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HYBRID STRATEGIC GROUPS

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The notion of strategic groups has recently emerged as a critical perspective for uncovering firms' strategic postures/recipes and competitive market structures. Firms within strategic groups generally adopt similar strategic recipes and compete more intensely than firms across strategic groups. Building on recent research, the authors develop the concept of hybrid strategic groups, which blend the strategic recipes of more than one group, in contrast to existing conceptualizations of strategic groups, where either firms tightly follow the recipes of a strategic group (i.e., core firms) or firms loosely follow the recipes of a strategic group (i.e., secondary firms). Thus, competition among firms depends not only on the strategic group but also on the overlap of that strategic group with other strategic groups. The authors devise a combinatorial optimization-based classification procedure utilizing a bilinear model that accommodates multiple variable batteries that can estimate hybrid strategic groups. The proposed methodology is illustrated by using archival data on public banks. For this illustration, the hybrid strategic group solution outperforms ordinary cluster analyses and offers critical insights into the nature of competition among firms.

INTRODUCTION

Since the first use of the term 'strategic groups' by Hunt (1972), strategic group research has been most pervasive and prevalent in the field of strategic management (Ketchen *et al*., 1997; McGee and Thomas, 1986; Thomas and Venkatraman, 1988). Typically, strategic groups consist of firms similar on some yardstick, such as cost structure, degree of product diversification, formal organization, resource profile, and/or strategic emphasis (e.g., Frazier and Howell, 1983; Nair and Kotha, 2001), so that firms in the same strategic group adopt similar strategic postures and appear to possess similar strategic identities (Ferguson, Deephouse, and Ferguson, 2000; Peteraf and Shanley, 1997; Spender, 1989). In addition, firms in the same group compete with one another more intensely than do firms across strategic groups in an industry (e.g., Cool and Schendel, 1987; Dranove, Peteraf, and Shanley, 1998). Most recent progress in strategic groups research has focused on (1) accessing the generalizability of the construct across industries such as retailing (e.g., Lewis and Thomas, 1990), banking (e.g., Amel and Rhoades, 1988), pharmaceuticals (e.g., Cool and Schendel, 1987), and insurance (e.g., Fiegenbaum and Thomas, 1990) or (2) using different types of data, such as archival data (e.g., Cool and Schendel, 1987), perceptual (e.g., Fombrun and Zajac, 1987) data, or direct measures of competition (e.g., Porac *et al*., 1995) to derive and assess

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strategic groups. This previous research aptly illustrates empirically that strategic groups exist across industries and that a high degree of convergence exists across data types (e.g., Ketchen *et al*., 1997; Nath and Gruca, 1997; Porac and Thomas, 1994).[1]

However, from a theoretical standpoint, strategic groups researchers have begun to recognize that heterogeneity may exist in the extent to which firms pursue strategic group recipes (Ketchen, Thomas, and Snow, 1993; McNamara, Deephouse, and Luce, 2003; Porac, Thomas, and Baden-Fuller, 1989). In other words, two firms may belong to the same strategic group but may vary in the extent to which they pursue the strategic recipes espoused by that strategic group.[2] Such conjectures rely on categorization theory (e.g., Rosch, 1978) and strategic group identity theory (e.g., Peteraf and Shanley, 1997), among others concepts, to anticipate variation in the extent to which firms belong to or identify with a strategic group. For example, in an attempt to provide a theoretical ground for strategic groups research, Reger and Huff (1993) rely on cognitive psychology to propose that *core* firms associate tightly with the recipe of a strategic group, *secondary* members are less consistent than core firms in their associations, and *transient* firms change from one strategic group to another (also see McNamara *et al*., 2003).

Building on this research, we propose the notion of *hybrid strategic groups* which are composed of firms that blend strategic recipes from more than one pure strategic group to derive their own unique strategic posture. Unlike secondary firms that follow the strategic recipes of a strategic group to a lesser extent than core firms, hybrid strategic group firms blend the strategic recipes of two or more strategic groups. Thus, core firms are aligned tightly with a strategic group, secondary firms are aligned loosely, and hybrid firms are aligned loosely with multiple strategic groups and borrow/blend strategic recipes from all of them.[3]

