MULTIPOINT COMPETITION, MUTUAL FORBEARANCE
AND ENTRY INTO GEOGRAPHIC MARKETS*

Lucio Fuentelsaz, Jaime Gómez
Universidad de Zaragoza
Department of Management and Marketing
Gran Vía 2 • 50005 Zaragoza (SPAIN)
Phone: +34 976 761000 / Fax: +34 976 761767
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There is a growing interest in the management and economics literatures in testing different hypotheses derived from the theory of multimarket competition. Although the last papers published seem to confirm the positive link between multimarket contact and mutual forbearance, the empirical results do not seem to be conclusive. This paper adds more evidence to this literature examining the influence of multipoint competition on the incentives of firms to collude. Contrary to other papers that focus on the effect of multipoint competition on performance, our analysis emphasizes competitor actions. Our hypotheses are tested through the analysis of entry behavior into new geographical markets in the Spanish savings bank market. Given the coordination assumption implicit in the theory, we do so using “variance corrected” and “frailty” survival models.

Keywords: Multimarket contact, entry, Spanish banking, savings banks.

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1. INTRODUCTION

In the last few years there has been an upsurge of interest in the theory of multipoint (or multimarket) competition both in the economics literature (Parker and Röller, 1997; Jans and Rosenbaum, 1997; Fernández and Marin, 1998; Spagnolo, 1999; Matsushima, 2001) and management literatures (Baum and Korn, 1996; Gimeno and Woo, 1996, 1999; Haveman and Nonnemaker, 2000). Given the relevance of the theory to competition policy and to the understanding of firm behavior and performance, different papers have attempted to clarify its role both theoretically and empirically. As a result, the foundations of the theory have been established, its relevance and applicability explained and extended, and its main predictions tested in a variety of markets such as airlines, banks, hotels or computer software.

In spite of this interest, the available empirical evidence on the link between multimarket contact and mutual forbearance is not totally conclusive. Whereas the theoretical arguments tend to suggest a positive link between multipoint competition and the incentives of firms to be tolerant with rivals, the empirical tests performed offer some contradictory results (Scott, 2001). Although the last papers tend to show that multimarket contact has a positive influence on tolerance when longitudinal tests are performed, early studies provided mixed support for the forbearance hypothesis (Gimeno, 1999). In addition, the importance of several market (seller concentration) and competitor (spheres of influence, resource similarity, organizational structure of competing firms, …) characteristics at moderating the relationship is not clear yet. Different papers have centered on testing the influence of these factors as moderators of the relationship. Nevertheless, no attempt has been made to integrate them (Jayachadran et al. 1999).

Our purpose in this paper is to provide further evidence on the effect of multipoint competition over mutual forbearance in order to help to clarify some of the issues above mentioned. To achieve this, we center the analysis on the information that competitor actions provide on the intensity of competition in the market. Competitor actions and reactions are preferable to other measures of interfirm rivalry (such us performance or market share stability) that center on the outcomes of the process of competitive interaction rather than studying the process per se (Cheng, 1996). We analyze entry behavior in the
Spanish savings bank market following deregulation. The link between multimarket contact and entry into new markets, as an indicator of firms’ behavior, has recently been tested in the literature (Baum and Korn, 1996; Haveman and Nonnemaker, 2000). In these papers, entry is not only seen as a way in which firms show their (aggressive or tolerant) conduct towards competitors, but also as a mean of establishing new competitive relations or reinforcing the existing ones. As in their cases, our paper emphasizes the geographic dimension of the market, instead of the more traditional focus on product diversification. Geographic diversification is specially interesting, given its importance in determining firm interaction (Haveman and Nonnemaker, 2000) and the relevance of multipoint competition in situations in which there exist a potential for strong resource sharing (as, for example, geographic expansion; Gimeno and Woo, 1999).

A final and important contribution of the paper has to do with methodological issues. One of the key assumptions of the theory of multimarket competition is that firms operations are coordinated across markets. In econometric terms, the coordination argument suggest the necessity of controlling for the possible non-independence of the observations corresponding to different markets operated by the same firm. In this paper, this is achieved through the use of two methods. First, we estimate a variance corrected Cox Proportional Hazards Model as proposed by Lin and Wei (1989). Second, the presence of unobservables is further ascertained through the use of “frailty” models.

The rest of the paper is structured as follows. Sections 2 and 3 revise the literature on the link between multipoint competition and mutual forbearance and enunciate the set of hypotheses to test. Section 4 describes the sample and presents the “variance-corrected” and “frailty” proportional hazards models that are used in the estimation. Finally, the last two Sections present the results and the conclusions from the analysis.

2. MULTIPOINT COMPETITION AND MUTUAL FORBEARANCE

The idea that market domain overlap may lead to mutual forbearance when firms compete in multiple markets is originally attributed to Simmel (1950) and Edwards (1955). It is argued that when two firms simultaneously operate in two or more markets, the mutual recognition of their interdependencies might affect the intensity of competition, leading to
cooperation or, simply, to mutual forbearance. As Edwards states: “When one large conglomerate enterprise competes with another, the two are likely to encounter each other in a considerable number of markets. The multiplicity of their contact may blunt the edge of their competition.” (as quoted by Scherer, 1980, p. 340.) Several arguments have been given to support this assertion in both the economics and management literatures. A revision of them follows.

The existence of multimarket contact means that, in the face of an aggression in a given market, retaliation may occur in all the markets in which the firms simultaneously compete. This multimarket retaliation has more negative consequences for the attacker than a simple retaliation in one market (Porter, 1980). Therefore, the possibility of obtaining an advantage in one market should be balanced against the danger of retaliation in all the markets simultaneously operated with rivals. Furthermore, under the assumption of asymmetries in the importance of the markets operated by firms, retaliation could take place in those markets in which potential losses for the aggressor were higher than the ones of the defender (Porter, 1980; Karnani and Wernerfelt, 1985). Therefore, the mutual recognition of the potential to damage the opponent would lead firms to cooperate or mutually forbear.

Bernheim and Whinston (1990) formalize some of these intuitions into a game theoretic framework in which they examine the effect of multimarket contact on the degree of cooperation when firms interact over an infinite number of periods. Their analysis characterizes the rivalry taking place between two firms, X and Y, in two markets, A and B. At every period each firm faces the decision of whether to collude in all the markets in which it simultaneously participates with its rival or to deviate from cooperation. If both firms (X and Y) collude they share monopoly profits in both markets. If one of the firms deviates in a given period (for example, firm X sets price just below the one corresponding to monopoly profits) it obtains all the static profits from that period. Nevertheless, this deviation from tacit cooperation is punished in terms of future profitability, with both firms retreating to the Bertrand solution forever.

The model shows that when firms and markets are identical, and there are constant returns to scale, the existence of multimarket contact does not have any effect as a facilitator of cooperation. Nevertheless, when some of the initial assumptions are relaxed,
multimarket contact influences the ability of firms to collude. Bernheim and Whinston demonstrate that when markets differ in the number of competitors, the degree in which actions are observed or the rate at which demand grows, firms have incentives to design strategic policies to redistribute market power among the products or markets in which they operate. In this way, profit maximization is achieved through the transference of enforcement power from the markets in which cooperation is easy to those in which more rivalry there exists. Interestingly, when firms differ in production costs (each firm is more efficient in a set of markets) the optimal behavior of rivals leads to the development of spheres of influence in which firms specialize. In this case, multimarket contact facilitates cooperation through the operation of two mechanisms: (1) the transference of sales towards the most efficient firm in each of the markets and (2) allowing the inefficient firm to obtain some profits in the market in which its production cost are higher (and therefore reducing the incentive of the inefficient firm to deviate from cooperation).

Bernheim and Whinston’s work has been followed by generalizations that have widen the relevance of the theory of multipoint competition. Drawing on the framework proposed by these authors, Spagnolo (1999) provides an additional reason why multimarket contact should lead to mutual forbearance. He begins arguing that the separation between ownership and control, the application of non-linear taxes and the imperfections in the capital markets tend to make firms’ objective functions strictly concave. That is, firms static evaluation of own performance in terms of utility is marginally decreasing. Spagnolo shows that when firm’s objective functions are strictly concave, the “irrelevance result” of Bernheim and Whinston disappears and multimarket contact is always a facilitator of collusion. A strictly concave objective function has the effect of making the repeated strategic interactions interdependent. That is, the evaluation of profitability in a given market depends on the total amount of profits and losses accumulated in the other markets. This is the reason why, in such circumstances (and relatively to the case in which the evaluation of profitability in any market is independent), firms would tend to favor the evenly distributed stream of returns on time provided by collusion rather than the large amount of accumulated short run profits originated from deviation.

Apart from the deterrence arguments derived from the literature revised above, other authors point to the increased familiarity among multimarket rivals in order to explain
mutual forbearance. Scott (1993, 2001) argues that the “irrelevance result” of Bernheim and Whinston only proofs that multimarket does not affect the set of Nash equilibria and not that it has no effect on mutual forbearance, even in the case where firms and markets are identical. Scott (1982) maintains that multimarket contact may facilitate oligopolistic collusion through the provision of the communication required to overcome the myopic (Nash) behavior of competing firms. As game theory shows, multiperiod games may have an indeterminate number of possible equilibrium. The simultaneous and repeated interactions in multiple markets could provide firms with enough experience to choose the equilibrium that maximized their own profits from the set of possible equilibria.

