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WHO PERFORMS A STRONGER RESPONSE TO WHOM?

DETECTING INDIVIDUAL COMPETITIVE ACTIONS AND REACTIONS

Abstract

This study analyzes the degree of competition through individual actions and reactions. Empirical support for this analysis has derived mainly from structural econometric models describing the nature of competition. This analysis extends the existing literature by empirically considering a direct measurement of competition through the analysis of the competitive actions and responses, and describing how firms compete within and between strategic groups. We estimate the firms' conduct in the Spanish deposits market with 146 firms and 18,888 observations. This is a specially compelling context for the banking industry, in which a deregulation process gives rise to the adoption of aggressive strategies seeking to increase the market shares of deposit accounts; thus, producing a turbulent situation of increasing rivalry. Our results offer a deeper understanding of the firms' competitive behavior, since we identify different patterns of actions and reactions depending upon the strategic group the firm belongs to.

Keywords: competition; strategic groups; mixed logit model.

1. INTRODUCTION

There has been an increase in empirical research in both economics and business fields that analyzes and quantifies the degree of competition (Eilon, 1993; Furrer and Thomas, 2000; Heiman, 2010; Liu and Nagurney, 2011; Pech and Slade, 2003; Schiavone, 2011; Sinha, 2000; Tsai and Hung, 2009; Wang et al., 2011; Xiao and Qi, 2008; Yan, Tang and Lee, 2007; Yao and Liu, 2005; Zhang, 2006).

Particularly, the banking industry has fuelled a large stream of literature on competition and has been a topic of considerable interest, especially since the 80s, when significant changes in structure and competition took place in several financial markets (Lozano-Vivas and Pastor, 2010; Maudos and Pérez, 2003; Oroz and Salas, 2003). During the 80s, many western European countries implemented structural changes in the banking industry in response to the processes of deregulation and to the need to achieve the level of harmonization required for the establishment of a single and competitive European market. The Spanish banking industry was not an exception to those important changes, moving from a situation of tight regulation and protection to a new situation characterized for an increased competition. Essentially, the deregulation process implemented in Spain concerned both, the competitive conduct of firms (liberalization of interest rates, fees, etc.), and the structure of the sector (foreign bank entry, removal of geographical controls on branching, etc.) (Jaumandreu and Lorences 2002). When the deregulation process went to an end at the earlier 90s, both commercial and savings banks adopted aggressive strategies seeking to increase their market share of deposit accounts (Carbó, Fernández, Humphrey and Maudos, 2009), which completely transformed the environment of stability during the 70s into a turbulent situation of increasing rivalry at the earlier 90s. Thus, the Spanish banking market provides an interesting test case for analyzing competition on complex industries undergoing deregulation.

To date, most of the researchers that have empirically studied banking competition have used structural econometric models from the Industrial Organization approach to describe the nature of competition and to identify the specific game being played between competing firms. Previous studies have measured Spanish banking competition estimating conjectural variations (e.g., Carbó *et al.* 2009), and Lerner index, or Panzar and Rosse H-statistic (e.g., Maudos and Pastor 2003). These studies, framed in the Industrial Organization approach, estimate a single parameter to infer competitive conduct in the industry, given that the attempt of empirically analyze the competitive interaction between the large number of firms comprising the banking industry may entail an extremely difficult or impossible estimation (which could be affected by the availability of degrees of freedom). To overcome this limitation and trying to provide more accurate information through the estimation of more than a single parameter for the entire industry, we follow the works by Porter (1985) and Putsis and Dhar (1998) and we examine competition by distinguishing how firms compete within and between strategic groups in an industry.

The existence of strategic groups has direct implications for the behavior of firms and their competitive interactions (Yu, Wei and Brockett, 1996; Leask and Parnell, 2005; Mas-Ruiz, Nicolau-Gonzálbez and Ruiz-Moreno, 2005; Prior and Surroca, 2006; Mas-Ruiz and Ruiz-Moreno, 2011; Epure, Kerstens and Prior, 2011). In this sense, there are two main issues in the rivalry and strategic group research (González-Moreno and Sáez-Martínez 2008). The first one is related to the fact that the detection of strategic groups helps managers to get a better knowledge of their industry, and therefore, a precise identification of their rivals. The second main issue is the distinction of the nature of intra- and inter- strategic group rivalry (Porter 1976, 1979; Peteraf 1993; Cool and Dierickx 1993, among others). Regarding the banking industry, empirical studies implemented under the Industrial Organization approach to assess the competition in the field of strategic groups (Spiller and Favaro 1984, Berg and

Kim 1994, Burke 1990, Coello 1994, among others) has grown over time and has provided a series of propositions on the competitive interaction of firms.