We also use this notion of hybrid strategic groups to assess competitive market structures.[4] Specifically, traditional strategic group literature suggests that firms in a strategic group compete more intensely with one another than firms across strategic groups. The notion of secondary strategic groups introduces an additional level of complexity, according to which both core and secondary firms exist within a strategic group, and core firms compete more intensely with one another but less intensely with secondary firms, and vice versa. Although these assertions advance current thinking in strategic groups, they are limited in two ways: (1) they do not indicate any variation in competition for firms within a strategic group beyond the core/secondary dichotomy—whereas the hybrid strategic group framework recognizes that competition varies depending on whether a firm is pure or hybrid, and posits that pure group firms compete more intensely with one another than firms in hybrid groups that overlap with this pure group—and (2) the intensity of competition for firms across strategic groups is not apparent from extant perspectives, so questions such as whether firms in two strategic groups compete more intensely than firms in a third strategic

[1] Whether strategic groups exist has been debated in the literature by Barney and Hoskisson (1990) and others (e.g., Dranove *et al*., 1998). However, the notion of strategic groups is theoretically compelling because it is unlikely that all firms in an industry follow similar strategies and compete with one another with similar intensity (e.g., Reger and Huff, 1993), and is empirically supported as cross-industry evidence shows that such groups exist (e.g., Ketchen *et al*., 1997). A full debate of this issue is beyond the scope of this manuscript, though our proposed methodology enables us to test the proposition empirically.

[2] We define strategic recipe as 'a pattern of appropriate resources as well as a way of looking at the world' (Spender, 1989: 192); so strategic recipes encompass the notion of strategic postures (e.g., Porter, 1979).

[3] A pertinent question asks what *pure* means in this context. Every industry contains some basic strategic postures/recipes (e.g., Spender, 1989) such that other strategic postures are derived as a combination of these basic postures. We refer to the basic posture as 'pure' and the derived postures as 'hybrid.' In an industry, it may be that no firm adopts a truly basic or pure posture, though such probably is not the case during the initial stages of industry evolution when only pure firms should exist. However, even in a cross-sectional analysis, there should be at least one firm that uses a basic posture or a posture derived from it. These notions of pure and hybrid provide us with a means to take a more continuous (less discrete) view of how strategic groups link in an industry.

[4] Strategic group and competitive market structures are codetermined and all strategic groups in an industry together define the competitive market structure (i.e., which firm competes with which other firms in the industry; see DeSarbo, Grewal, and Wind, 2006). A key criticism of strategic group research recognizes that even if firms follow the same strategy, they need not compete if they do not overlap in terms of the markets they serve (Chen, 1996). Thus, for strategic group research to be of use for competitor analysis, it must simultaneously consider market commonality, as espoused in multimarket competition research (e.g., Gimeno and Woo, 1996), and resource similarity, as discussed in the resource-based view of the firm (e.g., Wernerfelt, 1984). Consistent with these assertions, in our empirical illustration we consider a geographically secluded market. Furthermore, we assert that the issue of resource similarity can be gleaned from the strategic variables we examine in the empirical illustration.

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group do remain unanswered. The notion of hybrid strategic groups helps explain this issue in greater depth. Theoretically, we rely on literature pertaining to interfirm rivalry (e.g., Chen, 1996), strategic identity (e.g., Peteraf and Shanley, 1997), and the resource-based view of the firm (e.g., Wernerfelt, 1984) to lay the foundation for understanding competition among firms, and suggest that competitive market structure varies on the basis of whether the firm follows the strategic recipes of one group (pure) or belongs to a hybrid strategic group.

To examine empirically the possibility that a firm can belong to multiple strategic groups, we devise a general, flexible modeling framework for constrained, multi-objective classification, which is well suited for grouping entities such as firms (see DeSarbo and Grisaffe, 1998). We construct a modified version of the NORMCLUS family of classification procedures with a bilinear model to apply to secondary data pertaining to the product portfolios and financial strategies of public banks. As is often the case in strategic group research (e.g., McNamara *et al*., 2003), geography constrains competition among firms, so we analyze data on firms from a restricted geographic area to ensure their market commonality (e.g., Chen, 1996). To accommodate this geographic constraint, we use data from 131 public banks in the tri-state region of New Jersey, New York, and Pennsylvania to illustrate the proposed framework and methodology. We demonstrate empirically the superiority of our proposed conceptualization and methodology over more traditional strategic group theory and methods.