Similarly, Boeker et al. (1997) rely on the capacity of multimarket contact to transmit strategic information to explain the appearance of collusive behavior. Given the complexity of the environment in which firms develop their activities, it becomes difficult to collect information on all the environmental variables that are relevant for decision making. Such complexity leads firms to construct imperfect versions of competitive reality in which information on rivals and the strategies followed by them is incomplete (Jayachandran et al., 1999). As a consequence, firms may or may not be aware of all the interdependencies affecting their results. As the number of markets in which a pair of firms simultaneously operate increases, the level of information on other firm’s capabilities and strategies also increases, making higher the probability of recognizing the importance of rivals’ actions on results.

As mentioned before, the theory of multipoint competition has been tested in a variety of settings, including banks (Heggestad and Rhoades, 1978; Roadhes and Heggestad, 1985; Mester, 1987; Pillof, 1999; Barros, 1999; Haveman and Nonnemaker, 2000), hotels (Fernández and Marín, 1998), manufacturing firms (Scott, 1982), telephone companies (Parker and Röller, 1997; Busse, 2000), software firms (Young et al., 2000), airlines (Evans and Kessides, 1994; Baum and Korn, 1996, 1999; Gimeno, 1999; Gimeno and Woo, 1996, 1999) or cement companies (Jans and Rosembaum, 1997). In spite of the fact that the previous theoretical arguments point to the significance of multimarket contact at explaining competition and suggest the wide applicability of the theory to different markets, empirical research on the link between multipoint competition and firm rivalry has failed to provide conclusive results (Gimeno, 1999; Scott, 2001). Although the last papers
published tend to show a positive link between the multiplicity of contacts and the cooperative behavior of firms, in earlier papers this influence was found to be negative and, in some cases, the relationship has been proved to be insignificant.\(^1\) Gimeno (1999) argues that at least some of the differences may be explained in terms of the methodology used to perform the analysis. Whereas the earliest papers rely on the application of econometric techniques over cross sectional settings, later research is more longitudinally based.

An additional reason justifying the inconclusive empirical results may be the existence of moderators that influence the relationship between multimarket contact and mutual forbearance and that are not taken into account in some studies. The existence of facilitators of the relationship between multimarket contact and mutual forbearance is, in fact, suggested by Bernheim and Whinston game theoretic model. As mentioned before, they show as the effect of multimarket contact depends on various characteristics related to the set of markets in which contact takes place and the firms involved. In fact, their model relies on the existence of asymmetries between firms or markets to justify the significance of multimarket contact. In the same vein, Gimeno and Woo (1999) point out that mutual forbearance is more likely in those cases in which the industry provides firms with wide possibilities to share resources among market units. Therefore, the exclusion of variables controlling for scope economies could lead to a overestimation of the effects of multimarket contact.\(^2\)

Jayachandran \textit{et al.} (1999) propose the existence of four moderators of the relationship between multimarket contact and competitive intensity: three competitive factors (spheres of influence, resource similarity and organizational structure of rivals) and a market factor (seller concentration). These four moderators would reinforce the relationship between multipoint competition and mutual forbearance. Therefore, simultaneous integration of these factors should moderate both the capacity of firms to

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\(^2\) Gimeno and Woo (1999) point out the relevance of the theory of multimarket contact in those settings in which important possibilities to share resources there exist (as it is the case in airlines, packaged foods and telecommunication industries) and under conditions of related diversification or geographic expansion.
dissuade multimarket competitors and the degree of familiarity with rivals’ strategies, determining the influence of multimarket contact on competitive intensity. Their proposal and the hypotheses to test are revised with more detail in the next section.

3. MULTIMARKET CONTACT AND ENTRY INTO NEW GEOGRAPHICAL MARKETS: HYPOTHESES

As mentioned in the introduction, our purpose in this paper is to test the influence of multimarket contact on firm behavior. Two approaches have been used in the literature to proxy for the intensity of rivalry (Jayachandran et al., 1999). The method most commonly used relies on performance measures from which (tolerant or aggressive) behavior is inferred. Thus, papers frequently use price-cost margins (Parker and Roller, 1997), price levels (Fernandez and Marin, 1998), sales (Feinberg, 1985) or market share stability (Sandler, 1988). Nevertheless, some recent studies focus on a more direct evaluation of rivalry through the observation of the competitive actions that firms undertake. The type, speed, frequency and intensity of firms’ competitive actions are different depending on the level of interfirm rivalry and they provide useful information to ascertain as whether competition is intense or loose.

In this research we follow this second approach and use the information firms disclose through their entry behavior in order to evaluate the intensity of rivalry. Firms’ entries into new markets are key strategic movements (Baum and Korn, 1996; Caves and Porter, 1977; Tirole, 1988). The speed and intensity of entry into new markets are clear signs of aggressive behavior or connivance with multimarket rivals, providing a measure of the intensity of interfirm rivalry. The link between multimarket contact and entry into new markets, as an indicator of firms’ behavior, has recently been tested in the literature (Baum and Korn, 1996; Haveman and Nonnemaker, 2000). In these papers, entry is not only seen as a way in which firms show their (aggressive or tolerant) conduct towards competitors, but also as a mean of establishing new competitive relations or reinforcing the existing ones.
In the case of entry, recent research has tended to argue that the relationship between multimarket contact and rivalry takes an inverted U-shape. The distinguishing feature of entry, in comparison with other measures of rivalry, is that it provides firms with a way of increasing multimarket contact, changing the incentives of multimarket rivals to cooperate or deviate. Baum and Korn (1999) point out that when the level of multimarket contact between two firms is low, both firms would have incentives to establish a foothold in the rival’s market domain in order to signal their capacity to defend themselves from aggressive behavior (Karnani and Wernerfelt, 1985). Anecdotal evidence suggest that foothold strategies are in fact used by firms in order to strengthen their ability to effectively respond to the possibility of aggressive actions initiated by rivals (Caves, 1982; Karnani and Wernerfelt, 1985; van Witteloostuijn and van Wegberg, 1992). Initial aggressive entry movements would create incentives to counterattack, entering rivals’ markets and possibly initiating a process of competitive escalation and tit-for-tat entries in each others market (Baum and Korn, 1999). That is, foothold or preemption strategies would initiate and reinforce multimarket contact, increasing the interdependence between firms and the effectiveness of retaliatory actions. As the number of contacts grew, information on rival’s strategic behavior (strategic familiarity) and the recognition of the interdependencies and of the capacity of harming the rival (strategic deterrence) would foster mutual forbearance.

Therefore, for markets with a low level of multimarket contact, additional contacts would produce an intensification of rivalry, having competitive escalation as an outcome. For these markets, empirical test should show a negative relation between multipoint competition and forbearance. In markets with a high degree of multipoint competition firms would increasingly recognize the dependence of their results on rival actions and competition would deescalate, turning the influence positive. This intensification of the effect of multimarket contact on mutual forbearance is, in fact, coherent with Spagnolo’s theoretical model. Provided that firms’ objective functions are strictly concave (and that the addition of a market increases the total monopoly profits) it is not difficult to show that the effect of increasing multimarket contact is to strengthen the incentives to mutually forbear (or, in other words, a diminution of the discount factor required for cooperation).
Although scarce, the empirical evidence on the link between multimarket contact and entry offers support to these arguments. Analyzing dyadic competition between pairs of airlines, Baum and Korn (1999) find multimarket contact to have a quadratic influence on entry into competitor’s market. Haveman and Nonnemaker (2000) find an inverted U-shape influence of multimarket contact on entry. Multimarket firms seem to enter those markets with moderate multimarket contact, avoiding markets in which the level of multimarket contact is high. Therefore, our first hypothesis captures the empirical evidence and the theoretical arguments mentioned above.

Hypothesis 1: Multimarket contact is expected to have an inverted U-shape influence on the speed of entry into new geographical markets

As mentioned in the previous Section, one of the reasons given to explain the inconclusive empirical results maintains that the relationship between multipoint competition and multimarket contact is affected by several moderators. As mentioned before, these facilitators of the effect of multimarket contact on cooperation have, in fact, been suggested in the theoretical developments and have been separately taken into account in the empirical literature. Nevertheless, as Jayachandran et al. (1999) point out, no attempt has been made to simultaneously consider all these factors in an estimation of the effects of multimarket contact. Therefore, this paper is the first attempt to integrate them.

Spheres of influence and asymmetry in territorial interests. The relevance of spheres of influence in multipoint competition is also explicit in the words of Edwards. Edwards points out that the competition between two multimarket rivals may have as an outcome the recognition of “… the other's primacy of interest in markets important to the other, in the expectation that its own important interest will be similarly respected …”. Therefore rivals “… may come to have recognized spheres of influence and may hesitate to fight local wars vigorously because the prospect[s] of local gain are not worth the risk of general warfare.” (as quoted by Scherer, 1980, p. 340.)