We extent the existing literature by empirically considering: (a) a direct measurement of competition through the analysis of the competitive movements, which has a multidimensional character as it considers strategic firm actions and responses (Smith, Grimm and Wally, 1997), and constitutes a difference from previous banking empirical research from Industrial Organization approach (e.g., Coccorese 2008, or Carbó *et al.* 2009). Actually, this direct measurement (exemplified and presented in minute detail in section 3.1), which is based on the use of press information to subsequently analyze competitive actions, is a significant contribution of the article. Accordingly, the proposed method allows us to identify the primary actors and all those that respond with a temporal order of response to an initial action; and (b) describing how firms compete within and between strategic groups, which allows us to shed light on the dilemma intra- versus inter- strategic group rivalry and to offer different rivalry interpretations of the resulting strategic groups formed instead of a single parameter for the whole industry. Specifically, we use the history of the industry to identify strategic groups according to firm size, and we analyze and describe the type of competition, within and between strategic groups. To do so, we conduct an empirical analysis of data collected from the Spanish bank-loans market with 146 entities and 18,888 observations and between 1992 and 1994 (i.e., the period after deregulation), through an econometric approach based on the Mixed Logit Model estimated by Bayesian procedures, which allows capture of any firm's reaction structure and operates with specific information for each firm.

2. THEORY: LITERATURE REVIEW

2.1 Banking competition and strategic groups

Since the first use of the term strategic groups by Hunt (1972), strategic groups are considered

as one dimension of an industry's structure and an important topic in the field of strategic management research (Ketchen et al., 1997; McGee and Thomas, 1986; Thomas and Venkatraman, 1988; Panagiotou, 2007) that studies, for example, the persistence of profits or of competitive interactions between firms (Peteraf 1993). Prior literature on strategic groups has considered the following key topics: the emergence of strategic groups; performance differences between groups; the stability of a group structure; and the rivalry within and between strategic groups. Regarding the last one of these topics, an interesting question that has emerged is whether rivalry is greater between members of different groups than between members of the same group. Porter (1979, 1980), Ramsler (1982), and Hatten and Hatten (1987), for example, have examined how factors such as the strategic distance between firms, the number and size distribution of groups, and the interdependency of groups in the market, which differently affect rivalry within and between strategic groups. However, there is no consensus in previous studies when discussing this question.

On the one hand, the idea that rivalry between strategic groups is greater than within groups has been supported with several arguments. The first one is that intra-group rivalry is rare because the members of a group are able to recognize their mutual dependence with greater ease (Caves and Porter 1977; Porter 1976, Peteraf 1993). This argument is supported by the resource-based view of the firm, in that members of the same group will have similar endowments of resources, which will lead them to act and react to competitive disturbances in similar ways and consequently be better able to predict each other's actions and reactions and recognize their mutual dependence (Smith *et al.* 1997). Another argument is that a high level of rivalry exists between strategic groups because, other things being equal, a greater strategic distance makes tacit coordination more difficult (Hunt 1972; Porter 1976; Caves and Porter 1977), due to the fact that different strategies on the part of firms could lead to a lack of congruence in goals (Newman 1973, 1978). This suggestion is also supported by the resource-

based view of the firm, in that differences between strategic groups are usually the result of heterogeneous resources and varying patterns of competitive behavior, which will make it difficult to predict and coordinate actions with rivals across the groups (Porter 1980; Smith *et al.* 1997).

On the other hand, the idea that rivalry between strategic groups is greater than within groups has been criticized in the literature (Cool and Dierickx 1993). In fact, the hypothesis that tacit coordination among firms is more successful between firms that have similar strategies or between firms within a group that have similar resources has been challenged as follows (Gimeno and Woo 1996): i) Strategic distance (lack of strategic similarity) could facilitate tacit coordination by making it easier to know whether a rival has overstepped its tacit boundary; and ii) according to the resource-based view of the firm, a greater intra-group rivalry could be the result of homogeneity of resources among its members (Barney 1991; Bogner and Thomas 1994), given that each firm is trying to achieve the same goals but does not have unique resources or isolation mechanisms that would enable them to gain a competitive advantage (Smith *et al.* 1997).

Alternatively, Smith et al. (1997) suggest that the fundamental question pertains not to a comparison of within and between group rivalries, but rather to the behavior of groups themselves. We extend several works (e.g., Dranove, Peteraf and Shanley, 1998) whose theories of strategic groups and collusion hold that the group's identity is based on the actual behavioral relations and interactions among its member firms. Accordingly, we use the concept of strategic group trying to have a better understanding about the competitive behavior of groups in the banking industry through the comparison of within and between group rivalry.