Our research therefore makes important theoretical and methodological contributions. From a theoretical standpoint, we conceptualize the existence of hybrid strategic groups that blend the strategic recipes of pure strategic groups to derive their own unique strategic postures. In addition, similar to research that uses a traditional notion of strategic groups to identify competitive market structures (e.g., Smith *et al*., 1997; Fiegenbaum, Thomas, and Tang, 2001; Nair and Filer, 2003; Smith *et al*., 1997), we consider hybrid strategic groups to develop a levels theorization of competition and thereby derive competitive market structures. As we elaborate subsequently, our conceptualization of competitive market structure varies depending on whether the firm uses the strategic recipe of one or multiple strategic groups (Figure 1). From a methodological viewpoint, we devise a new multicriterion classification procedure by formulating a bilinear model of overlapping classification, as well as an alternative and improved objective function tailored for this application. The proposed methodology represents a more general classification tool than ordinary cluster analysis, in that it accommodates traditional, nonoverlapping clustering solutions as special or nested cases. Thus, the structure of the input data determines the optimal representation of strategic groups because we impose no explicit external framework in the analysis.

We organize the remainder of this article as follows: in the next section, we review the pertinent literature on strategic groups, develop our arguments for the existence of hybrid strategic groups, and use these arguments to propose a new levels theorization of competition. In the subsequent section, we suggest that to uncover this theorized nature of competition, we need a methodology for overlapping classification and therefore present the proposed bilinear multicriterion classification procedure to estimate hybrid strategic groups. We also discuss our research context and detail how we customize the proposed procedure for that context. Then, we present our methodology and describe the data collection process. We next present the results and demonstrate the superiority of our proposed methodology over existing clustering methods, and we conclude with a discussion of the findings, along with implications for theory and practice with future research directions.

CONCEPTUAL BACKGROUND

Hybrid strategic groups

Recognizing that considerable heterogeneity exists among firms in any industry (e.g., Hatten and Schendel, 1977; Scherer and Ross, 1990), the notion of strategic groups suggests that firms in the same groups have similar resources (e.g., Cool and Schendel, 1988), pursue similar strategies (e.g., Porter, 1979), and, as a result, seemingly experience similar levels of performance (e.g., Fiegenbaum and Thomas, 1990). Meta-analytic evidence (Ketchen *et al*., 1997) and recent empirical research (e.g., Ferguson *et al*., 2000; Nair and Kotha, 2001) indicate performance differences across different strategic groups.

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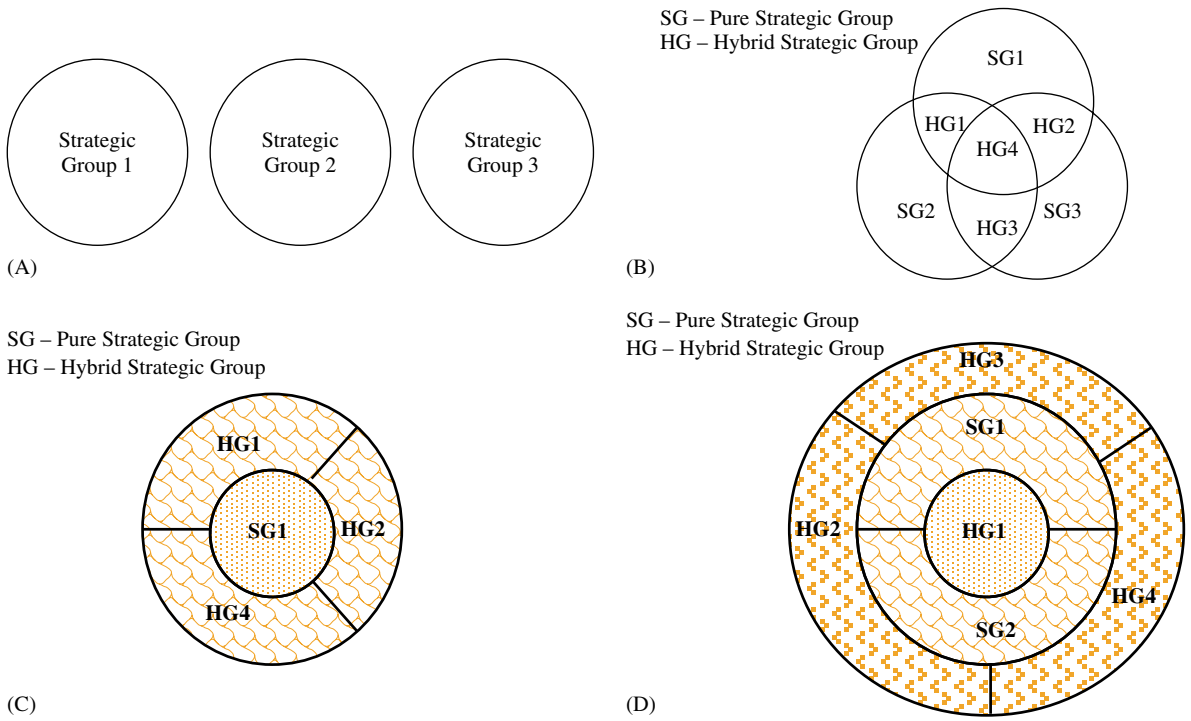