Bernheim and Whinston (1990) highlight the importance of spheres of influence at explaining multipoint competition by analyzing the case in which multipoint competitors
differ in their production costs and when fixed costs are present. In these situations firms are able to increase the benefits of collusion and reduce the incentives to deviate by diverting market share towards the most efficient firm in each market and allocating some fraction of sales to the inefficient one. Thus, in their model, collusion is achieved through the development of spheres of influence in which each firm is willing to renounce to some market share in the markets in which it is inefficient in the expectation of the same treatment in the markets in which it is superior.

The theory of multimarket competition indicates that it is the mutual recognition of retaliatory power what produces strategic deterrence. Nevertheless, multimarket firms may assign different strategic importance to the markets in which they overlap with competitors. The concept of spheres of influence suggests a refinement of the theory by recognizing the differences in strategic importance of the markets in which multipoint competitors overlap and, therefore, further detailing the conditions under which mutual recognition is achieved (Gimeno, 1999). Multimarket contacts in markets with a greater strategic importance for competitors are more effective at reducing rivalry than contacts that take place in non-important markets. Therefore, mutual recognition and, hence, forbearance do not only depend on the absolute number of contacts among multimarket rivals, but also on the strategic importance of the markets in which those contacts take place.

Gimeno (1999) studies the importance of spheres of influence and asymmetries of interests in the US airline industry. He shows as when multipoint competition is symmetrical, mutual recognition is more easily achieved, having a positive effect at reducing rivalry. Reciprocal multimarket contacts are shown to have a positive influence on performance and leaders’ market share and they tend to be superior at sustaining tacit collusion than non-reciprocal contacts. Therefore, given a degree of absolute multimarket contact between a firm and its competitors, we should expect the symmetry of these contacts to have a positive influence on mutual forbearance.

Hypothesis 2a: we expect symmetric multimarket contact to have a negative influence on the speed of entry into new geographical markets
As mentioned before, entry is not only a way through which firms manifest their rivalry or connivance with competitors, but also an option for them to redefine market domains and the degree of overlap with rivals. Entry into new markets potentially creates or reinforces links with single market or multimarket competitors also present in the focal market. The spheres of influence hypothesis suggests that the strategic importance of the focal market for the incumbents could also be relevant at explaining entry behavior. Entrants could refrain from entering markets in which multimarket rivals are dominant, in the expectation of similar treatments in their own spheres of influence.

In support of these arguments, Baum and Korn (1996) found that the interaction between multimarket contact and market share of the dominant firm has a negative influence of entry in the routes of airlines operating in California. Similarly, Haveman and Nonnemaker’s results show that market dominance (measured as the total market share of the four largest multimarket firms in the focal market) did have a negative influence on entry into new geographical markets by savings banks operating in California. According to this evidence, our second hypothesis is enunciated as follows:

Hypothesis 2b: we expect market dominance in the focal market to have a negative influence on the speed of entry into new geographical markets

Strategic similarity. From the Caves-Porter (1977) hypothesis that similar firms would tend to compete less aggressively, different papers in the industrial organization and management literatures have attempted to address the issue of whether more dissimilar firms would tend to show higher (or lower) levels of rivalry. Caves and Porter argue that the structural similarity between firms (for instance, in R&D, advertising, cost structures) would lead them to closely recognize the interdependences and anticipate the moves of rivals accurately, making tacit collusion easier. The existence of groups of firms with heterogeneous strategic choices would modify the standard structure-performance relationship by increasing the amount and the accuracy of the informational exchange required to achieve collusion (Newman, 1978).
In spite of some evidence in favor (see, for instance, Peteraf, 1993b), the hypothesis that more similar firms experience less rivalry has been challenged by several papers. Cool and Dierickx (1993) argue that it is not clear why rivalry among group members should be less intense than competition coming from firms in other groups. Although group members tend to recognize the interdependencies between them more closely, the existence of groups could also help to identify the set of rivals more capable to negatively affect performance should tacit cooperation break. Firms with similar strategies would likely have similar underlying resource endowments that could be used more effectively to face aggressive rivals (Barney, 1991; Peteraf, 1993a; Gimeno and Woo, 1996).

A stream of research within this literature has attempted to disentangle the effects of multimarket contact and resource similarity on interfirm rivalry. Scott (1989) argues that tacit collusion is achieved thanks to the interaction between multimarket contact and symmetry in the types of investments undertaken by firms. This symmetry makes costs structures more alike, fostering cooperative behavior and further increasing the possibilities to mutually forbear. Cheng (1996) offers additional reasons to clarify how multimarket contact and resource similarity interact to determine the likelihood of competitor attack and response. Cheng argues that the similarity between firms, in terms of both type and amount of strategic endowments, affects their capability to compete and their conjectures on rivals’ behavior. More similar firms would be more capable to match competitor strategies and therefore more effective at offering responses to competitive moves initiated by them. Therefore, in terms of entry, higher similarity would imply a reduction of potential entrants’ conjectured profitability and the incentives to diversify towards the focal market.

Hypothesis 3: we expect strategic similarity between potential entrants and incumbents in the focal market to reduce the speed of entry into new geographical markets

**Seller concentration.** The number and size distribution of firms competing in a market has traditionally been seen as an indicator of both rivalry and profitability by industrial organization economists. Higher market concentration could serve as an indicator of higher profitability (increased attractiveness), but also a sign that oligopolists could be jointly building strategic or conduct based barriers to entry (Coterill and Haller, 1992).
The influence of concentration on collusion has also been discussed in the literature analyzing the relationship between multimarket contact and mutual forbearance. Mester (1987) argues that it is the interaction between multimarket contact and concentration in the focal market what explains cooperative behavior between firms. She develops a model in which multimarket firms compete in quantities along the different markets in which they participate. Firms do have information on their own costs, but they only have incomplete information about the costs of their opponents. Using quantity as the strategic variable, every firm would have incentives to mislead its rivals about their own costs placing a larger output in a given market. If costs were imperfectly correlated across markets, in the next market each firm would have incentives to increase output above the single-market profit maximizing quantity. Mester (1987) points out as an immediate implication of the model is that the interaction between multimarket contact and concentration affects behavior: firms in more concentrated markets would have more incentives to mislead rivals about their costs, given that the potential gains from deceiving would be higher.

The prediction that the interaction between multimarket contact and concentration explains mutual forbearance is also analyzed by Fernández and Marín (1998) over a sample belonging to the Spanish hotel industry. Building on Bernheim and Whinston’s framework they demonstrate that firms may find profitable to redistribute market power along the markets in which they operate. Concretely, their results show as hotels have incentives to establish lower prices in those markets where more collusive outcomes could be reached (concentrated markets) in exchange of higher prices in more competitive markets.

Apart from the implications of oligopoly theory and the theoretical developments mentioned, no attempt has been made to formalize the study of the effects of concentration on entry in a multimarket context. Nevertheless, some authors have tackled the issue empirically. Haveman and Nonnemaker (2000) predict the impact of multimarket contact on mutual forbearance to be amplified when the markets are dominated by a few multimarket firms. The reason is that cooperation is substantially easier in markets dominated by a smaller number of multimarket rivals. In this case, their hypothesis is

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3 Other empirical articles provide further evidence on the importance of the interaction between multimarket contact and concentration at explaining cooperation. Thus, Alexander (1985) and Feinberg (1985) find significant quadratic interaction effects of multimarket contact on mutual forbearance.
confirmed on a study of diversification on the savings and loan industry in California. In a similar vein, Baum and Korn (1996) find that concentration has a negative influence on entry into new routes by California airlines. Although they argue in favor of an interaction effect between multimarket contact and concentration their results do not show any significant influence. Therefore, our fourth hypothesis takes the following form:

**Hypothesis 4:** *we expect market concentration in the focal market to have a negative influence on the speed of entry into new geographical markets*

**Organizational structure of competing firms.** As it was implicit in the theoretical discussion, a necessary requirement for the theory of multimarket competition to hold is that firms’ actions are coordinated across markets. In the absence of coordination mechanisms, multimarket firms would not be able to pool the incentive constraints of the markets in which they operate (Bernheim and Whinston, 1990). In other words, firms would not recognize the existence of multipoint competition and would behave as if they were single market competitors. Therefore, for multipoint competition to have any effect on firms’ strategies firms should possess administrative units capable of recognizing the interdependencies affecting performance at the company level and coordinating adequate responses among all the markets.

In the same vein, differences in the organizational structures of firms are likely to be differently efficient at monitoring competitors, observing actions and devising adequate strategic responses. Multimarket firms differing in this respect would be found to have different images of competitive reality and, therefore, we should expect the influence of multimarket contact to vary between them. Firms with poorly adequate structures would be slower at recognizing environmental influences and also slower at designing competitive strategies for successfully coping with competition. Matsushima (2001) studies the effect of multimarket contact when firms cannot perfectly monitor their opponents’ choices. Imperfect monitoring has the effect of impeding rivals to achieve collusive agreements. In these cases, it is shown as implicit collusion may be achieve provided that the extent of
multimarket contact tends to infinity.\textsuperscript{4} Therefore, we should expect these firms to need a higher level of multimarket contact to be able to recognize the interdependences affecting their results and being responsive to multimarket contact.