Although some authors like Day *et al.* (1995) indicate that conflicting results could be

attributable to the lack of multiple criteria[1] and inappropriate selection methods in the identification of groups, we follow Dranove, et al. (1998) by suggesting that the degree of rivalry within and between strategic groups depends on the size of the firms that constitute that group. We support our decision to define strategic groups according to firm size on the institutional/historical approach of the industry, originally proposed by Porter (1979), and one of the more widely accepted approaches to explaining the configuration of strategic groups (see Porter, 1979; Peteraf, 1993). Porter (1979), for example, links an analysis of an industry's history to an a priori definition of strategic groups based on firm size and group-level effects[2]. Therefore, we analyze the history of the industry—in our case, the Spanish banking industry—to form size-defined strategic groups. Dranove *et al.* (1998) recommend that researchers identify groups a priori based on a deep institutional knowledge of the industry which would allow them to search for barriers to mobility and define the limits of the groups in a temporal period. Peteraf (1993) accepts that if the industry's legal regulations lead to a certain strategic group structure, it will be possible, following an a priori theoretical approach, to identify different company classes, which are sufficiently different in their scope, resources, and strategic profile, to constitute separate strategic groups (Thomas and Venkatraman, 1988). A large number of empirical studies, most importantly those of Smith and Grimm (1987), Corsi and Grimm (1989), Corsi, Grimm, Smith and Smith, (1991), Zajac and Shortell (1989), and Peteraf (1993), among others, follow this institutional/historical approach and analyze the impact of deregulation on firm strategy and/or performance.

Essentially, we similarly consider historical and institutional contexts (for a historical analysis of strategic groups in the Spanish banking industry, see "Spanish banking industry") as criteria for defining strategic groups a priori through firm size, with size serving as a

[1] Several works use multidimensionality for forming strategic groups (i.e., Pehrsson, 1990). Regarding the banking industry, Ray and Das (2010) and Epure et al. (2011) cluster banking ratios to form groups.

[2] For a more extensive explanation of the firm size effects on group behavior, see Mas-Ruiz and Ruiz-Moreno (2011).

determinant of group behavior.

2.2. Spanish banking industry

The Spanish banking market provides an interesting test case for analyzing competition on complex industries undergoing a deregulation process, which, in this case, was fully completed by 1992. In particular, two types of regulations have influenced the history of the Spanish banking industry: the regulation of firm behavior through the setting of prices (interest rates), and the regulation of market structure through the control on the savings banks' geographical expansion (Gual 1992; García-Cestona and Surroca, 2008).

Although prices and controls on fees were liberalized in 1987, the regulation of interest rates since the 60s removed price competition and induced the larger banks to compete through investing more in services and client proximity (i.e., through expanding their branch networks). In this sense, the branch structure of the Spanish banking industry is the result of the competition generated in a context of regulated interest rates: the broadest branch networks belong to the largest banks, which can then provide their clients with the most comfortable service (Sánchez and Sastre 1995).

The regulation in the 1970s and 80s of the Spanish banking industry's geographical expansion created a market wherein financial firms operate at either the national, regional, or local level. However, these geographical restrictions were applied only to savings banks. That is, savings banks were permitted to make strategic geographical choices but these choices were limited to either regional or local, but not national, markets. No such limits were imposed on commercial banks. Therefore, large financial firms that have offices in numerous regions face a different (and more diversified) competitive structure and socioeconomic reality than small entities operating in only one territory (Carbó *et al.* 2003). Boeker (1991) and Burke (1990) both find that a firm's size parallels its classification according to geographical spread; indeed, national entities are generally larger than those with a regional

scope, which in turn are generally larger than local entities.

Factors like the removal of branching restrictions on savings banks' geographical expansion since 1988, and the integrating effects of the entry of Spain into the European Community (EC) in 1986 (nowadays European Union (EU)), induce to the concentration of the banking industry. First, the removal of branching restrictions created, on the one hand, the expansion of large savings banks to the national level and, on the other, the defensive formation of small savings banks into geographical groups. The latter was achieved through an accelerated process of mergers and acquisitions primarily involving savings banks operating in the same markets. Second, Spain's membership in the EC also concentrated banking through additional mergers and acquisitions, which, in turn, completely affected the domestic competitive environment. In particular, banks underwent mergers and acquisitions at the end of the 1980s to increase the size of Spain's financial entities for the purpose of competing in the broader European market and preserving market power.

To sum up, regulation/deregulation and institutional structure demonstrate that size is a defining characteristic of the Spanish banking industry (Espitia, Polo and Salas, 1991), which explains why several authors (e.g., Freixas 1996) have used size to identify three distinct strategic groups: larger banks, which are national in scope and distinguished by their extensive branch networks; medium banks, which are regional in scope and have a significant presence in a few local markets; and smaller banks, which are to a greater or lesser extent functionally or geographically oriented toward a single local market. For the latter two categories, the relevant markets are, respectively, the Autonomous Region and the Province (Gual and Vives 1991). Therefore, following the strategic group as defined by Dranove *et al.* (1998), our analysis of Spanish banking industry supports differentiating strategic groups based on the size of their member banks.

3. THE MODEL

3.1. Sample and variables.

Our sample includes 52 savings banks and 94 commercial banks over a two-year period (1994-1995). Because in that period, the financial entities in our sample covered more than 96% of the Spanish deposit market, we are able to proceed with an effective analysis of the market structure. We excluded from our sample the credit unions because of their residual participation and those banks that either lacked the data necessary for our empirical analysis or had data that seemed likely to contain errors.

