between groups are called mobility barriers (Caves and Porter, 1977). The only difference from entry barriers is that mobility barriers are idiosyncratic to the group (Porter, 1979).

Due to the inheritance of industrial organisation, the strategic group concept has been associated to the position of firms within the product market. Nevertheless, resource heterogeneity is a necessary condition for mobility barriers to exist. The explicit consideration of firm resources provides a richer understanding of strategic groups (Mascarenhas and Aaker, 1989; Mehra, 1994). Indeed, it provides a solid rationality to explain the existence and temporal persistence of performance differences across industries, across strategic groups within each industry and among firms within each strategic group. The existence of inimitable resources and the associated mobility barriers are a necessary condition for the existence of significant performance differences across strategic groups (Mehra and Floyd, 1998). If not, competition through firms moving across groups would erode any occasional advantage enjoyed by a particular strategic group.

Following a resource-based perspective, Tallman and Atchison (1996) have defined a strategic group as the set of firms within an industry which possess a similar strategic configuration: their products occupy similar positions

of variance in firm level performance explained by industry factors.

in the marketplace, their internal organisation is similar, and they pursue the same economic rents with similar resources. This definition explicitly accounts for the importance of distinctive competencies as determinants of the industry groups structure. The model proposed by Tallman and Atchison (1996) distinguishes among three types of rent generating competencies:

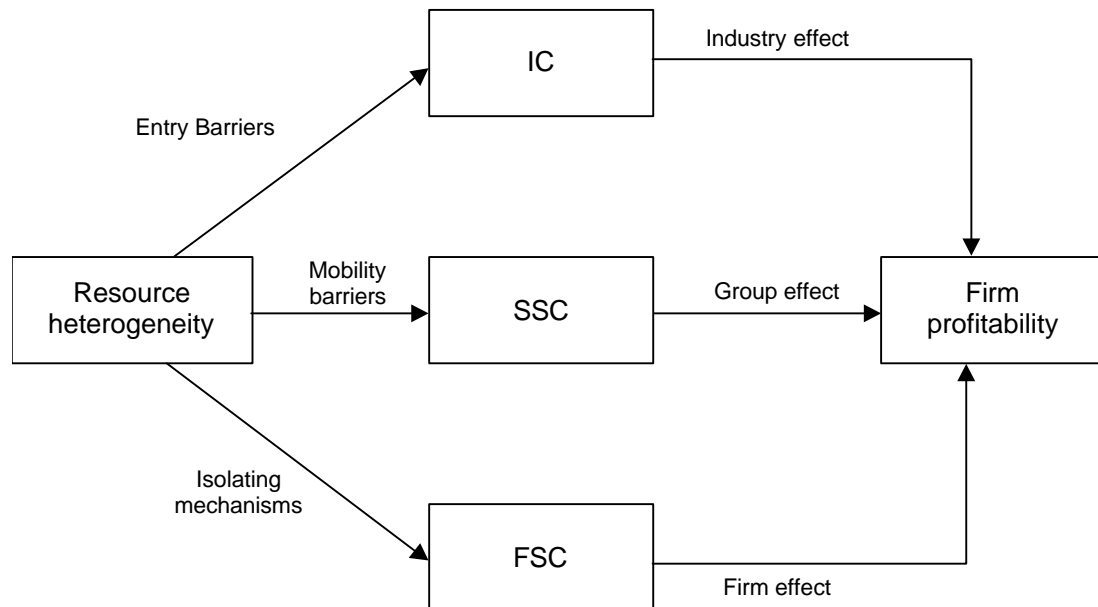
1.- Industry Competencies (IC): those which are common to all the firms within the industry. Within the industry they are identifiable and imitable. However, they support entry barriers because potential entrants must be able to acquire them in order to enter the industry.

2.- Strategy-Specific Competencies (SSC): those which are common to all the firms within a strategic group. They are needed to implement the strategy that defines group membership and constitute the source of mobility barriers across groups. Obviously, not all strategies imply possessing a set of hard to imitate resources. In other words, strategy does not imply the existence of SSCs. For instance, a strategy oriented towards direct sale can be easily imitated, and thus, it does not raise high mobility barriers (Mascarenhas and Aaker, 1989).

3.- Firm Specific Competencies (FSC): these competencies are developed internally or acquired at below actual market value. FSCs are specific to the unique history of the firm, being subject to causal ambiguity and uncertain imitability. They constitute the source of Rumelt's (1984) isolating mechanisms. As such, they provide a sustainable flow of rents to the firm which possess superior FSCs.