According to these arguments, our last hypothesis is enunciated as follows:

Hypothesis 5: The organizational structure of competing firms is expected to have a significant influence on the relationship between multipoint competition and mutual forbearance

4. SAMPLE, VARIABLES AND METHOD

Sample

The data available to the analysis describes entry behavior into new geographic markets in the Spanish savings banks industry between 1986 and 1999, after restrictions to branching were eliminated.\textsuperscript{5} This data set is especially interesting for our purposes for several reasons. First, savings banks simultaneously develop their activities in a multiplicity of geographic and product markets, what provides a natural setting to analyze our hypotheses. Second, as Gimeno and Woo (1999) highlight, multipoint competition is especially relevant under conditions of strong potential for resource sharing, as it certainly happens with geographic expansion. The reason is that mutual forbearance seems to be a mechanism by which multipoint rivals retain the value created by scope economies, avoiding its loss through price competition. In consequence, they suggest multimarket competition research to proceed in settings in which scope economies and multimarket contact occur at the same time, given that the probability of finding a multimarket effects is higher. Third, the evidence on the effects of multimarket contact on behavior are especially inconclusive in the banking sector. In this case, the balance between positive (Heggestad

\textsuperscript{4} Matsushima (2001: 159) points out that other papers have found that, with imperfect monitoring, collusion may be achieved provided that the discount factor approaches unity. Nevertheless, he argues that when multimarket contact exists, cooperation may be possible even for a “fixed and possibly low discount factor”, as the number of contacts tends to infinity.

\textsuperscript{5} Although the total elimination of restrictions did not take place until 1989, a few years before savings banks had been authorized to compete within their own Autonomous Region and to establish some branches in the five biggest cities in Spain. This advises us to anticipate the time of analyses until 1986 in order to avoid the potential bias stemming from the existence of left censoring.
and Rhoades, 1978; Martinez, 1990; Pilloff, 1999), negative (Roadhes and Heggestad, 1985; Mester, 1987) and quadratic (Alexander, 1985; Haveman and Nonnemaker, 2000) influences offers a confusing equilibrium claiming for more research. Finally, the market has been, until recently, highly concentrated with the majority of savings banks operating in just one province (Fuentelsaz and Gomez, 2001). The observation of the expansion process from the beginning of deregulation provides us with the opportunity to analyze the behavior followed by banks in a market in which multimarket contact was, initially, almost inexistent. This offers the possibility to study the relevance of multipoint competition in the process of competitive escalation and the stabilization of relationships as the arguments of familiarity and deterrence suggest. Moreover, regulation protected savings banks from potential competition from other savings banks having, as a likely consequence, the evolution of spheres of influence. Given Edwards’ hypotheses, the analysis of the behavior of the players after deregulation should show the development of live-and-let-live policies directed to reduce rivalry.

Our study makes use of public data, mainly provided by the Bank of Spain (BE) and the Spanish Savings Banks Confederation (CECA). The data has a longitudinal dimension: information about the covariates and the dependent variable is provided every year. Each pair potential entrant-focal market and their associated covariates are followed year by year (from 1986 to 1999) until either entry takes place or censoring occurs. For an entry to be recorded we consider that the savings bank has to show a certain degree of commitment with the focal market. Therefore, we follow Geroski (1991) in considering that an entity is present in a market when it has, at least, one-percent of the total number of savings banks branches in the market.  

Sampling is affected by the mergers and acquisitions taking place from the beginning of the 1990s, that have reduced the number of savings banks from 77 entities in 1986 to 49 in 1999. The number of observations is given by all the possible combinations of savings bank-year-market in which the entity is not present at the beginning of the follow up. This

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6 In same cases, branches are opened only for representative purposes. The application of this criteria only eliminates 120 branches (1.1 percent of the total number of branches in 1986), mostly situated in Madrid (55), Barcelona (31), Valencia (12) and Zaragoza (7), five of the biggest cities in Spain. As a consequence, by operating in this way we only eliminate 15 branches (0.14 percent) not situated in the four mentioned provinces.
provides us with 4350 measured durations (34,529 single entity-market-year observations) from which 189 correspond to effective entries.

**Variables**

Hypothesis 1 states that the level of multimarket contact influences entry rates. To measure multimarket contact we are confronted with a few operative problems over which the literature shows no agreement (Gimeno, 1999). The measures proposed differ on two main dimensions: (1) the level of measurement and analysis and (2) the scaling and weighting of multimarket contact (Gimeno and Jeong, 2001). Given the lack of consensus, we choose a simple index. Our measure of multimarket contact for firm $i$ in a focal market $n$ averages the number of contacts that firm $i$ has with the incumbents in market $n$ in markets different from focal market $n$. That is, the expression used to calculate multimarket contact between potential entrants and incumbents in market $n$ takes the following form:

$$MMC_{int} = \frac{\sum_j E_{jnt} \times (E_{int} \times E_{jnt})}{\sum_j E_{jnt}}$$

In this expression, $n$ represents the set of markets in which firm $i$ is not established, $m$ is a market (province) from $M$ (the market domain of firm $i$), and $E_{int}$ ($E_{jnt}$, $E_{jnt}$) is an indicator taking value 1 if firm $i$ ($j$) is established in market $m$ ($n$) at time $t$. This measure ranges between zero, in the case in which firm $i$ does not have any contact with incumbents in market $n$, and the number of markets $M$ in which firm $i$ is established. Given that similar indexes have been used in previous papers (see, for example, Gimeno and Woo, 1996, or Young et al., 1999), it gives us the possibility of comparing our results with those.\(^7\)

Once the degree of multimarket contact is controlled for, hypothesis 2a and 2b attempt to evaluate the effect of the symmetry (or asymmetry) of the contacts on the likelihood to collude. Following hypothesis 2a, we expect multimarket competition to be

---

\(^7\) The index is different from the one used in Gimeno and Woo (1996) or Young et al. (1999) in that it is not required for firm $i$ to be present in the focal market ($n$). In this sense, it is more similar to the one used by Baum and Korn (1996) to analyze entry and exit. Finally, note that the measure is a firm-by-market measure as defined by Gimeno and Jeong (2001).
more effective at deterring aggressive behavior when the contacts between the competing firms are symmetric. To measure this hypothesis we construct a variable taking into account the importance of the contact between every pair of firms. For every pair of firms with multimarket contact (one potential entrant $i$ and one incumbent $j$ present in the focal market $n$) we build a measure of the importance of the contact from the point of view of both firms. For the case of the potential entrant $i$, the variable measuring the importance of its contact with incumbent $j$ is the following:

$$IMC_{ij} = E_{jmt} \times C_{imt} \times \left( E_{imt} \times E_{jnt} \right)$$

In this expression, $n$ stands for the set of markets in which firm $i$ is not established, $m$ is a market (province) from $M$ (the market domain of firm $i$), $C_{imt}$ represents market share of savings banks $i$ in market $m$ at time $t$ and, finally, $E_{imt}$ ($E_{jmt}$, $E_{jnt}$) is an indicator taking a value of 1 if firm $i$ ($j$) is established in market $m$ ($n$) at time $t$. That is, for each multimarket rival $j$ operating in the new market $n$, the index calculates the importance of the contact for firm $i$ counting the number of markets in which both firms simultaneously participate, weighted by the importance of the market for firm $i$.

Similarly, the importance of the contact between potential entrant $i$ and incumbent $j$ from the point of view of incumbent $j$ is measured as follows:

$$IMC_{ji} = E_{jpt} \times C_{jpt} \times \left( E_{jpt} \times E_{jnt} \right)$$

where, in this case, $p$ represents a province from $P$ (the market domain of incumbent $j$) and all the other variables are defined as above. As in the case of potential entrant $i$, this index measures the importance of multimarket contact between firms $i$ and $j$ from the point of view of firm $j$.

Given this expressions, the variable that measures the symmetry of multimarket contacts is constructed calculating the average absolute difference between both expressions for all the incumbents $j$ in focal market $n$ at time $t$: 


This expression takes values between zero (when, for all the incumbents, the potential entrant attaches the same importance to the contacts with any incumbent as the incumbent does) and one (when, for every pair of competitors, either the incumbent or the potential entrant attaches a far higher importance to the contact than its rival). A low value of \( SYMM_{ijnt} \) would indicate a higher symmetry between the importance that a potential entrant \( i \) and the incumbents represented by \( j \) attach to their contact in markets different from \( n \). Following our theoretical arguments this should mean that multimarket competition is more effective at reducing entry and, therefore, that the likelihood of entry in market \( n \) by firm \( i \) would be reduced. On the contrary, a high value of the variable would imply increasing asymmetry between the relative positions of the potential entrant and the incumbents and, therefore, an increase in this probability.

On the other hand, hypothesis 2b states that the dominance of the focal market should have a negative influence on the probability of entry into new geographical markets. Following Baum and Korn (1996) we include a SPHE variable that measures market share of the dominant incumbent in the focal market.