We conduct an empirical analysis of data from the Spanish banking industry between 1994 and 1995 (i.e., the period after deregulation in 1992). This period of time is characterized by a change in the economic cycle of Spain with the start of a period of recovery and by an increase of competition after a long deregulation process (see "Spanish banking industry").This time-specific change is fundamental to the study of competition between banks, as it allows us to identify the two determining factors of the strategies and performance of the sector: economic situation and competition. In periods of recovery, situational aspects and competitive pressure have the opposite effect on margins, which allows us to better estimate the impact of competitive erosion and to obtain more precise results than those generated by previous analyses (Freixas, 1996).

Our variables fall into two main categories:

i) Variables for delimiting the groups.

Firm size: the total monetary value of deposits issued at the end at the end of each year of the analyzed period. We define deposits broadly to include the sum of "debits to clients", "debits represented by negotiable shares" and "other debits" reported on the balance sheet. As do other studies on the Spanish banking sector (e.g., Freixas, 1996), we consider the three aforementioned strategic groups: large banks, medium banks, and small banks. We establish

the following limits of each group by identifying a certain homogeneity in the scope of each group's markets—based on the parallelism between company size and geographical spread (Boeker 1991; Burke 1990): large firms with a national scope who deposited more than 2 billion pesetas, medium firms with regional scope who deposited between 415,000 million and 2 billion pesetas, and small firms with a local scope who deposited less than 415,000 million pesetas for the year 1995. Doing so enables us to see that while two firms may be similar in size, they belong to different size classes because they have different geographical scopes. The first group (i.e., GI) contains the six largest firms and constitutes 41.0% of the deposits market. The second group (i.e., GII) contains 27 medium banks and constitutes 35.6% of the deposits market. The third group (i.e., GIII) contains the 113 remaining firms, which are the smallest and account for 21.1% of the deposits market.

L_i: Lerner index of bank *i*. We chose this variable because it is the relative margin suitable for analyzing the evolution of competence for two reasons (Maudos and Pérez, 2003): i) oligopolistic competition models determine a equilibrium relationship between this relative margin and the structural and competitive conditions of the market; and ii) this relative margin is the best proxy for the social welfare loss suffered due to market power. As stated before, Dranove *et al.* (1998) focus on firms' strategic interactions to develop a theory of how strategic groups form. According to the authors, a strategic group exists only if the performance of its member firms is a function of the group characteristics or, in other words, if we can predict a firm's performance based on the group to which it belongs. We build on this approach by arguing that groups display interactions as a function of the size of their member firms. Following Mas-Ruiz and Ruiz-Moreno (2011), while rivalry remains our focus, it is rivalry's link to performance that allows us to determine whether group interactions derive from the size of the group's members.

The AEB (*Asociación Española de Banca*), and the CECA (*Confederación Española de*

Cajas de Ahorros) publish the information required for elaborating these variables.

ii) Variables used for representing the competitive behavior:

The method used to identify the banking competition has been reported from the work by Smith *et al.* (1997), framed within the Strategic Management perspective, and it is focused on the rivalry movements between the involved firms. In this line, rivalry is defined as the interchange of competitive movements between the firms of a market (Porter, 1980). Therefore, Smith *et al.* (1997) propose the examination of competitive actions and responses as an alternative to the study of competitive interaction. Accordingly, we hinge on the fact that the way in which a company acts and responds in a market determines its performance (Porter, 1980). Stemming from Schumpeter (1950), Smith *et al.* (1997) define "competitive actions" as specific and detectable competitive movements, such as price cuts, the launch of new products, expansion into new markets and special promotions, initiated by a firm to defend or better its relative competitive position. A "competitive response" is a discernible and observable competitive movement of counterattack (to an initial competitive action), undertaken by a firm with respect to one or more competitors to defend or better its position (Porter, 1980).

Consequently, we analyze the content of a collection of news items published in newspapers and specialized magazines, on the competitive actions and responses of the entities (e.g., new branches' opening, the launch of new products, moves of the interest rate, etc.). News items were obtained from Baratz Database, which gives a summary of news published in 28 national and regional publications. The way of operating in the database was initiated with the distinction between actions and responses. The identification of the competitive responses was effectuated by selecting news items which contained expressions such as 'in response to...', "following...", "under pressure from...", "reacting to...", etc., taking as a starting point the last day of the time period (31 December 1995). Next, we looked for the

news of the initial action, to which each response referred, going back one day at a time until 1 January 1994. Finally, we identified the competitive actions, to which no competitive response could be observed. This method allows us to identify the primary actors and all those that respond with a temporal order of response to an initial action. For example, Banco Central Hispano (included in the strategic group of the larger banks) reinforced its promotional activity on its main bank account as responding to Banco Santander's (also in the strategic group of the larger banks) increase in promotion expenses on its new product "superaccount"; consequently, the competitive move by Banco Central Hispano was considered as a competitive response to an initial competitive actions by Banco Santander. As a result of this method, we identify 126 actions, 38 of which provoked at least 1 response, and 82 responses. The distribution of competitive movements between entity types is balanced: 143 competitive movements are taken by commercial banks and 65 by savings banks (taking into account that the sample used in this research include twice as many commercial banks as savings banks). Table 1 summarizes the statistics for the main categories all the competitive movements (actions and responses) identified through this method.