Figure 1. Strategic groups and competition. (A) Pure strategic group. (B) Pure and hybrid strategic groups. (C) Competition for pure strategic group. (D) Competition for hybrid strategic group. This figure is available in color online at www.interscience.wiley.com/journal/smj

In terms of competition, assuming market commonality (Chen, 1996), contemporary strategic groups research implies that firms in a strategic group compete more intensely with one another than do firms across strategic groups (e.g., Fiegenbaum *et al*., 2001; Nair and Filer, 2003; Ruiz, 1999; Smith *et al*., 1997). Thus, from a traditional managerial perspective, firms should focus on other firms in their strategic group as primary competitors and consider firms outside the strategic groups as peripheral competitors. This competitive configuration, depicted in Figure 1(A), makes intuitive sense, and often reflects a parsimonious model of competitive market structures in which an industry can be divided into distinct groups of competitive firms.

Although this representation of competition is somewhat parsimonious, we question the extent it is accurate. Recent theoretical developments in strategic groups literature suggest that such a simplistic representation may ignore critical information. Specifically, substantial heterogeneity may exist within strategic groups (e.g., Cool and Schendel, 1988; Lawless, Bergh, and Wilsted, 1989; McNamara *et al*., 2003). Relying on the resource-based view of the firm (e.g. Barney, 1991; Wernerfelt, 1984), we argue that every firm possesses unique resources, so even if a subset of firms belong to the same strategic group, they still will exhibit considerable variability (e.g., Nair and Kotha, 2001). Strategic identity theory (e.g., Peteraf and Shanley, 1997; Scott and Lane, 2000)[5] seems to suggest that firms also differ in the degree to which they identify with a strategic group, such that some firms relate strongly whereas others try to differentiate themselves somehow (e.g., Caves and Porter, 1978; Reger and Huff, 1993). According to the resource-based view of the firm and strategic group identity theory, three types of firms characterize industries: (1) *core*, (2) *secondary*, and (3) *solitary* firms. Core firms strictly adhere to the strategic recipes of the group to which they belong, secondary firms identify with them to a lesser degree, and solitary firms

[5] Strategic group identity has been theorized to represent 'a set of mutual understandings, among members of a cognitive intraindustry group, regarding the central, enduring, and distinctive characteristics of the group' (Peteraf and Shanley, 1997: 166).

belong to strategic groups that include only them (McNamara *et al*., 2003; Reger and Huff, 1993).

Because core firms identify more closely with and more strictly follow the strategic recipes of their strategic groups than do secondary firms (McNamara *et al*., 2003; Peteraf and Shanley, 1997), they appear to value the central, enduring, and distinctive characteristics of their strategic group. Both types of firms represent pure strategic group firms, in that they pursue the strategic recipes of one strategic group. These pure strategic group firms seem to benefit from the legitimacy gained by following a well-accepted, respected business model (DiMaggio and Powell, 1983; Grewal and Dharwadkar, 2002).

Every industry has its own recipes for success and understandings of how to do business (e.g., Spender, 1989). Firms that follow these recipes are perceived as legitimate and receive support from organizational stakeholders, including customers, employees, shareholders, governmental institutions, and society at large (e.g., DiMaggio and Powell, 1983; Suchman, 1995). Firms that deviate significantly from industry recipes risk being perceived as illegitimate, unreliable, or irrational (e.g., Deephouse, 1999; Meyer and Rowan, 1977). Strategic recipes develop through repeated interactions with competitors over time (path dependence) and the eventual recognition of the benefits of those recipes (cognitive lock-in; Arthur, 1997; Rosa *et al*., 1999). Over time, a recipe becomes legitimate (e.g., Grewal and Dharwadkar, 2002; Suchman, 1995), and this legitimacy endows benefits such as the willingness of business partners to work with the legitimized firms (e.g., Baum and Oliver, 1991); furthermore, enhanced benefits can ensue from the reputation that legitimacy endows, including those from various stakeholders such as consumers (e.g., Fombrun and Shanley, 1990).