The former typology identifies three sources of competitiveness at three different levels of analysis: industry, strategic group, and firm. Although fully compatible, they correspond to three different research streams: industrial organisation, strategic groups theory, and the resource-based view of the firm. Figure 1 suggests that these three effects can explain performance differences among firms. The relative importance of each effect is an empirical question, which we examine in the following section.

Figure 1.- Industry, Group, and Firm effects



4.- EMPIRICAL ANALYSIS

Our empirical analysis draws on the models used by Schmalensee (1985) and Rumelt (1991) to evaluate the relative importance of industry and firm effects on firm profitability. After performing an Analysis of Variance and a Variance Components Analysis, both authors are able to decompose the variance in firm performance in two main sources of variation—industry and firm—obtaining conflicting results. Most of the papers that have used this methodology have found that industry effects have a low explanatory power—below 10% of total variance—while firm effects would explain between 30% and 50%⁴. To incorporate the strategic group effect into this discussion, we use Spanish firm level data from *Encuesta Sobre Estrategias Empresariales* (ESEE).

⁴ McGahan and Porter (1997) is a notable exception. Their results show that the industry effect is particularly small in the manufacturing sector (10,8%)—in which previous papers were based. In the rest of the sectors, industry effects explain more than 30% of dispersion in firm performance, being even larger than firm effects.

4.1.- DATA

We use the 1991-1994 ESEE data. ESEE is a survey undertaken by the *Fundación Empresa Pública* and the Spanish *Ministerio de Industria y Energía*, since 1990. It collects accounting and activity data from a sample of Spanish manufacturing firms in different industries. Sample selection has tried to achieve an exhaustive participation of the biggest firms in each industry. The rest of the firms were randomly sampled (see Fariñas and Jaumandreu, 1994, 1999).

In order to classify firms into industries, we used the three digit CNAE-93 code⁵. CNAE stands for *Clasificación Nacional de Actividades Económicas* and is the Spanish equivalent to the SIC codes. ESEE only reports the CNAE-74⁶ code⁷. The conversion to CNAE-93 was done using the codes of the *Clasificación Nacional de Bienes y Servicios* associated to the CNAE-74 codes⁸. Official correspondence tables were used to recover the three digit CNAE-93 codes⁹. However, in some cases, 3 digit codes were deemed inappropriate, because the resulting industry does not have any meaningful interpretation in competitive terms. Such is the case of code 159 (Beverages) which includes wine, beer, tapered water and carbonate drinks, or code 158 (Other feed products) which includes producers of goods as diverse as cookies and coffee—which would be better interpreted as complements. We did not consider any of those conflicting codes to enter the sample.

Four strategy variables were used to empirically derive the strategic groups within each industry. Three of these variables—advertising over sales (MKT), R&D over sales (R&D) and capital intensity, as measured by the ratio of fixed assets to the number of employees (CAPI)—represent Khandwalla's (1981) typology of competitive strategies, and have been frequently used in the study of strategic groups and industry variety (Miles, Snow, and Sharfman, 1993). Additionally, we use a geographic span variable, because of its crucial importance to delimit the effective competitive area of the firm.

⁵ Real Decreto 1560/1992, December 18, 1992.

⁶ Decreto 2518/1974, August 9, 1974.

⁷ This is because the first year covered by the survey is 1990.

⁸ This classification adds three digits to the four digit CNAE-74 codes.

⁹ Unfortunately, the information provided by ESEE does not allow for a finer 4 digit code.

Return on assets (ROA) was used to approximate firm performance. Accounting data are only available from 1991 to 1994, and preliminary inspection shows that they may be somewhat distorted by the quality of accounting practices. To limit the impact of such distortions, we rejected the data from all firms in which ROA was larger than 100% in absolute value in one of the 4 years of the sample¹⁰. Also, no sector with less than 5 representing firms entered the sample. This way, the final sample contains data from 304 firms whose data were observed from 1991 to 1994. These firms belong to 27 industries, with an average of 11.2 firms per industry. The total size of the sample is $304 \cdot 4 = 1216$ observations.

4.2.- DERIVING THE STRATEGIC GROUPS

The literature on strategic groups offers little guidance to classify firms into strategic groups. Cluster Analysis has been the most widely used technique and it seems appropriate because it classifies firms according to the magnitude of differences (distances) between the observations. However, the use of this methodology to derive the strategic groups present in an industry has been seriously criticised in the literature (Barney and Hoskisson, 1990). The main criticism comes from the fact that Cluster Analysis does not incorporate any rule or statistical test that allows to decide the correct number of groups in which the sample must be split; the clustering algorithm finds as many groups as the researcher wants to find¹¹. In this paper we suggest using a heuristic procedure to objectively determine the number of strategic groups, which is just based in following Porter's (1980) definition.