Note that "geographical expansion" and "launch of new products" stand out among the categories of competitive behavior; however, if the type of entity is considered, while the former is equally sought by both commercial and saving banks, the latter is far more prevalent in the "commercial banks" category. A similar asymmetrical pattern is found for "new distribution channels" and "promotion". "Operative movements" are equitably distributed between both types of entities. Additionally, if the variable "size" is introduced in this descriptive analysis, "promotion" and "new distribution channels" are clearly preferred by the largest entities; "geographical expansion" and "operating movements" while following this same pattern the differences are smaller. Interestingly note that "launch of new products" seem to be more common among the smallest entities.

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Although one can find some level of selection bias in this data set, the truth is that the use of Spanish economic press as an information source has obvious appeal (Suárez-Zuloaga, 1995). The strong competition between economic publications to provide news items, which leads them to publish even smaller firms' operations, and the small number of stock market quoted firms, which makes it important to follow the non-quoted firms' news (i.e., the larger proportion of the total number of firms), attenuate the possible over-representation of the larger firms in the press.

3.2. Econometric analysis

To analyze the type of competition within and across strategic groups we rely on the Mixed Logit Model estimated by Bayesian procedures, which allows capture of any firm's reaction structure and operates with specific information for each firm[3]. We use the Mixed Logit Model because of its ability to deal with the unobserved heterogeneity of firms, by assuming that the coefficients of the variables vary among them. This technique has been previously used in the banking literature, like the work by Pestana-Barrosa, Ferreira and William (2007), which analyzes the determinants that explain the probability of a bank operating in the European Union being the best (worst) performer.

Following the formal approach of Train (2009), the reaction function R_n for firm n is defined as

$$R_n = \sum_{i=1}^{G} \sum_{j=1}^{G} \beta_{ij} A_{ij} + \varepsilon_n$$

[3]Train (2001b) points out the following advantages of Bayesian procedures over classical procedures: i) they avoid the usual problems of global and local maximums, given that they are not based on the maximisation of any likelihood function; and ii) they obtain consistent and efficient estimations under more flexible conditions. The advantages of Bayesian estimation have been little used by choice researchers, and only through the work of Albert and Chib (1993) have different techniques been developed for their application (Allenby and Ginter, 1995; Lenk *et al.*, 1996).

where A_{ij} is a vector that represents the actions of a firm in group j against a firm in group i; β_{ij} is the vector of reaction coefficients; and ε_n is a random term that is iid extreme value. The likelihood of the observed choice y_n (to react or not) for firm n conditional on parameters b and W (mean and variance of β_n, respectively) is expressed as

$$L(y_n / b, W) = \frac{\exp\left\{\sum_{i=1}^{G}\sum_{j=1}^{G}\beta_{ij}A_{ij}\right\}}{1+\exp\left\{\sum_{i=1}^{G}\sum_{j=1}^{G}\beta_{ij}A_{ij}\right\}}\phi(\beta_{ij} / b, W)$$

where ϕ is the function of Normal distribution.

Let $k(b,W)$ be the prior distribution of parameters b and W[4]. Bayes' rule allows the analyst to obtain the posterior distribution $K(b,W,\beta_n/Y)$ for the group of choices and of the sample firms (n=1,..., N) as:

$$K(b, W, \beta_n / Y) \propto \prod_{n=1}^{N} L(y_n / b, W)k(b, W)$$

The posterior distribution has three parameter types to estimate $\theta=\{b,W,\beta_n\}$: the average b, the variance W, and the parameters of each firm β_n, from which we obtain the reaction functions of each firm and, therefore, the reaction structure. The estimation of the parameters is obtained through the following expression

$$\hat{\theta} = \int_{\theta} \theta \cdot K(\theta / Y) d\theta$$

This integral has no closed solution, which leads the researcher to use a procedure of estimation by simulation. Therefore, θ is estimated as the average of the simulated drawings. However, the posterior distribution $K(\theta/Y)$ does not always take the form of a known distribution from which one could immediately take draws. Train (2001a), in the case of

[4] In general, it is assumed that b has a Normal distribution and W an Inverted Gamma distribution (or Inverted Wishart distribution in the case of multi-variation) of type $f(W)=W^{-(v+1)/2}e^{-vs/2W}$ with v being the degrees of freedom and s a parameter of scale to be estimated.

choice models, suggests the use of Monte Carlo Markov Chains; specifically, the sample simulation algorithms of Gibbs and Metropolis-Hasting for the draws of the density function. Train (2001b) also demonstrates that the estimator of the simulated average of the posterior distribution is consistent, asymptomatically normal and equivalent to the estimator of maximum likelihood.