To test the Caves-Porter hypothesis that more similar firms compete less aggressively (hypothesis 3) we use a multidimensional approach. As Cool and Schendel (1987) propose, we distinguish between scope and resource commitments to construct a measure of average strategic similarity between potential entrant \( i \) and incumbents in market \( n \). Accordingly, we select a set of eight variables capturing potential entrant’s scope and resource commitments. Similarly to Gimeno and Woo (1996), for each year we construct as synthetic measure summarizing the degree of strategic similarity for every focal firm-incumbent dyad:

\[
SYMM_{ijnt} = \frac{\sum_j E_{jnt} \times |IMC_{ijnt} - IMC_{jnt}|}{\sum_j E_{jnt}}
\]

The description of these variables and their descriptive statistics are presented in the Appendix.
This measure takes a value of “0” when there is maximum strategic similarity and “1” when the case is of maximum dissimilarity. From this calculation, we obtain a firm-market specific measure of strategic similarity by summing and dividing by the number of incumbents ($j$) in every focal market ($n$) (Gimeno and Woo, 1996):

$$\text{STRS}_{ijt} = \frac{\sum_j \text{Similarity}_{ijt}^\text{strat} x E_{jnt}}{\sum_j E_{jnt}}$$

**Seller concentration.**

Seller concentration (hypothesis 4), is measured through the use of a province Herfindahl, using the number of branches as a proxy for market share. In order to take into account the interaction between commercial banks and savings banks, this index has been calculated considering the branches of both types of intermediaries.

**Organizational structure of competing firms.**

Finally, our last hypothesis (number 5) states that the relationship between multipoint competition and mutual forbearance should be significantly affected by organizational structures. Although the availability of data does not allow us to test this hypothesis, it suggests the relevance of coordination and information for multimarket contact to lead to mutual forbearance. Given that, as it is in our case, data on these two aspects is rarely available, it points to the importance of controlling for correlation and unobservable heterogeneity at estimating models of this type. Our econometric strategy, described below, takes both aspects into account.

**Control variables.**

In addition to the variables used to test for the hypotheses developed in the previous Section we also control for other factors suggested by the literature on entry, entry timing and multimarket competition. In relation to firm characteristics, we control for the size of the savings bank (SIZE), its profitability (PROFI), its net position in the money market...
(MONEY) and its experience in managing operations across markets (NMARK). In agreement with the literature, we expect resource availability, profitability and experience to have a positive and significant influence on the likelihood of entry.

Apart from firm specific factors, entry incentives may also be affected by origin and target market characteristics. On the one hand, we control for two origin market characteristics. The first one, COREH, accounts for the degree of rivalry in the markets in which the savings banks were initially operating. Given that survival is expected to critically depend on these markets, a higher rivalry would provide firms with an incentive to look for new opportunities and relax the intensity of competition.

On the other hand, as long as profitability in the new markets crucially depends on the structure of demand and supply, focal markets characteristics could also be relevant at explaining entry. On the demand side we include measures of the density of population (DENSI), intensity of demand (DEPHA) and market growth (MGROW). Higher values in these three variables are expected to have a positive influence on entry. Similarly, and in addition to focal market concentration, we also control for the operation of two supply factors. The relevance of potential competition at determining entry has been both proposed theoretically (Shermand and Willet, 1967) and tested empirically (Gimeno, 1999; Fuentelsaz and Gómez, 2001). The variable potential rivalry (NUMSB) attempts to capture this effect counting the number of savings banks operating in the markets adjacent to every potential objective (focal) market.

Finally, the degree of relatedness between the markets in which the firm is operating and the new markets may be an important determinant of the sequence of entry. Firms would first tend to enter markets for which they have better resources and capabilities. In this case, we use proximity between markets as a measure of relatedness in the geographical context. Firms closer to a market are better informed about the opportunities arising in it and may also be more known to future customers (Fuentelsaz and Gómez, 2001). Therefore we expect physical proximity to play an important role at explaining entry. Given that acquiring information on a near market takes time, this suggest a distinction between markets close to the original scope of operation of the savings banks and markets close to the new entries. Accordingly, we define two dummy variables
attempting to capture this effect. The first one, PROXIC, takes a value of one when the focal market is geographically adjacent to the scope of operation of the savings bank before expansion started, and zero otherwise. The second, PROXIE, takes a value of one when the focal market is adjacent to a market entered by the savings banks as a consequence of diversification (and zero otherwise).

Methodology

Given our interest in analyzing the effect of multipoint competition on entry and the availability of longitudinal data, to test the hypotheses proposed in the previous section we make use of survival analysis techniques. Accordingly, we estimate the hazard that a savings banks enters a certain geographical market, given that, it does not have current activities in the market. Survival models are specially appropriate when the data under analysis may be censored. In an entry setting, censoring may occur when a firm no longer operates in the market or when entry has not taken place at the end of the study. In these cases, the models take into account the information available up to the end of the follow up.

In this paper, the Andersen and Gill (1982) version of the Proportional Hazards Model proposed by Cox (1972) is used. The model is of a semiparametric type and, therefore, does not require to specify the form of the underlying distribution. The model is flexible enough to accommodate different sample characteristics (time dependent covariates, delayed entry into the risk set, …). Its main assumption is that the hazard functions of all the individuals are a multiple of an unspecified baseline hazard function. Therefore, the baseline hazard function is an arbitrary and non-negative function in time. If we let $X(t)$ be the vector of covariates for the $i$-th individual (each savings bank-market pair in our case) at time $t$, then the model assumes that the hazard (probability of entry into the market, given that the savings bank has not entered before) for a subject takes the following form:

$$\lambda(t;z_i) = \lambda_0(t)\tau(t)$$

9 Therneau (1997) concludes that this is the version of the model more reliable for overall estimation of covariate effects and it is less likely to violate the proportional hazards hypothesis than other models (Box-Steffensmeier and Zorn, 1999).
where

\[ r_i(t) = \exp(\beta z_i(t)) \]

is referred to as the risk score for the \( i \)-th subject, \( \beta \) is a vector of regression parameters and \( \lambda_0(t) \) is the baseline hazard function. The model does not include a constant term due to the fact that it is incorporated in \( \lambda_0(t) \).

Before applying the model to our data a precision is necessary. A key assumption of the theory of multimarket competition is that firms coordinate their activities across markets. Without such coordination, the potential of cooperation of multimarket firms would not differ from the one of single market firms. In terms of our sample this means that we should expect entry behavior of each firm to be correlated across markets, breaking the assumption of independence between observations implicit in any econometric estimation and possibly underestimating the variance of the estimates. Given that we do not have the relevant data to test hypothesis 5 and other firm specific variables may also be omitted this potential correlation should be accounted for.

To solve this problem we are confronted with two methods (Cleves, 1999). The first one proposes to estimate a Cox model in which the dependence between observations is modeled as a random effect (or frailty).\(^{10}\) Therefore, this method assumes the existence of unmeasured covariates that influence survival time and behave as a known statistical distribution. Thus, the model is specified as above, but now \( r_i(t) \) is defined as

\[ r_i(t) = \xi_j \exp(\beta z_i(t)) \]

where \( \xi_j = \exp(\psi h_j(t)) \). \( h_j(t) \) is a vector describing how the random effects apply to individual subjects and the individual elements \( \psi_j \) are independent and identically distributed realizations from some distribution \( D(\theta) \) (Therneau and Grambsch, 1998). The most popular choice for this distribution is the Gamma distribution, the reason of this being

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\(^{10}\) The estimation of fixed effects models is also possible. Nevertheless they are much less frequent than random effects models (see Andersen et al., 1999, for the comparison of both methods).
mainly based on analytical tractability (Box-Steppensmeier and Zorn, 1999) although other positive distributions (Gaussian or $t$) are also used.\(^{11}\)

An alternative is to correct the variance of the estimates in order to account for the correlation between observations belonging to the same firm. Lin and Wei (1989) show how to estimate the corrected variances in the context of a Cox Proportional Hazards Model. The method is based on the assumption that the observations are independent across firms, but not necessarily within the markets that each firm may potentially enter (Box-Steppensmeier and Zorn, 2001). The robust variance estimates are, therefore, calculated in the following way:\(^{12}\)

\[
V = I^{-1}BI^{-1}
\]

where $I^{-1}$ is the inverse of the information matrix and $B$ is a correction factor. When observations (for the same entity) are not independent, but can be divided into groups (those formed by the observations corresponding to each entity) of independent observations, then the robust estimation takes the form:

\[
V = I^{-1}G'GI^{-1}
\]

where $G$ is a matrix containing the group efficient score residuals (Cleves, 1999).\(^{13}\)

5. RESULTS

Table 1 shows the results of estimating a first set of models on the relationship between multimarket contact and the probability of entry. All the estimations are performed using the Andersen and Gill (1982) version of the Cox Proportional Hazards Model and using the Efron (1977) approximation for handling ties. Column 1 (4, 7) presents a basic model in which all the control variables are present and the variables relevant for hypothesis testing are omitted. The observation of the table leads us to conclude that model 1 is globally significant and confirm, in a larger sample, the validity of the variables

\(^{11}\) Although the selection of the Gamma distribution is wide and has been mainly justified in terms of computational convenience, Abbring and van den Berg (2001) show as this is also justified theoretically. They demonstrate that, for a “very large class of distributions, the distribution among survivors converges to a gamma distribution” (pg. 2).