First of all, we propose using a hierarchical cluster technique. There are several alternative criteria to hierarchically cluster individuals. Among these, Ward criterion clusters individuals or groups iteratively until a unique cluster is reached, minimising in each step the lost of information that results from the

¹⁰ Our fine-grained inspection of the data showed that these numbers were generally due to undervaluation of assets in reported data.

¹¹ Although, several ad hoc criteria have been proposed to determine the appropriate number of groups (Hardy, 1996; Everitt, 1993)

aggregation. In other words, this method minimises intragroup variance while maximising intergroup variance. Thus, this criterion is consistent with the standard definition of strategic groups. The number of groups in a hierarchical analysis is determined by the cutting level of the hierarchical tree. For that level, we obtain the groups that are more heterogeneous and internally homogeneous. The decision about the cutting level must be grounded on understanding when two groups are sufficiently different as to be relevant for understanding the competitive landscape of the industry. A sound criterion to consider that two groups are sufficiently different is to check whether the differences between them in the relevant strategic dimensions are statistically significant. Thus, we propose an iterative procedure to determine the number of groups, which implies following the next steps:

- 1.- Construct the hierarchical classification tree (we apply the Ward criterion, but other criteria may be used). Set $G=2$.
- 2.- Cut the tree at the G groups level.
- 3.- Test whether there exist statistically significant differences between each pair of groups in at least one strategic dimension¹².
- 4.- If significant differences between each pair of groups in at least one variable are found, update $G=G+1$ and return to step 2. If not, continue to step 5.
- 5.- $G-1$ is the appropriate number of strategic groups supported by the data.

This way, each of the $G-1$ groups is significantly different from the rest in at least one strategic dimension¹³. This partition is consistent with Porter's (1980) definition and with the process that is followed to mentally construct the groups from a cognitive perspective (Reger and Huff, 1993).

¹² Given that, in general, we will have a small number of observations within each group, we will use the Mann and Whitney non parametric test of means on each strategy variable.

¹³ This procedure is very similar to the approach followed in Amel and Rhoades (1988).

4.3.- VARIANCE COMPONENTS ANALYSIS

Within the strategic groups literature, a major research topic has been to test whether performance differs systematically across groups. The traditional approach to this question has been based in simple Analysis of Variance, testing whether within-group dispersion is significantly smaller than between-groups dispersion. In this paper we follow a different approach, which not only tests whether significant differences exist between groups but also examines the relative importance of the group effect vis a vis industry and firm effects. The Variance Components Analysis (VCA) is a statistical technique that allows the decomposition of the variance of a variable into the sum of the variances of a number of *a priori* established sources of variation. This technique has been successfully used in the papers listed in Table 1, which estimated the relative importance of firm and industry effects as determinants of firm profitability. It is a natural extension of this literature to separate the part of the variance explained by strategic group effects.

To decompose the variance in firm performance we propose the following main sources of variation: 1) the industry effect, 2) the strategic group effect, and 3) the firm effect; additionally we add a year effect, being noise the residual source of variation. Note the hierarchical nested structure of the main sources of variation. Each strategic group is defined within a specific industry—it is not observed across industries—and each firm, in turn, belongs to a specific strategic group. The three-way nested model can be written as¹⁴:

$$R_{ijk t} = m + a_i + g_j + b_{ijk} + l_t + e_{ijk t} \quad (1)$$

where $R_{ijk t}$ is the performance (ROA) of firm k of strategic group j in industry i and year t , m is the intercept, a_i is the effect of industry i , g_j is the effect of being in strategic group j of industry i , b_{ijk} is the effect of being firm k in strategic group j of industry i , l_t is the year effect, and $e_{ijk t}$ is the residual term.

¹⁴ This is not a 3-way model strictly speaking, because of the year effect. We use this expression to indicate that it includes the 3 nested factors of interest (industry-group-firm) in contrast with the 2-way nested model that includes just the industry and firm effects.

The effects in expression (1) may be treated as fixed parameters or as random variables. Fixed effects models examine the specific influence of each factor and can be estimated using the Least Squares Dummy Variables estimator or the equivalent Analysis of Variance. However, due to the nested structure of the data it is not possible to introduce all the effects in the model together. A separate estimation must be conducted for each of the nested effects. Thus, it is not possible to assess the relative importance of each effect, *ceteris paribus* the rest of the nested effects. In any case, the results from a sequential fixed effects analysis provide an interesting preliminary evaluation of the relative importance of the effects.