4. RESULTS AND DISCUSSION

Before commenting on the results about competition, we describe the strategic groups in terms of operating cost and performance. Regarding the marginal cost, differences are found across strategic groups. Specifically, the marginal costs of GI (i.e., 0.019) during the analyzed period are significantly lower than those of GII (0.024), and GIII (0.028) (ANOVA: $F = 17.2$, $p < 0.0001$); this expected outcome derives from large firms' scale and scope economies. We also find significant performance differences across groups (ANOVA: $F = 5.11$, $p < 0.0068$). Actually, the margins (measured by the Lerner index) obtained in each group increase from GIII (0.133) to GII (0.158), and again from GII to GI (0.199). It seems that the average firm performance in each strategic group decreases as the size of the member firms decreases. These findings therefore confirm that a firm's profitability is affected by the size of its competitors.

Regarding the competition analysis, we employ a direct measurement through the analysis of the competitive actions and responses in the Spanish banking industry with 146 entities and 18,888 observations. Table 2 classifies competitive movements corresponding to the news of action and responses between entities (distinguished by strategic group). Following Smith et al. (1997), we apply a chi-square test in order to see whether between-group rivalry is greater than within-group rivalry. The lack of significance in the results does not allow any conclusions on whether between group rivalry is higher than within-group. This

result might have relevant methodological implications (as indicated in the Conclusion section) as this way of measuring rivalry might well unearth some hidden interconnectedness that other methods cannot fathom out.

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However, a detailed analysis of the horizontal and vertical percentages of Table 2 allows clarification of the competitive behavior of strategic groups. It is observed that 3 (30 percent) of actions taken by GII are responded to by GI, while 21 (36 percent) of GI actions are responded to by GII. At a response level (% vertical), it seems that GII tends to respond with more ease to GI (75 percent of the responses by GII were to actions of GI) than vice versa (8 percent of the responses by GI were to actions of GII).

On the other hand, 40 percent of GII actions are replicated by GIII, while 26 percent of GIII actions are responded by GII. With regard to responses, 21 percent of GIII reactions were to GII actions, and 14 percent of GII reactions were to GIII actions. Finally, 10 GI actions are replicated by GIII, while 6 GIII actions are counterattacked by GI. In terms of responses, 52 percent of GIII reactions (52%) were to GI actions as opposed to 17 percent of GI reactions to GIII actions. It seems that GIII tends to respond with more ease to GI than vice versa.

Next, we estimate the firm's conduct within and across strategic groups in order to identify different patterns of actions and reactions depending upon the strategic group the firm belongs to. The estimation results from model specified above are as follows. Table 3 presents the results of the estimated model in the Spanish deposit market and suggests that there are significant differences across strategic groups.

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Firstly, and regarding the competition within each one of the strategic groups, our model detects an independent behavior within groups GII and GIII and an aggressive conduct

within the group GI (see Table 3). That is, while the larger firms (GI) react to actions coming from firms within its own group (β_{11}), we do not find the same behavior within GII and GIII, which suggest that the firms in strategic groups GII and GIII do not experience any competition from the firms in their groups, or, in other words, medium (GII) neither smaller firms (GIII) do not react to actions initiated by firms of GII and GIII, respectively (β_{22} and β_{33}). By contrast, our empirical analysis detects a competitive behavior between the large firms (i.e., GI) of the Spanish deposit market. Thus, when a larger firm makes a competitive move, it meets with a strong retaliation from other larger firms. Taken together, these findings provide evidence of an asymmetrical rivalry within strategic groups.

Secondly, Table 3 reveals the following findings on the analysis of competition across strategic groups: Regarding the rivalry between groups GI and GII, our empirical study finds positive and significant β_{12}, which suggest that larger firms (GI) strongly react to the actions coming from the medium firms (GII). In the same line, we also find a positive and significant β_{21}, showing that GII also respond to the actions coming from larger firms. To be precise, the competition between groups GI and GII is characterized by a non-cooperative behavior, i.e., an action of a larger firm (medium firm) is met by a competitive response of its medium (larger) rival (β_{12} and β_{21}).

Regarding the rivalry between groups GI and GIII, our empirical analysis reveals that while β_{13} is significant and positive, β_{31} is not significant, which suggest an asymmetrical competition between firms of these strategic groups. Accordingly, while larger firms (GI) strongly respond to the actions coming from the smaller firms (GIII), these firms do not react to actions from the GI firms. That is, the GI firms have a more aggressive attitude toward the GIII firms than vice versa. This finding, along with our findings on both the interaction between the GI and GII firms and the rivalry within GI, provides evidence of a clear pattern of competition on the part of the GI firms. That is, this analysis characterizes GI firms as

competitive agents who will respond aggressively to every attack, no matter where the initial action comes from (β_{11}, β_{12} and β_{13}).