In contrast, *hybrid strategic group* firms follow the competitive recipes of more than one pure strategic group or blend competitive recipes to derive their own unique competitive approach. Hybrid firms seem to recognize that as strategies become similar, competitive intensity increases, leading to intense rivalries (e.g., Cool and Dierickx, 1993; Hatten and Hatten, 1987). A differentiated positioning tends to buffer the firm from competitive intensity as a result of the protections of isolating mechanisms and thereby provides opportunities for greater economic rents (e.g., Rumelt and Lippman, 1982). Thus, 'firms may need to maintain balance on the "competitive cusp" between differentiation and conformity,' such that pure strategic group firms prefer conformity over differentiation, whereas hybrid strategic group firms seek out differentiation (McNamara *et al*., 2003: 162). That is, hybrid strategic group firms purposefully deviate from typical industry recipes to exploit their differentiated position and resource bases (e.g., Baum and Mezias, 1992; Baum and Singh, 1994). We graphically depict the distinctions between pure and hybrid strategic group firms in Figure 1(B), which shows that strategic groups may be considered hybrid when they blend disparate pure strategic groups. For example, the first hybrid strategic group (HG1) emerges as a result of the overlap between the first and second pure strategic groups (SG1 and SG2).

The notion of hybrid strategic groups also is useful in explaining 'solitary firms' that tend to form one-firm strategic groups (pure or hybrid) and are strategically unique (Cool and Schendel, 1987; Fiegenbaum and Thomas, 1993; Mascarenhas, 1989). These solitary firms typically deviate significantly from industry recipes and have been referred to as 'misfits' by Reger and Huff (1993). However, from the standpoint of hybrid strategic groups, solitary firms may emerge by blending strategic recipes of pure strategic groups. Even though the positioning of such solitary firms is unique, we subsequently reason and show that from a competitive standpoint, the notion of hybrid strategic groups can identify competitors of solitary firms.[6]

Hybrid strategic groups and competition

Building on this bipartite classification of strategic groups, we seek to conceptualize the nature of competition among firms in an industry.[7]

[6] In ordinary cluster analysis, the preferred technique to identify strategic groups (e.g., Harrigan, 1985), solitary firms exist when single clusters of one firm emerge. Thus, overreliance on cluster analysis may have institutionalized the notion of solitary firms, when clusters with a single firm actually may be a quirk of the particular type of clustering technique or the type of data employed in the analysis.

[7] In the context of hybrid strategic groups, we define competition as the pursuit of similar strategic recipes by two or more firms to gain access to the same customers (i.e., assuming market commonality). Competitive intensity reflects the relative intensity of competition between two sets of competitors, and competitive market structure depicts the varying levels of competition between firms in an industry or product or geographic market.

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Specifically, instead of treating competition as a dichotomy (i.e., competitor vs. not a competitor), we conceptualize it in terms of levels, such that competitive intensity with first-level competitors is much greater than that with second-level competitors, and so on. With this levels conceptualization of competition, we derive the competitive structure for the pure strategic group firm SG1 in Figure 1(C). Consistent with traditional strategic groups research (e.g., McGee and Thomas, 1986), the first level of competition for a firm in a pure strategic group is with other firms in the same pure strategic group (SG1 in Figure 1C). The second level of competition comes from the hybrid strategic group firms that overlap with the pure strategic group, such as HG1, HG2, and HG4. From a theoretical standpoint, a pure strategic group experiences the greatest similarity with other firms in the same pure group, as is manifested by resource endowments (e.g., Mehra and Floyd, 1998), strategic postures (e.g., Porter, 1979), mental models (e.g., Porac *et al*., 1989), and, consequently, firm performance (e.g., Cool and Schendel, 1987). Hybrid strategic group firms (e.g., HG1) that use the recipes of a pure strategic group, such as SG1, in combination with the recipes of one or more other pure groups (e.g., SG2) have more similarities with the original pure group (SG1) than do hybrid group firms that do not blend the same pure group recipes (i.e., firms that do not use the recipes of SG1). Thus, hybrid strategic group firms like HG1 should compete with pure strategic group firms like SG1, because the competitive recipes of SG1 form part of the competitive recipes of HG1. Hence, though the hybrid group firms distinguish themselves from pure strategic group firms, they have commonalities with the pure group firms and thus compete with them.[8]