Individual effects are random when the data at hand is a sample from a larger population, and the effects are thus a random sample of a larger population of effects. "...the situation to which a model applies is the deciding factor in determining whether the effects of a factor are fixed or random" (Searle, 1971: 382). In our case, the effects must be considered random, because we are interested in measuring the relative importance of each factor, not of each specific industry, group or firm in the sample. In a random effects model, each effect is a random variable with mean and variance. We model all the effects as realisations of stochastic distributions with mean 0 and constant variances, S^2_a , S^2_g , S^2_b , S^2_l .

The linearity of model (1) allows for a decomposition of the variance of the dependent variable as the sum of the variances of the random effects: $S^2_R = S^2_a + S^2_g + S^2_b + S^2_l + S^2_e$. The estimates of these components have been interpreted as reflecting the relative importance of each factor, *ceteris paribus* the other factors. The most common estimator in an unbalanced design (as it is our case) is Henderson's (1953) Method 1 also known as the Analogous Analysis of Variance estimator. However, in an unbalanced design many different estimators can be used to perform the variance decomposition (see Searle, 1971; Ch. 10)¹⁵. Given that there is no objective way to select among these, we decided to report the results obtained from applying three different

¹⁵ All of them collapse to the Analysis of Variance estimator in balanced designs.

estimators to out data set: the Analogous Analysis of Variance Estimator (Henderson's Method 1), the Fitting Constants Method (Henderson's Method 3) and the Best Quadratic Unbiased Estimator (BQUE)¹⁶.

The relative contribution of each effect can be approximated by the ratio of the estimated component to the variance of the dependent variable. These indicators are useful to distinguish whether dispersion is higher between industries or within industries, between strategic groups in an industry or within strategic groups, and so on. However, Brush and Bromiley (1997) and Brush, Bromiley, and Hendrickx (1999) have recently challenged this interpretation of variance components as indicators of the relative importance of the effects. Basically, the estimation of the components involves equating observed values of quadratic forms to their expected values and solving the resulting equations. Thus, the estimates represent the squares of the relative importance and not the relative importance itself¹⁷. Brush, Bromiley, and Hendrickx (1999: 522) suggest using the square roots of the variance components estimates instead of the variance components estimates to obtain a more accurate measure of the relative importance of the smallest effects. The tables in the following section show the BBH index of relative importance along with the traditional index of relative importance.

4.3.3.- RESULTS

Previous work on the measurement of industry and firm effects has not entirely relied in VCA. Instead, many of the papers have also implemented a set of sequential Analyses of Variance to estimate the incremental proportion of variance explained by each factor in a fixed effects model (e.g., Rumelt, 1991; McGahan and Porter, 1997; McGahan, 1999). To further link this work to previous literature we decided to estimate a fixed effects model through sequential Analyses of Variance along with the VCA.

¹⁶ See Searle (1971; Ch. 10) for details.

¹⁷ Brush and Bromiley (1997) have confirmed this point by means of a Monte Carlo experiment.

The fixed effects model estimates the factors as fixed parameters and does not impose the assumption that the effects are uncorrelated. Thus, the separate effect of each factor cannot be assessed. However, given the nested structure of the model, the effects were introduced sequentially in the model, computing the increase in the coefficient of determination as a first approach to the evaluation of the relative importance of the nested effects. The year and the industry effects were introduced first, then the group effects and finally the firm effects. Table 2 summarises the results, showing the degrees of freedom of each effect (DF), the percentage of total variance explained by each effect (R^2), the increase in the percentage of total variance explained over the immediately higher order effect (ΔR^2) and the value of the F test.

Table 2.- Fixed Effects Model

VARIABLE	DF	R^2	ΔR^2	F-test
YEAR	3	0.008	0.008	3.24**
INDUSTRY	26	0.112	0.104	5.77***
GROUP	71	0.227	0.115	4.73***
FIRM	303	0.607	0.380	4.64***
GLOBAL MODEL (FIRM+YEAR)	306	0.615		4.74***
ERROR	909	0.385		
TOTAL	1215			

** Significance level 0.05 *** Significance level 0.01

The results of the Analysis of Variance reject the hypothesis that average profitability is equal across industries ($F=5.57$). Industry dummies explain about 11% of variation in firm performance, while firm dummies apparently explain

60.7%, although they implicitly include the industry and group effects. Both effects are significantly different from zero. In turn, group dummies explain almost 23% of the variance in firm ROA. Although the partial contribution of each effect to total variation in firm performance cannot be assessed in a fixed effects model, the incremental variation in the coefficient of determination (ΔR^2) shows that introducing the group dummies improves the fit achieved with the *industry-year model* by 11.5%. Similarly, the variation in the coefficient of determination shows that the firm effects explain an additional 38% of variance that remained unexplained in the *group-year model*. The time effect explains a modest 0.8%, but its influence is statistically significant. Given that this effect should capture the impact of the last Spanish economic crisis, it was expected to be higher¹⁸.