Finally, and regarding the rivalry between groups GII and GIII, our study also detects that β_{23} is not significant, while β_{32} is significant, but below the 10 percent level. That is, while the GII firms, which are specialized in regional markets, do not react to actions coming from the GIII firms, which are specialized in local markets, the GIII firms show some reaction to actions coming from GII firms. It would seem that medium (GII) and smaller (GIII) firms are exclusively focused on the attacks coming from firms in the immediately larger size groups, GI and GII respectively, rather than attacks coming from firms in smaller size groups.

Through the association of the different patterns of competitive conduct within and across strategic groups, the findings would suggest the following: i) A strongly competitive situation is detected between larger (GI) and medium (GII) firms in the Spanish deposit market, although only the larger firms (GI) react to actions coming from firms within its own group, while medium firms (GII) do not show a reaction to competitive moves within GII; ii) Competition between GI and GIII is referred as the "dominant-fringe" behavior[5]. The dominant firms (GI) have a strong retaliation from other dominant firms (as we mentioned before), while the fringe or weaker firm (GIII) may not be willing to take the dominant firm on directly (β_{31}), hence accommodating its larger rival's action (in this analysis, the term accommodate could be understood as the lack of responses). The fringe firm finds some retaliation from the dominant firms with no reaction from the other fringe firms; iii) Finally, the findings allow to characterize the competition between GII and GIII as the "leader-follower"[6] (Stackelberg) behavior, in which the medium firms (GII) act as the leader ones

[5] The "dominant-fringe firm" behavior predicts that a dominant firm expects strong retaliation from other dominant firms, while it expects accommodation from the fringe firms. Moreover, a fringe firm should expect some small retaliation from the dominant firms with no reaction from the other fringe firms (Spiller and Favaro, 1984).

[6] The "leader-follower" behavior implies that one firm reacts to changes in it's rival's actions (the "follower"), while the other (the "leader") does not (Putsis and Dhar, 1998)

(i.e., they do not react to the smaller firms' (GIII) actions), while smaller firms react to actions coming from GII.

Finally, it is important to stress the fact that the rivalry varies not only according to the strategic group but also to the type of entity as well as type of action. In this regard, take as examples "promotional activities" and "new distribution channels", which are mostly conducted by commercial banks (rather than saving banks) and especially those included in the large-sized firms; and "launch of new products", which are prevalent in commercial banks included in both large- and small-sized companies.

CONCLUSIONS

There has been an increase in empirical research that analyses and quantifies the degree of banking competition, especially since the 80s, when substantial changes in structure and competition took place in the Spanish banking industry, as well as in other European countries, affected by a deregulation process that completely affected the domestic competitive environment.

Therefore, the objective of this paper is to analyze and describe the type of competition extending the previous studies by empirically considering (a) a direct measurement of competition through the analysis of the competitive actions and responses and using an econometric approach based on the Mixed Logit Model estimated by Bayesian procedures, which constitutes a difference from previous banking empirical research from Industrial Organization approach, and (b) describing how firms compete within and between strategic groups. To do so, we use a sample from the Spanish deposits market of 146 entities and 18,888 observations to analyze the competitive behavior within and between size-defined strategic groups.

Our analysis of the empirical data reveals the following. Regarding the rivalry within groups, only the larger firms (GI) react to actions coming from firms within its own group, but this is not the case for medium (GII) and smaller firms (GIII). However, and concerning the rivalry across groups, larger firms (GI) strongly react wherever the initial action comes from, leading to a non-cooperative behavior between GI and GII and a dominant-fringe behavior between GI and GIII; as for the competition between GII and GIII the Stackelberg behavior is found, the GII firms acting as the leader.

This study can help managers weigh the opportunities and risks of alternative courses of action and responses. As such, the implications to firm management of these results are as follows: Firstly, this research advances on the utility of the strategic group concept by suggesting that different competitive behavior may be predicted by the size of the strategic group members. Following the proposal of Chen (1996), managers should analyze their competitive environment from the point of view of the firms within their own or different size-defined strategic group. Second, the findings should ultimately offer valuable information to strategic decision-making (Chen, Smith and Grimm, 1992). Initiators of strategic actions should consider whether these actions can be designed and implemented such that they do not prompt other firms to retaliate. The attributes of firms within and outside the size-defined strategic group may provide a useful frame of reference. Third, when deciding how to remain competitive, banking managers must consider the direction of a rival's most likely response. Thus, our description of the competitive pattern presented here could prove very important to the assessment of the effectiveness of an initial action, or how likely a rival's response depending on its strategic group membership is. Fourth, at the level of public management, knowledge of an industry's competitive pattern facilitates both the detection of illegal competitive actions (e.g., collusion) and the quantification of the impact that such actions have, for the purposes of assigning a monetary penalty to them.