\(^{12}\) This is the familiar “sandwich” estimate proposed by White (1980).

\(^{13}\) A more detailed description of the grouped jackknife estimates may be found in Therneau (1997).

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proposed in Fuentelsaz, Gómez and Polo (2002) to explain diversification patterns in the Spanish banking sector. The results highlight the presence of important size and proximity effects and the relevance of home and objective market specific competitive conditions at explaining entry.

Hypothesis 1 posits that multimarket contact has a quadratic influence on mutual forbearance and, therefore, on entry. Nevertheless, as we have seen, the bulk of the previous studies on multimarket contact maintain that this relationship is linear. In order to explore the existence of both linear and quadratic effects of multimarket contact on entry we proceed in two steps. Column 2 (5, 8) investigates on the relationship between multimarket contact and entry through the linear introduction of the MMKC variable in the model. Column 3 (6, 9) introduces the quadratic structure necessary to test hypothesis 1.

Table 1. Estimation of the effect of multimarket contact on the likelihood of entry

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>AG (1) (robust)</th>
<th>AG (2) (robust)</th>
<th>AG (3) (robust)</th>
<th>AG (4) (robust)</th>
<th>AG (5) (robust)</th>
<th>AG (6) (robust)</th>
<th>AG (7) (heterog)</th>
<th>AG (8) (heterog)</th>
<th>AG (9) (heterog)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNSIZE</td>
<td>1.200***</td>
<td>1.219***</td>
<td>1.293***</td>
<td>1.200***</td>
<td>1.219***</td>
<td>1.293***</td>
<td>1.293***</td>
<td>1.321***</td>
<td>1.402***</td>
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<tr>
<td>(2.420)</td>
<td>(2.343)</td>
<td>(2.234)</td>
<td>(1.837)</td>
<td>(1.756)</td>
<td>(1.576)</td>
<td>(1.405)</td>
<td>(1.405)</td>
<td>(1.128)</td>
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<tr>
<td>PROFI</td>
<td>0.031</td>
<td>0.027</td>
<td>0.072</td>
<td>0.031</td>
<td>0.027</td>
<td>0.072</td>
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</tr>
<tr>
<td>(0.218)</td>
<td>(0.186)</td>
<td>(0.497)</td>
<td>(0.177)</td>
<td>(0.150)</td>
<td>(0.413)</td>
<td>(1.708)</td>
<td>(1.887)</td>
<td>(1.943)</td>
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<td>PROXIC</td>
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<td>2.412***</td>
<td>2.313***</td>
<td>2.432***</td>
<td>2.412***</td>
<td>2.313***</td>
<td>2.313***</td>
<td>2.313***</td>
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<tr>
<td>COREH</td>
<td>1.905***</td>
<td>1.839***</td>
<td>1.807***</td>
<td>1.905***</td>
<td>1.839***</td>
<td>1.807***</td>
<td>1.807***</td>
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<td></td>
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<tr>
<td>NUMSB</td>
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<td>0.044</td>
<td>-0.030</td>
<td>0.056</td>
<td>0.044</td>
<td>-0.030</td>
<td>0.034</td>
<td>0.029</td>
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<tr>
<td>(1.579)</td>
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<td>(1.485)</td>
<td>(1.158)</td>
<td>(-0.488)</td>
<td>(0.768)</td>
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<td>NMARK</td>
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<td>-0.115</td>
<td>0.036</td>
<td>-0.113*</td>
<td>-0.115*</td>
<td>0.036</td>
<td>-0.051</td>
<td>-0.080</td>
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<td>(-1.747)</td>
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<td>(0.486)</td>
<td>(-1.631)</td>
<td>(-1.634)</td>
<td>(0.322)</td>
<td>(-0.640)</td>
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<td>DEPHA</td>
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<td>-0.121</td>
<td>-0.145</td>
<td>-0.158</td>
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<tr>
<td>(0.264)</td>
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<td>-0.100</td>
<td>0.186</td>
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<tr>
<td>(0.173)</td>
<td>(-0.176)</td>
<td>(0.338)</td>
<td>(0.133)</td>
<td>(0.125)</td>
<td>(0.287)</td>
<td>(0.292)</td>
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<td>MGROW</td>
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<td>0.669</td>
<td>0.301</td>
<td>0.941</td>
<td>0.669</td>
<td>0.301</td>
<td>0.703</td>
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<tr>
<td>(0.387)</td>
<td>(0.273)</td>
<td>(0.122)</td>
<td>(0.457)</td>
<td>(0.324)</td>
<td>(0.129)</td>
<td>(0.285)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>MMKC</td>
<td>-</td>
<td>0.051*</td>
<td>-0.217***</td>
<td>0.051**</td>
<td>0.271***</td>
<td>0.066*</td>
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</tr>
<tr>
<td>(-1.752)</td>
<td>(0.273)</td>
<td>(0.122)</td>
<td>(0.457)</td>
<td>(0.324)</td>
<td>(0.129)</td>
<td>(0.285)</td>
<td></td>
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<tr>
<td>MMKC2</td>
<td>-</td>
<td>-0.012**</td>
<td>(-3.283)</td>
<td>-0.012**</td>
<td>(-2.380)</td>
<td>-0.012**</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Variance of the random effect

Likelihood ratio test

Wald test

Number of observations

LR test vs. (1, 7)

LR test vs. (2, 8)

***, **, * Coefficient statistically significant at 1%, 5% and 10% levels, respectively. T-ratios in parenthesis.
Models 2 and 3 in Table 1 show as both approximations result in globally significant models and also significant coefficients for the multimarket measure. However, whereas the impact of linear effect of multimarket contact on the rate of entry is positive, the quadratic structure has the U inverted shape predicted by hypothesis 1. In order to rule out any of the two influences of multimarket contact on hazard rates we calculate the likelihood ratio test of models 2 and 3 versus model 1 and model 2. The results of these calculations are presented at the bottom of table 1. As we can see, both models 2 and 3 present a significant improvement over model 1. Nevertheless, the confidence level for the improvement of model 3 (vs 1) is much higher than its counterpart for model 2 (vs 1). Furthermore, the introduction of quadratic (instead of linear) multimarket effects significantly improves the explanatory power of our model, as shown by the likelihood ratio test of model 3 vs model 2. Therefore, according to the last theoretical developments, the results clearly reflect a U inverted influence of multimarket contact on the hazard of entry, confirming hypothesis 1.

As mentioned in our last hypothesis, the multimarket contact-multimarket forbearance framework assumes that firm actions are coordinated across markets. The statistical implication of this hypothesis is that the observations belonging to the same firm should show signs of correlation among them and, therefore, the variance of the coefficients presented in the first three models would either underestimate or overestimate the true variance. Models 4 to 6 attempt account for this possibility. As we can observe, all the three models are, again, globally significant.\(^{14}\) Although the value of the coefficients is not affected by the estimation of the variance-corrected models, the robust standard errors present a higher value in all the cases. The pattern of influences shown by the multimarket contact terms is similar to the one presented in models 1 to 3, with multimarket contact having a quadratic influence on the rate of entry.

Another way of approaching the issue of potentially correlated observations is through the estimation of random effects models. These models assume that the observations belonging to the same firm show a dependence that may be modeled through a known statistical distribution. Columns 7 to 9 present the estimation of the precedent three

\(^{14}\) Note that the likelihood ratio test is not adequate in the robust setting, given that it assumes the independence of observations belonging to the same firm.
models on our sample of savings banks. Two aspects deserve special mention. First, as the comparison of the models through the likelihood ratio test shows, the estimations confirm the predicted quadratic influence of multimarket contact on entry. Given that this structure is consistently found through all the estimations performed, we conclude that our data strongly supports hypothesis 1. Second, it is important to notice that the variance of the random effect shows a value different from cero and highly significant. Therefore, we have to conclude that observations belonging to the same entity are not independent and entries corresponding to the same firm are correlated (Sastry, 1997). Although this correlation could be due to the omission of unobserved covariates different from the internal coordination mechanism, this result is an indication that these mechanisms could be in operation and offers circumstantial evidence that supports hypothesis 5. In any case, the comparison of the nine estimations performed, clearly demonstrates that the relevant coefficients are not largely affected.

Figure 1 depicts the relationship between multimarket contact and the timing of entry into new markets taking the coefficients presented in column 9 as reference. The plot clearly shows that the quadratic relationship just commented is valid for the range of variation included in the sample. The graphic presents a clear increase in the probability of entry for values of multimarket contact lower than 10.89. Nevertheless, the opposite relation is observed when multimarket contact takes higher values. For firms with a value of 10.89 in the MMKC variable, the hazard of entering a new market is 3.65 times higher than for firms with average values of multimarket contact. Similarly, firms at the extremes of the range of variation of MMKC in the sample (that is, for firms with values 0 and 24) show a probability of entering the market 20% and 60% lower than the average firm.
It is interesting to show how the process of deregulation has affected the probability of entry into new markets through the increase of multimarket contact. Given that prior to the elimination of restrictions to free entry the sector was highly concentrated, with savings banks usually operating in one market, deregulation had a strong impact on the established relationships, having entry and competitive escalation as a consequence. As diversification increased the level of multimarket contact, firms started to recognize the importance of new ties with competitors, leading them to perceive the importance of mutually forbear and, consequently, to the stabilization of relationships.\textsuperscript{15}

As mentioned in Section 3, Jayachandran et al. (1999) suggest that one of the reasons explaining the inconclusive results of the multipoint competition-mutual forbearance relationship might be the existence of moderators affecting the relationship. Therefore, our investigation of the influences of multimarket contact over multipoint competition continues in Table 2, which includes the rest of the hypotheses previously enunciated.