This exploratory analysis confirms our expectations about the relative importance of the industry-group-firm effects. The results are similar to those reported by previous research, i.e. a larger importance of firm versus industry effects. However, it must be noted that without including the group effect, an explanatory power of 50% would have been attributed to firm effects. Including the group effect shows that the group dummies can capture part of that variation. This evidence moderates the conclusions about the large difference between the explanatory power of the firm itself and more aggregated units of analysis. Actually, taken together, group and industry effects explain 22% of total variance, i.e. more than half as much as firm effects.

To confirm the former results, we performed a Variance Components Analysis, which treats the factors as uncorrelated random variables. Table 3 shows the results obtained with the three estimators mentioned in the previous section—Analogous Analysis of Variance (ANOVA), Fitting Constants Method (FITTING), and the Best Quadratic Unbiased Estimator (BQUE)—along with the F value which tests the statistical significance of the corresponding estimate, in

¹⁸ Year effects reflect the impact of macroeconomic fluctuations that are invariant across firms, i.e. facts that affect equally all the firms during each year. Our data refer to the first half of the decade of 1990. The beginning of the 90s, with the Iraqi invasion of Kuwait, started an economic recession in Spain that had its worst years in 1992 and 1993, to recover quickly in 1994.

the case of the ANOVA and the FITTING estimators. We also include the BBH index of relative importance.

Table 3.- Variance Components Analysis (VCA)

ANOVA	Var	% Var	BBH	F-test
Industry effect	0.00083	2.9	9.1	1.69*
Group effect	0.00240	8.5	15.5	1.56**
Firm effect	0.01044	36.6	32.3	3.86***
Temporal effect	0.00025	0.9	5.0	6.25***
Error	0.01459	51.1	38.1	
Total Variance	0.02851			

FITTING	Var	% Var	BBH	F-test
Industry effect	0.00208	7.0	13.7	1.87**
Group effect	0.00241	8.1	14.7	1.56**
Firm effect	0.01044	35.1	30.6	3.86***
Temporal effect	0.00025	0.8	4.8	6.25***
Error	0.01459	49.0	36.2	
Total Variance	0.02977			

BQUE	Var	% Var	BBH
Industry effect	0.00192	6.5	13.2
Group effect	0.00225	7.6	14.3
Firm effect	0.01066	35.9	31.2
Temporal effect	0.00025	0.8	4.8
Error	0.01459	49.2	36.5
Total Variance	0.02967		

* Significance level 0.1 ** Significance level 0.05 *** Significance level

The ANOVA estimator shows an estimate of the Industry effect that accounts for 2.9% of total variance in firm performance, with a BBH index of relative importance of 9.1%. The Firm effect reaches a 36.6% with a BBH index of 32.3%. In turn, the Group effect explains 8.5% of the variance, with a BBH index of relative importance of 15.5%. The time effect is not substantially different from the one obtained in the fixed effects model, explaining 0.9% of total variance. However, the BBH index takes the value 5% for this temporal effect, which is more in consonance with the expected importance of the effect—recall that the data refer to the period 1991-1994, which includes three years of depression (1990-1993) and one year of fast recovery (1994). This result shows the importance of the BBH interpretation of the variance components estimates in the case of small effects, thus confirming the appropriateness of the BBH index for practical purposes. All the effects are significantly different from zero at conventional levels.

The results are similar when we use the FITTING and the BQUE estimators, except for the industry effect. The ANOVA estimator suggests that this effect explains just 2.9% of firm performance variability, while the other two estimators show a much larger share for the industry effect: 7% and 6.5%, respectively. The BBH indexes of relative importance take values of 13.7% and 13.2%, instead of the 9.1% suggested by the ANOVA estimates. The unexplained variance (noise) shrinks from 51% to about 49%. This lack of congruence between the estimates of the ANOVA and the estimates of the FITTING and the BQUE estimators complicates the assessment of the industry effect. To further check the discrepancy among the estimators, we also used the Maximum Likelihood Estimator (see Searle, 1971). The results are extremely similar to those obtained using the FITTING and the BQUE estimators.