Also, academic implications are obtained: from a methodological viewpoint, when analyzing competitive reactions derived from the news of action, we find a lack of significance, so no conclusions can be obtained regarding whether between group rivalry is higher than within-group. It certainly means that, at the very least, some intuitive, real-life information, such as press information, should be used in competition analysis –to complement, back or even qualify other more rational methods. From a theoretical perspective, and paralleling the previous approach, this outcome emphasizes the validity of the use of "perceived competitive movements" that can be contrasted against the more prevalent and employed "cognitive approach". While "perceptions" does not necessarily have to coincide with "cognitions", their comparison might help reach a more detailed and comprehensive rivalry analysis.

The current study is not free from several concerns. First, in identifying the competitive movements in the banking industry, we used news published in economic national press publications. Although, the analysis of news items content allows a more complete panorama of Spanish banking as it covers all the groups in our study, it could be affected by: i) the nature of the source, as these competitive movements could be better seen as "perceived competitive movements"; and ii) the quantity of news items published on financial firms in the printed press – a quantity that falls as firm size falls. Second, the market data used in this study were chosen on the basis of being an interesting case of competition, but the banking industry has many particularities regarding its structure and competitive conduct and its results are not generalize. Then, the concerns regarding the current study might have affected the conclusions we draw for a particular market.

We consider the following to be valuable directions for further research. First, since this paper uses past data right after the end of a deregulation process of the banking system, this analysis could be useful on the background of the recent financial crisis and may be replicated

once we have enough ex post data. Second, in order to corroborate the obtained results, the current study could be done analyzing other industries as well as other time periods. Third, it would be interesting to test whether rivalry varies over time by applying different methodologies (Kadiyali, Sudhir and Rao, 2001). Forth, different ways of identifying strategic groups, like those using multiple criteria, could be introduced in order to test if the results on rivalry are influenced by different methods of forming groups. Fifth, an interesting line for future research is to consider a different source of data by analyzing "declared competitive movements" from the banks' annual reports instead of using news published in economic national press publications. Finally, replication of this analysis in the credit market would shed some light on resemblances and differences in a firm's competitive conduct (deposit vs. credit market). This would imply identifying whether there are specific competitive actions related to risk and, more specifically, monitoring of loan portfolios.

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Table 1. Analysis of strategic behavior between strategic groups

Categories of Behavior	**GI**	**GII**	**GIII**	**Total per category**	**By commercial banks**	**By savings banks**
Promotion	7	1	2	**10**	**9**	**1**
Geographical expansion	31	17	18	**66**	**36**	**30**
Launch of new products	25	19	27	**71**	**60**	**11**
Operative movements	17	13	7	**37**	**19**	**18**
New distribution channels	12	6	6	**24**	**19**	**5**
Total per group	**92**	**56**	**60**	**208**	**143**	**65**

Table 2. Rivalry between strategic groups in terms of responses

Actions	Responses			
	G.I	G.II	G.III	Total of rows
G.I Large entities	26	21	10	57
% rows	45.6%	36.8%	17.5%	69.5%
% columns	74.3%	75.0%	52.6%	
G.II Medium entities	3	3	4	10
% rows	30.0%	30.0%	40.0%	12.2%
% columns	8.6%	10.7%	21.1%	
G.III Small entities	6	4	5	15
% rows	40.0%	26.7%	33.3%	18.3%
% columns	17.1%	14.3%	26.3%	
Total of columns	35	28	19	82
% rows	42.7%	34.1%	23.2%	100.0%
χ^2				3.60

a=Prob.<0.01; b=Prob.<0.05; c=Prob.<0.10.

Table 3. Estimation results

Within group competition		**Across groups competition**	
GI		***GI vs. GII***	
β_{11}	5.059[a] (0.521)	β_{12}	3.679[a] (0.935)
		β_{21}	2.039[b] (0.878)
GII		***GII vs. GIII***	
β_{22}	0.295 (0.730)	β_{23}	1.046 (0.710)
		β_{32}	0.794[d] (0.473)
GIII		***GI vs. GIII***	
β_{33}	-0.163 (0.734)	β_{13}	3.825[a] (0.300)
		β_{31}	0.211 (0.556)
Constant	-7.923[a] (0.372)	***ML***	***-447.27***

a=Prob.<0.001; b=Prob.<0.01; c=Prob.<0.05; d=Prob.<0.10

The estimated variance of each parameter and the standard error of this estimated variance are as follows: $V(\beta_{11})$=10.981 (14.758); $V(\beta_{12})$= 190.990[a] (24.833); $V(\beta_{21})$= 28.011 (17.860); $V(\beta_{22})$= 17.939 (17.524); $V(\beta_{23})$= 13.636 (12.977); $V(\beta_{32})$= 0.462 (0.411); $V(\beta_{33})$= 13.648 (10.012); $V(\beta_{13})$= 0.641 (0.545); $V(\beta_{31})$= 23.346 (17.229); $V(\beta_{constant})$= 0.917[d] (0.472). For the sake of clarity of Table 3 and interpretation of the competitive reactions we do not place them into it