\textsuperscript{15} In spite of this comment, it is important to recognize that the level of multimarket contact in the Spanish savings banks is still low. Although the MMKC variable ranges between 0 and 24 in the full sample, the average level of multimarket contact for the last year was 1.62 what may indicate that the market is still more prone to the existence of processes of competitive escalation than to the stabilization of relationships.
Similarly to Table 1, Table 2 shows three different groups of estimations. The first four columns presents basic models in which each of the previously designed variables are introduced at a time. In the same vein, columns 5 to 8 and 9 to 12 present their robust and random effects counterparts.

The results of the estimation of the models presented in Table 2 are generally satisfactory. All the models are globally significant, further confirming the relevance of the approach. Furthermore, the results are fairly consistent across all the twelve estimations, although some differences arise. As we may notice, the basic and robust models are substantially close. The asymmetry in the contacts between a potential entrant and the incumbents (SYMM) in a market has a positive effect on the probability of entry, confirming hypothesis 2a. Therefore, more symmetric positions are shown to facilitate the recognition of the importance of multimarket contact, reducing rivalry. In a like manner, firms more dissimilar in the resource and scope commitments (STRS) are shown to have a more aggressive behavior towards rivals. This confirms the Caves-Porter hypothesis and the results of Cheng (1996), implying that higher similarity helps either to anticipate more exactly the moves of rivals or to discover and perceive the importance of the interdependencies with them, diminishing the expected profitability of potential entrants. On the other hand, neither the measure of spheres of influence (SPHE, hypothesis, 2b) nor the one of market concentration (OBJEH, hypothesis 4) do significantly affect the probability of entry into new markets.  

Similarly, our estimates of the random effects models are also very close in magnitude and significance to the ones of the basic and robust sets of models. Perhaps the more clear difference arises in hypothesis 3 (STRS), not supported by the estimations with heterogeneity.

Importantly, the quadratic relationship between multimarket contact and mutual forbearance seems to be highly consistent along all the 15 models presented in the paper. Both the estimations presented in Tables 1 and 2 confirm this observation. Furthermore, the

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16 As it is shown in Table 2, the variable measuring the existence of spheres of influence (SPHE) is significant at the 10% confidence level when a basic model is estimated. However, the value of its t-ratio diminishes to non significant levels when robust standard errors are taken into account.
relationship is shown not to be highly affected by changes in the estimation method or by the introduction of the moderators of the relationship.\textsuperscript{17}

\textsuperscript{17} This observation is clearly not valid for models 1, 5 and 9 in Table 2. When the SYMM variable is introduced, the relationship between multimarket contact and entry seems to be altered. Nevertheless, given that the correlation between the MMKC and SYMM variables is the highest among all the moderators and one of the highest in the sample, this change should be evaluated with some care.
### Table 2. Moderators of the relationship between multimarket contact and mutual forbearance

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>AG (1) (robust)</th>
<th>AG (2) (robust)</th>
<th>AG (3) (robust)</th>
<th>AG (4) (robust)</th>
<th>AG (5) (robust) (heterog)</th>
<th>AG (6) (robust) (heterog)</th>
<th>AG (7) (robust) (heterog)</th>
<th>AG (8) (robust) (heterog)</th>
<th>AG (9) (heterog) (heterog)</th>
<th>AG (10) (heterog) (heterog)</th>
<th>AG (11) (heterog) (heterog)</th>
<th>AG (12) (heterog) (heterog)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFI</td>
<td>-0.005</td>
<td>0.008</td>
<td>0.137</td>
<td>0.064</td>
<td>-0.005</td>
<td>0.080</td>
<td>0.137</td>
<td>0.064</td>
<td>0.415**</td>
<td>0.433**</td>
<td>0.368*</td>
<td>0.401*</td>
</tr>
<tr>
<td>PROXIC</td>
<td>7.010</td>
<td>7.193</td>
<td>1.730</td>
<td>1.800</td>
<td>7.010</td>
<td>7.193</td>
<td>1.793</td>
<td>1.800</td>
<td>1.808***</td>
<td>1.461***</td>
<td>1.590***</td>
<td>1.649***</td>
</tr>
<tr>
<td>NUMSB</td>
<td>-0.118***</td>
<td>-0.106***</td>
<td>-0.139***</td>
<td>-0.089***</td>
<td>-0.118***</td>
<td>-0.106***</td>
<td>-0.139***</td>
<td>-0.089***</td>
<td>-0.130***</td>
<td>-0.115***</td>
<td>-0.109***</td>
<td>-0.101***</td>
</tr>
<tr>
<td>DEPHI</td>
<td>0.042</td>
<td>0.257</td>
<td>0.031</td>
<td>0.026</td>
<td>0.042</td>
<td>0.257</td>
<td>0.031</td>
<td>0.026</td>
<td>0.077</td>
<td>-0.231</td>
<td>-0.101</td>
<td>0.057</td>
</tr>
<tr>
<td>DNSI2</td>
<td>0.088</td>
<td>-0.539</td>
<td>0.066</td>
<td>0.053</td>
<td>0.088</td>
<td>-0.539</td>
<td>0.066</td>
<td>0.053</td>
<td>0.173</td>
<td>0.469</td>
<td>0.200</td>
<td>0.100</td>
</tr>
<tr>
<td>MGROW2</td>
<td>0.171</td>
<td>0.301</td>
<td>0.170</td>
<td>-0.151</td>
<td>0.171</td>
<td>0.301</td>
<td>0.170</td>
<td>-0.151</td>
<td>0.214</td>
<td>0.196</td>
<td>0.138</td>
<td>-0.266</td>
</tr>
<tr>
<td>MMKC</td>
<td>0.309</td>
<td>0.539</td>
<td>0.311</td>
<td>-0.249</td>
<td>0.309</td>
<td>0.539</td>
<td>0.311</td>
<td>-0.249</td>
<td>0.269</td>
<td>0.387</td>
<td>0.346</td>
<td>0.245</td>
</tr>
<tr>
<td>MMKCC</td>
<td>0.101</td>
<td>0.013</td>
<td>0.119</td>
<td>0.000</td>
<td>0.101</td>
<td>0.013</td>
<td>0.119</td>
<td>0.000</td>
<td>0.129</td>
<td>0.001</td>
<td>0.100</td>
<td>0.141</td>
</tr>
<tr>
<td>SYMM</td>
<td>-0.066</td>
<td>-0.013***</td>
<td>-0.024***</td>
<td>-0.021***</td>
<td>-0.066</td>
<td>-0.013***</td>
<td>-0.024***</td>
<td>-0.021***</td>
<td>-0.005</td>
<td>-0.003***</td>
<td>-0.013***</td>
<td>-0.012***</td>
</tr>
</tbody>
</table>

**Variance of the random effect**

| Variance of the random effect | 0.691*** | 0.589*** | 0.530*** | 0.521*** |

**Likelihood ratio test**

| Likelihood ratio test | 886*** | 871*** | 883*** | 869*** |

**Wald test**

| Wald test | 800*** | 799*** | 832*** | 815*** |

**Number of observations**

| Number of observations | 34529 | 34529 | 34529 | 34529 |

***, **, * Coefficient statistically significant at 1%, 5% and 10% levels, respectively. T-ratios in parenthesis.
6. PRELIMINARY CONCLUSIONS

This paper adds evidence on the conflictive link between multimarket contact and mutual forbearance. Contrarily to the papers that postulate linear influences of multimarket contact on mutual forbearance, we test the hypothesis that this influence takes a quadratic U inverted form. To achieve this, we do not center on the results of competition but on the actions through which firms attack and defend themselves.

Our results suggest that the influence of multimarket contact on the actions of firms is, in effect, of the U inverted form predicted by the theory. Therefore, deregulation did have a double influence on the geographic diversification of activities of the savings banks. For those entities with a low degree of multimarket contact, the elimination of branching restrictions provided them with incentives to look for new markets, given not exclusively by the expected profitability of the objective market, but also by the strategic importance of footholds as deterrents. This initial aggressive movements destabilized the relationship among firms maintained during the regulated period, starting a process of competitive escalation, changing market domains and increasing the level of multimarket contact. Nevertheless, for firms with enlarged market domains (and for those with an initially high level of multimarket contact) multimarket contact was translated into unaltered relationships through the effect of increased familiarity and the threats of retaliation.

Interestingly, this conclusion seems to be fairly consistent, independently of the estimation method used and of the inclusion or exclusion of the moderators of the relationship. Furthermore, these moderators do not seem to have played a very important role at explaining firm’s competitive behavior, being the asymmetry in territorial interest the only relevant variable at promoting entry.