Following the traditional interpretation of the variance components as indicators of relative importance, the FITTING and BQUE estimates show that the strategic group can explain about 8% of the variance in firm performance. Industry and firm effects would explain 7% and 35%, respectively. However, the BBH indexes of relative importance suggest a very different picture. The most

important effect is the firm effect—between 30% and 31%—followed by the group effect—between 14.3% and 14.7%—, and, finally, the industry effect—between 13.2% and 13.7%. Taken together, the industry and group effects are almost as important as the firm effect in determining firm level performance.

Figure 2.- BBH Relative Importance of the effects (BQUE estimator)

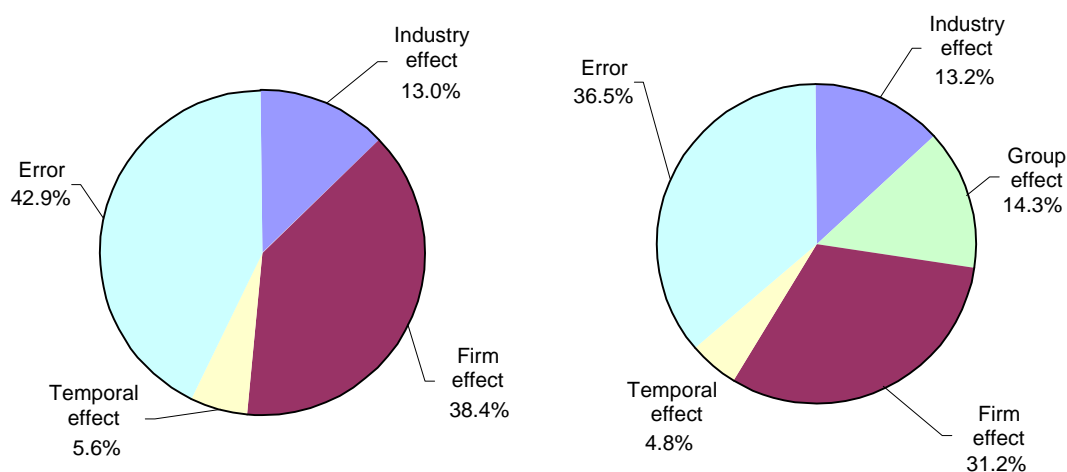


Figure 2 graphically depicts the BBH indexes of relative importance of the different effects on firm performance, using the results of the BQUE estimator, in a 2-way nested model (industry-firm) and our 3-way nested model (industry-group-firm)¹⁹. A straightforward conclusion arises from comparing these figures: if the strategic group of the firm is unknown (i.e., not included in the model) we would assign a much larger share of the variance to firm effects (38%), while the industry effect would be almost identical (13%). Thus, including information about the strategic group of the firm results in a smaller share of the firm effect and also to a smaller error—the relative importance of the error (i.e., unexplained variance) goes from 42.9% to 36.5%; this difference is explained by the group effect (14.3%). Given the magnitude of the group effect, the results confirm the main hypothesis of the paper.

¹⁹ The details about the 2-way nested model are discussed in González (2000).

5.- CONCLUSION

Explaining dispersion in firm performance is a main goal of research in Strategic Management. Conceptually, differences in firm profitability are due to firm heterogeneity in basic competencies. Following Tallman and Atchinson (1996) this paper has distinguished among three sources of firm heterogeneity which give rise to observed dispersion in profit rates: Industry Competencies—those required to compete in a given industry—Strategy Specific Competencies—required to implement the strategy that distinguishes a given strategic group—and Firm Specific Competencies—firm specific, rare and hard to imitate. Industry competencies—heterogeneity among firms in different industries—explain interindustry differences in firm performance, as they raise entry and exit barriers. Strategy specific competencies—strategic group heterogeneity—raise mobility barriers between groups, which sustain intergroup dispersion in firm performance. Firm specific competencies—pure firm heterogeneity—give rise to isolating mechanisms, capable of sustaining the competitive advantages of some firms within the industry and within the strategic group.

Most of the papers that have analysed the relative importance of industry and firm effects report a much larger explanatory power of firm effects, but did not consider the existence of a moderating group effect. In fact, we are not aware of any empirical evidence about the relative importance of strategic group effects. The traditional approach to test the existence of a Group effect has been to derive the strategic groups present in a well-known (to the researcher) industry and then to test whether average profitability significantly differs across groups. This methodology has produced mixed evidence. On the contrary, this paper has examined firm level data from a wider range of industries. Using the Variance Components Analysis, a technique used by Schmalensee (1985), Rumelt (1991), and others to evaluate the relative importance of Industry versus Firm effects, we have incorporated the group effect to the analysis in a natural way.