Along similar lines, we present the competitive structure for hybrid strategic group firms in Figure 1(D), in which the first level of competition for firms in a hybrid strategic group comes from other firms in that group. For example, the first level of competition for firms in HG1 comes from other firms in HG1. From a theoretical standpoint, all firms in a hybrid strategic group blend the same pure strategic group recipes (i.e., SG1 and SG2 for HG1) to differentiate themselves from the pure strategic group firms (i.e., HG1 firms differentiate themselves from SG1 and SG2 by blending their competitive recipes). Thus, extant literature would suggest that first-level competition should exist among the firms in HG1 (e.g., Fiegenbaum *et al*., 2001; Smith *et al*., 1997). Because HG1 firms blend recipes from SG1 and SG2, these pure strategic groups represent the next (second) level of competition (Panel D, Figure 1). Similarly, the third level of competition for HG1 comes from firms in other hybrid strategic groups that share at least one pure group with the focal hybrid strategic group. In Figure 1(B), the hybrid strategic group HG1 shares at least one pure strategic group with HG2, HG3, and HG4. For example, it blends recipes of SG1 and SG2, and HG2 blends recipes of SG1 and SG3; thus, HG1 and HG2 have commonality in terms of SG1. Therefore, the competition between HG1 and HG2 should be less intense than that among the HG1 firms and between HG1 and SG1, but managers still should recognize and strategize in response to this competition.

Finally, this *levels theorization of competition* helps solitary firms identify their competitors as well. In our framework (Figure 1B), solitary firms emerge when either a pure or a hybrid strategic group consists of a single firm. Contrary to the assertion in the literature that unique solitary firms do not face much competitive pressure or compete with all firms in the industry (e.g., Reger and Huff, 1993), our proposed conceptualization of levels of competition (Figure 1C, D) identifies just such competitors. For example, if SG1 represents a strategic group with a solitary firm, the firm competes with HG1, HG2, and HG4 (Figure 1C). In turn, solitary firms, which tend to be larger (e.g., Cool and Schendel, 1987), may compete with most or no firms in the market, but the proposed framework makes no assumption about the default condition. Rather, the empirical results determine whether a solitary firm competes with all firms or only a select few. Finally, consistent with the resource-based view of the firm

[8] We recognize that a strategic group is one of many ways to map competitive market structures (for a recent discussion, see DeSarbo *et al*., 2006), including demand-based perspectives that rely on data from consumers (and assume competitive battles take place in the hearts and minds of consumers; e.g., DeSarbo *et al*., 2006) and management cognitive perspectives that give primacy to managerial mental maps (e.g., Porac and Thomas, 1990). All approaches used to identify competitive market structures, including strategic group research, have their limitations. For example, human cognitive constraints and biases, well-documented in psychology literature (e.g., Kahneman, Slovic, and Tversky, 1982), should be manifested in biases in the competitive market structures identified using data from consumers and managers.

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(e.g., Wernerfelt, 1984) and as Chen (1996: 103) emphasizes, 'each firm is unique, [which] implies that competitor analysis is a firm-specific analysis,' so in all cases the proposed framework can identify competitors from the perspective of a single firm (even if the strategic group contains more than one firm).

Note that the competitive market structures identified by the hybrid strategic groups approach are quite distinct from the competitive market structures identified by the traditional strategic groups approach. When all competitive configurations are taken into consideration together, competitive market structures emerge, i.e., competitive market structures are market level views of competition as opposed to the competition discussed thus far, which is a strategic group specific view of competition. For traditional strategic group research Figure 1(A) can represent competitive market structures, while for the hybrid strategic groups conceptualization competitive market structures would look similar to Figure 1(B). Figure 1(B) provides a richer picture than Figure 1(A) for representing competitive market structures. In fact, part (B) subsumes part (A) such that (B) boils down to (A) when all the hybrid strategic groups (HG1–HG4) are empty (i.e., not inhabited by any firm).

METHODOLOGICAL APPROACH AND RESEARCH CONTEXT

We begin this section by using the proposed theory to motivate the methodological procedure developed for uncovering hybrid strategic groups. Subsequently, we provide general details about the constrained multi-objective bilinear classification approach we develop to identify hybrid strategic groups.