In a different dimension, our results highlight the significance of unobservable factors at explaining the influence of multimarket contact on firm’s competitive actions. As the theory assumed this could well be pointing to the importance of differences in the organizational structure of competing firms at explaining competitive behavior. Particularly, to the relevance of mechanisms designed to understand competitive reality, devise adequate strategic responses and coordinate them. Although the data available did not allow us to distinguish between the operating mechanism, our results could be the first
evidence suggesting that firms competitive behavior is coordinated across markets, assumption fundamental to the concept of mutual forbearance.

These results have implications for the study of multimarket contact. First, it adds evidence on the link between multimarket contact which is consistent with the predictions of the theoretical literature and the last empirical papers on the matter. This evidence helps to globally understand and bring to a common point the extant evidence on the relationship. Markets with low levels of multimarket contact should show an intensification of rivalry as the level of multimarket contacts rises. Foothold strategies and initial aggressive entry movements could create incentives to counterattack and start a process of competitive escalation. Contrarily, markets with high levels of multimarket contact should experience the effects of familiarity and strategic deterrence, transforming the positive influence into negative. Only those markets with enough variation in their levels of multimarket contact could help us to capture and would clearly show the complexities of the quadratic relationship between multimarket contact and multipoint competition.

Second, our results point out the relevance of unobservable variables and the importance of methodological issues at empirically assessing the relationship. In this sense, our paper introduces improvements that could be followed in the future. The consequences of the potential correlation among observations belonging to the same firm could be taking in two different ways: using “variance-corrected” or random effects survival models. The application of both types of solutions to a given setting may suggest the existence of correlation among the observations belonging to the same entity, given the differences in the robust standard errors in relation to the basic models and the significance of the variance of the random effect. In spite of the fact that both methods are alternative ways of solving the problem, perhaps the second presents a more clear assessment of the presence of unobservables. In any case, both type of models are specially relevant in a context in which monitoring and coordination lay at the bottom of the hypothesis of the existence of a link between multimarket contact and mutual forbearance.
REFERENCES


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APPENDIX 1. Definition of variables

This appendix presents the definition of the independent and control variables used in the analysis. Monetary variables are expressed in constant pesetas of 1986. All the data used in the analysis is publicly available and comes from the following sources: CECA (Confederación Española de Cajas de Ahorros), Boletín Estadístico del Banco de España and Anuario El País. All the values are taken at the beginning of the corresponding year.

A. Definition of independent variables

- **Hypothesis 1 (MMKC):** number of contacts of potential entrant \( i \) with every incumbent \( j \) in the focal market \( n \) in markets other than \( n \).
- **Hypothesis 2a (SYMM):** degree of symmetry of the importance of the contact of potential entrant \( i \) with all the incumbents \( j \) in the focal market \( n \).
- **Hypothesis 2b (SPHE):** market share of the dominant incumbent in the focal market \( n \).
- **Hypothesis 3 (STRS):** strategic similarity between potential entrant \( i \) with incumbents in the focal market \( n \). Following Cool and Schendel (1987) we use a multidimensional approach and we distinguish between scope and resource commitments. In the scope dimension we take into account three variables (Mas, 1998; Surroca, 2001):
  - Credits/financial investments.
  - Treasury/financial investments.
  - Portfolio/financial investments.
Similarly, in the resource dimension we include another set of three variables (Mehra, 1996; Surroca, 2001):
  - Personnel expenses/Total revenue
  - (Passive-Equity)/Passive.

- **Hypothesis 4 (OBJEH):** Herfindahl in each focal market \( n \), calculated from the number of branches. It refers to both banks and savings banks.

B. Definition of control variables

**Firm characteristics:**

- **Size (SIZE):** equity deflated by IPC (Spanish Inflation Index). Equity consist of capital, rotation fund, reserves, subordinated financing and retained earnings.
- **Profitability (PROFI):** Savings bank profitability (net profit divided by assets)
- **Money market position (MONEY):** net balance (as a lender) of savings banks in the money market, normalized by the average assets of the entity.
- **Experience managing markets (NMARK):** Number of provinces in which the entity was operating at the end of the previous year

**Origin market characteristics:**
- **Concentration (COREH):** Herfindahl weighted by the relative importance of each market for the entity under observation. To calculate it, a province Herfindahl was first developed using the number of branches as a proxy for market share. Then, the core market Herfindahl was worked out by multiplying each single Herfindahl of the provinces in which the entity was operating in 1986, by the relative importance of the province for the entity under observation. The number of branches was used to measure the importance of the province for the entity.

**Objective market characteristics:**
- **Potential rivalry (NUMSB):** number of savings banks operating in the markets adjacent to every potential objective market. The 1% limit was used in order to decide whether a savings bank was operating in a province or not
- **Density (DENSI):** inhabitants per square kilometre in the province.
- **Intensity of demand (DEPHA):** total deposits per inhabitant (millions of pesetas).
- **Market growth (MGROW):** average relative increase in the total volume of deposits of the province in the three years before the focal year.

**Relationship between firm characteristics and objective industry characteristics:**
- **Proximity to core market (PROXIC):** dummy variable which takes value one when the province towards which an entity could direct itself is adjacent to the province(s) in which the entity has its original market and zero in any other case.
- **Proximity to expansion (PROXIE):** Dummy variable that takes a value of one when the province is adjacent to the new markets entered by the savings bank (end of previous year).
APPENDIX 2. Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>LOGSIZE</th>
<th>INTER</th>
<th>PROFI</th>
<th>PROXIC</th>
<th>PROXIE</th>
<th>NMARK</th>
<th>CMOBC</th>
<th>NUMSB</th>
<th>DEPHA</th>
<th>DENSI2</th>
<th>MGROW2</th>
<th>MMKC</th>
<th>SYMM</th>
<th>SPHE</th>
<th>STRS</th>
<th>OBJEH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>5.21</td>
<td>-0.13</td>
<td>-2.22</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.06</td>
<td>0.06</td>
<td>0.20</td>
<td>0.01</td>
<td>-0.06</td>
<td>0.00</td>
<td>0.00</td>
<td>0.30</td>
<td>0.00</td>
<td>0.06</td>
</tr>
<tr>
<td>Mean</td>
<td>8.96</td>
<td>0.10</td>
<td>1.04</td>
<td>0.10</td>
<td>0.02</td>
<td>2.85</td>
<td>0.13</td>
<td>0.56</td>
<td>0.11</td>
<td>0.05</td>
<td>0.05</td>
<td>0.83</td>
<td>0.24</td>
<td>0.66</td>
<td>0.25</td>
<td>0.15</td>
</tr>
<tr>
<td>Max.</td>
<td>12.46</td>
<td>0.48</td>
<td>3.53</td>
<td>1.00</td>
<td>1.00</td>
<td>49.00</td>
<td>0.35</td>
<td>20.00</td>
<td>1.65</td>
<td>0.63</td>
<td>0.23</td>
<td>24.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.81</td>
<td>0.35</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>1.24</td>
<td>0.08</td>
<td>0.55</td>
<td>0.29</td>
<td>0.15</td>
<td>3.15</td>
<td>0.04</td>
<td>3.71</td>
<td>0.22</td>
<td>0.14</td>
<td>0.04</td>
<td>1.27</td>
<td>0.21</td>
<td>0.19</td>
<td>0.10</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Correlation matrix:

- LOGSIZE: 1.00
- INTER: -0.10, 1.00
- PROFI: -0.11, 0.18, 1.00
- PROXIC: 0.04, 0.00, 0.00, 1.00
- PROXIE: 0.19, -0.02, -0.03, -0.05, 1.00
- NMARK: 0.54, -0.11, -0.15, 0.04, 0.37, 1.00
- CMOBC: 0.12, 0.18, 0.07, 0.09, -0.00, -0.06, 1.00
- NUMSB: -0.16, -0.01, 0.06, 0.18, -0.02, -0.08, -0.05, 1.00
- DEPHA: 0.18, -0.00, -0.06, 0.04, 0.08, 0.11, 0.02, 0.00, 1.00
- DENSI2: 0.00, 0.00, 0.00, -0.06, -0.02, 0.01, 0.02, -0.27, 0.28, 1.00
- MGROW2: -0.10, -0.00, -0.06, 0.01, -0.04, -0.06, -0.01, 0.14, -0.05, 0.04, 1.00
- MMKC: 0.48, -0.07, -0.13, 0.08, 0.38, 0.77, -0.02, -0.14, 0.24, 0.00, -0.14, 1.00
- SYMM: 0.15, 0.04, -0.07, 0.14, 0.07, 0.03, 0.03, -0.20, 0.32, -0.02, -0.16, 0.38, 1.00
- SPHE: -0.05, 0.01, 0.00, 0.02, -0.00, -0.01, -0.02, 0.14, 0.05, -0.04, 0.11, 0.03, 0.05, 1.00
- STRS: -0.02, 0.05, -0.02, -0.07, -0.01, 0.01, 0.03, -0.10, 0.06, -0.05, -0.04, 0.06, 0.19, -0.00, 1.00
- OBJEH: 0.02, -0.00, -0.03, 0.09, 0.03, 0.03, -0.03, 0.41, 0.19, -0.38, 0.04, 0.08, 0.11, 0.54, 0.03, 1.00