To evaluate the relative importance of the group effect, we estimated the variance components in a 3-way nested model. The BBH index of relative importance takes a value between 14% and 15% for the group effect, while industry and firm effects attain indexes of 13% and 31%, respectively. This finding shows that it is possible to identify relatively homogeneous strategic groups within an industry and, more important, that the strategic group construct is useful to explain dispersion in firm performance. Furthermore, the incorporation of the group effect enriches the debate about the relative importance of industry and firm effects. We hope that this research would be complemented with similar studies using data from different countries to further establish the relative importance of the three effects.

References

- Amel, D.F. and L. Froeb (1991), "Do Firms Differ Much?", *The Journal of Industrial Economics*, 39: 323-331.
- Amel, D.F. and S.A. Rhoades (1988), "Strategic Groups in Banking", *The Review of Economics and Statistics*, 70: 685-689.
- Bain, J.S. (1951), "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-40", *Quarterly Journal of Economics*, 65: 293-324.
- Bain, J.S. (1956), *Barriers to New Competition*, Harvard University Press, Cambridge, MA.
- Barney, J.B. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management*, 17: 99-120.
- Barney, J.B. and R.E. Hoskisson (1990), "Strategic Groups: Untested Assertions and Research Proposals", *Managerial and Decision Economics*, 11: 187-198.
- Brush, T.H. and P. Bromiley (1997), "What Does a Small Corporate Effect Mean? a Variance Components Simulation of Corporate and Business Effects", *Strategic Management Journal*, 18: 825-835.
- Brush, T.H., Bromiley, P. and M. Hendrickx (1999), "The Relative Influence of Industry and Corporation on Business Segment Performance: an Alternative Estimate", *Strategic Management Journal*, 20: 519-547.
- Caves, R.E. and M.E. Porter (1977), "From Entry Barriers to Mobility Barriers: Conjectural Decisions and Contrived Deterrence to New Competition", *Quarterly Journal of Economics*, 91: 241-261.
- Claver, E., Molina, J.F. and D. Quer (1999), "Efecto Empresa y Efecto Sector: un Análisis Empírico", *IX Congreso Nacional de ACEDE, Empresa y Mercado: Nuevas Tendencias*, Burgos.
- Demsetz, H. (1973), "Industry Structure, Market Rivalry, and Public Policy", *Journal of Law and Economics*, 16: 1-10.

- Demsetz, H. (1974), "Two Systems of Beliefs about Monopoly", in H. Goldschmid, H.M. Mann and J.F. Weston (eds), *Industrial Concentration: the New Learning*, Boston: Little Brown & Company: 164-184.
- Everitt, B.S. (1993), *Cluster Analysis*, 3^a ed., Edward Arnold, London.
- Fariñas, J.C. and J. Jaumandreu (1994), "La Encuesta Sobre Estrategias Empresariales: Características y Usos", *Economía Industrial*, 109-119.
- Fariñas, J.C. and J. Jaumandreu (coord.) (1999), *La Empresa Industrial en la Década de los Noventa*, Fundación Argentaria, Visor Dis.
- Fernández, E., Montes, J.M. and C. Vázquez (1997), *La Competitividad de la Empresa. Un Enfoque basado en la Teoría de Recursos*, Servicio de Publicaciones de la Universidad de Oviedo, Oviedo.
- Galán, J.L. and J. Vecino (1997), "Las Fuentes de Rentabilidad de las Empresas", *Revista Europea de Dirección y Economía de la Empresa*, 6(1): 21-36.
- González, E. (2000), *Variación Estratégica y Rentabilidad Empresarial*, Doctoral Dissertation, Universidad de Oviedo.
- Hansen, G.S. and B. Wernerfelt (1989), "Determinants of Firm Performance: the Relative Importance of Economic and Organizational Factors", *Strategic Management Journal*, 10: 399-411.
- Hardy, A. (1996), "On the Number of Clusters", *Computational Statistics and Data Analysis*, 23: 83-96.
- Hatten, K.J. and D.E. Schendel (1977) "Heterogeneity within an industry: firm conduct in the U.S. brewing industry, 1952-1971", *Journal of Industrial Economics*, 26, pág. 97-113.
- Hay, D.A. and D.J. Morris (1991), *Industrial Economics and Organization: Theory and Evidence*, Oxford University Press, New York.
- Henderson, C.R. (1953), "Estimation of Variance and Covariance Components", *Biometrics*, 9: 226-252.
- Hill, C.W.L. and D.L. Deeds (1996), "The Importance of Industry Structure for the Determination of Firm Profitability: a Neo-Austrian Perspective", *Journal of Management Studies*, 33: 429-451.
- Hunt, M.S. (1972), "Competition in the Major Home Appliance Industry. 1960-1970", Unpublished Doctoral Dissertation, Harvard University.
- Kessides, I.N. (1990), "Internal Versus External Market Conditions and Firm Profitability: an Exploratory Model", *The Economic Journal*, 100: 773-792.
- Khandwalla, P. N. (1981), "Properties of Competing Organizations", in P. C. Nystrom and W. H. Starbuck (eds.), *Handbook of Organizational Design*, Vol. 1, Oxford University Press, Oxford: 409-432.
- Mascarenhas, B. and D.A. Aaker (1989), "Mobility Barriers and Strategic Groups", *Strategic Management Journal*, 10: 475-485.
- Mason, E.S. (1939), "Price and Production Policies of Large-Scale Enterprise", *American Economic Review*, 29: 61-74.
- Mauri, A.J. and M.P. Michaels (1998), "Firm and Industry Effects Within Strategic Management: an Empirical Examination", *Strategic Management Journal*, 19: 211-219.
- McGahan, A.M. (1999), "The Performance of U.S. Corporations: 1981-1994", *The Journal of Industrial Economics*, 47: 373-398.