Motivating the modeling procedure

Although traditional cluster analysis has been the primary methodology to estimate and identify strategic groups (Harrigan, 1985; Osborne, Stubbart, and Ramaprasad, 2001; Reger and Huff, 1993), it makes several restrictive assumptions, including that firms can belong to only one strategic group (for a further critique of traditional cluster analysis, see Wedel and Kamakura, 2000). That is, traditional cluster analysis can uncover the strategic group structure represented in Figure 1(A), but it cannot reveal the hybrid strategic group structure depicted in (B). Because of the conceptual superiority of the hybrid strategic group formulation represented in parts (B–D) of Figure 1, we seek to devise a method that enables us to uncover hybrid strategic groups (should they exist). When we relax the assumption of firms necessarily belonging to only one strategic group, we can model hybrid strategic groups, such that firms may belong to multiple strategic groups and therefore compete with firms in different strategic groups. Our proposed methodology enables the structure contained in the data to determine the appropriate hybrid strategic group representation. Specifically, we develop a constrained multi-objective classification approach to identify hybrid strategic groups, as we detail next.

The constrained multi-objective classification approach

The procedure we employ reflects a modification of a general, flexible modeling framework for constrained, multi-objective classification (NORMCLUS) that is well suited for grouping entities such as firms or customers. DeSarbo and Grisaffe (1998) formulated the original NORMCLUS procedure that we modify to allow for hybrid strategic groups, and thus offer greater flexibility in accommodating multiple data batteries collected for the same firms, as well as permit a variety of constraints, such as different types of clusters, minimum size (e.g., number of firms) of the resulting clusters, and so forth (for an application of the original NORMCLUS methodology to derive strategic types, see DeSarbo *et al*., 2005). The overall benefits of this constrained, multi-objective clustering methodology over traditional classification schemes entail its ability to satisfy key empirically grounded and managerially relevant criteria (for a more complete discussion, see DeSarbo and Grisaffe, 1998; for additional motivations of multicriterion clustering, see Brusco, Cradit, and Stahl, 2002; Brusco, Cradit, and Tashchian, 2003). The NORMCLUS approach is particularly applicable to the problem of hybrid strategic groups because of its ability to estimate overlapping clusters and appropriately accommodate multiple batteries of variables in a multi-objective function setting. In addition, NORMCLUS provides

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a quasi-statistical framework in which competing solutions may be formally compared in terms of comparative goodness-of-fit statistics, both overall and by variable battery. This goodness-of-fit aspect is of particular interest in strategic group applications that aim to derive an optimal, parsimonious solution in terms of the 'best' number of strategic groups. Also, this framework can compare a natural 'straw man' or benchmark against alternative, empirically derived solutions on common numerical fit grounds (we examine traditional cluster analysis as an alternative comparison standard). Finally, NORMCLUS can accommodate user-specified constraints to control various aspects of the resulting cluster solution (e.g., minimum cluster size) and may be modified to allow for either traditional, nonoverlapping or overlapping clusters (e.g., hybrid strategic groups). As to be shown shortly, nonoverlapping classifications are special nested cases of overlapping classifications.

The NORMCLUS methodology

The NORMCLUS approach uses recent developments in combinatorial optimization for finding strategic groups or firm clusters to optimize a user-specified objective function, subject to any user-specified constraints. Suppose there are $m = 1, \ldots, J$ objective functions that are comparably scaled in range and distribution, and that a particular clustering/classification problem implies their joint optimization (minimization or maximization). In the utility function method of multicriteria optimization, the utility function $U_j(f_j(\underline{\theta}))$ is defined for each objective f_j, depending on the importance of f_j compared with other objective functions. We can define a total utility function U as:

$$U = \sum_{j=1}^{J} U_j(f_j(\underline{\theta})). \tag{1}$$

A solution vector $\underline{\theta}^*$ emerges when we optimize U, subject to user-specified constraints:

$$H_n(\underline{\theta}) = 0 \; j = 1, \ldots, N \text{ equality constraints} \tag{2}$$

and

$$g_s(\underline{\theta}) \leq 0 \; s = 1, \ldots, S \text{ inequality constraints} \tag{3}$$