- McGahan, A.M. and M.E. Porter (1997), "How Much does Industry Matter, Really?", *Strategic Management Journal*, 18: 15-30.
- Mehra, A. (1994), "Strategic Groups: A Resource Approach", *Journal of Socio Economics*, 23: 423-439.
- Mehra, A. and S.W. Floyd (1998), "Product Market Heterogeneity, Resource Imitability and Strategic Group Formation", *Journal of Management*, 24: 511-531.
- Miles, G., Snow, C.C. and M.P. Sharfman (1993), "Industry Variety and Performance", *Strategic Management Journal*, 14: 163-177.
- Newman, H.H. (1978), "Strategic Groups and the Structure-Performance Relationship", *Review of Economics and Statistics*, 60: 417-427.
- Peteraf, M.A. (1993), "The Cornerstones of Competitive Advantage: a Resource-Based View", *Strategic Management Journal*, 14: 179-191.
- Porter, M.E. (1979), "The Structure Within Industries and Companies' Performance", *Review of Economics and Statistics*, 61: 214-227.
- Porter, M.E. (1980), *Competitive Strategy*, Free Press, New York.
- Powell, T.C. (1996), "How Much Does Industry Matter? an Alternative Empirical Test", *Strategic Management Journal*, 17: 323-334.
- Reger, R.K. and A.S. Huff (1993), "Strategic Groups: a Cognitive Perspective", *Strategic Management Journal*, 14: 103-124.
- Roquebert, J.A., Phillips, R.L. and P.A. Westfall (1996), "Markets Vs. Management: What 'Drives' Profitability?", *Strategic Management Journal*, 17: 653-664.
- Rumelt, R.P. (1984), "Towards a Strategic Theory of the Firm", in *Competitive Strategic Management*, R. Lamb (ed.), Prentice-Hall, Englewood Cliffs, NJ. pp. 556-570.
- Rumelt, R.P. (1991), "How Much does Industry Matter?", *Strategic Management Journal*, 12: 167-185.
- Schmalensee, R. (1985), "Do Markets Differ Much?", *American Economic Review*, 75: 341-351.
- Searle, S.R. (1971), *Linear Models*, John Wiley & Sons, New York. Reedited in 1997 in the Wiley Classics Library Edition.
- Stigler, G.J. (1968), *The Organization of Industry*, Irwin, Homewood, Ill.
- Tallman, S.B. and D.L. Atchison (1996), "Competence-Based Competition and the Evolution of Strategic Configurations", in *Dynamics of Competence-Based Competition*, R. Sanchez, A. Heene and H. Thomas (eds.), Pergamon.
- Weiss, L. (1973), "The Concentration Profit Relationship and Antitrust", in H. J. Goldsmidt, H. M. Mann and J. F. Watson (eds.), *Industrial Organization: the New Learning*, Boston.
- Wernerfelt, B. and C.A. Montgomery (1988), "Tobin's q and the Importance of Focus in Firm Performance", *American Economic Review*, 78: 246-250.