A specific form for Equation 1 can be given by:

$$U = \sum_{j=1}^{J} U_j = \sum \alpha_j f_j(\underline{\theta}), \tag{4}$$

where α_j is a scalar weighting or importance factor associated with the jth objective function $f_j(\underline{\theta})$ with $\sum_j \alpha_j$, and $h_n(\underline{\theta})$ and $g_s(\underline{\theta})$ are linear or nonlinear equality and inequality constraint functions, respectively, in terms of the classification (see DeSarbo and Grisaffe, 1998). In our context, j indexes each variable battery and its associated impact or fit for the derived classification. In the absence of *a priori* theory, α_j typically are set to equal $1/J$, though *a posteriori* weights subsequently are estimated on the basis of each variable battery's fit. Rao (1996) calls this the 'weighting function method' for solving multicriteria optimization problems that typically generate Pareto optimal solutions, and describes various alternative multicriteria optimization frameworks such as the inverted utility, global criterion, bounded objective function, and lexicographic methods (Rao, 1996: 780–782), which can all be accommodated by NORMCLUS. DeSarbo *et al*. (2006) summarize the various types of constraints that can be implemented or tailored for any particular taxonomy problem in the strategic arena.

Illustrative application: the research context

The banking industry has been studied by many strategic groups researchers (e.g., Amel and Rhoades, 1988; McNamara *et al*., 2003; Mehra, 1996; Ruiz, 1999; Serrano-Cinca, 1998; Zuniga-Vicente, Fuente-Sabate, and Rodriguez-Puerta, 2004). Furthermore, identifying strategic groups in the banking industry is nontrivial because the industry represents a turbulent environment with fuzzy boundaries (Fiegenbaum and Thomas, 1993).

Consistent with literature on strategic groups, we collect archival data pertaining to various strategic variables (Cool and Schendel, 1987; Fiegenbaum and Thomas, 1990; Tang and Thomas, 1992). Although strategic group researchers frequently use archival data, they also have employed perceptual cognitive measures (which can easily be incorporated in NORMCLUS analyses). In an examination of alternative methods to assess strategic groups, Nath and Gruca (1997) compare archival

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methods with perceptual-cognitive data and find convergence (also see Ketchen *et al*., 1997). Thus, archival data seem appropriate for our illustrative purposes in this research.

Although the constructs used to identify strategic groups vary with the particular industry context (e.g., McGee and Thomas, 1986), existing research seems to focus on a diverse set of strategic variables such as indicators of financial (e.g., Fiegenbaum and Thomas, 1990), product (e.g., Cool and Schendel, 1987), and marketing (e.g., Frazier and Howell, 1983) strategies. Most research assesses the validity of the identified strategic groups by examining performance differences across them (e.g., Barney and Hoskisson, 1990; Dranove *et al*., 1998; Wiggins and Ruefli, 1995). To represent strategic variables, we use indicators of the financial and product strategies of firms. Consistent with research in finance (e.g., Brealey and Myers, 1988) and research of strategic groups using financial variables (e.g., Baird, Sudharsan, and Thomas, 1987) along with strategic groups research concerning banks (e.g., Deephouse, 1999; McNamara *et al*., 2003), we employ three different batteries of strategic variables as input into the modified NORMCLUS procedure: (1) liquidity and leverage ratios, (2) product portfolio of loans, and (3) product portfolio of deposits. We use the current ratio of assets to liabilities to capture *firm liquidity,* and the ratios of (1) debt to equity, (2) total borrowing to total assets, and (3) interest expense to total assets as indicators of the *leverage ratio* (Brealey and Myers, 1988). To assess the *product portfolio of loans,* we use the ratios of gross loans to total investment securities and gross loans to total assets (Rose, 1999; Ruiz, 1999). For the *product portfolio of deposits,* we use four ratios (Rose, 1999; Serrano-Cinca, 1998): (1) total investment securities to total worldwide deposits, (2) gross loans to total worldwide deposits, (3) total borrowings to total worldwide deposits, and (4) total interest expenses to total worldwide deposits.

For the *post hoc* profiling of the derived strategic groups, in addition to the strategic variables, we use performance indicators of financial market ratios, efficiency ratios, and descriptors of firm size. Specifically, we use Tobin's q, market-to-book value, dividend yield, and price-to-earnings ratio to assess the firms' *market value* (Brealey and Myers, 1988). These ratios signal the intangible value of the firm and capture future earnings potential, in addition to current earnings (e.g., Tobin, 1969; Wernerfelt and Montgomery, 1988). To operationalize Tobin's q, we use the approximation detailed by Chung and Pruitt (1994), which is often used in empirical research (e.g., Bharadwaj, Bharadwaj, and Konsynski, 1999; Lee and Grewal, 2004).[9] To assess *bank efficiency*, we use (1) the sales to total assets ratio, (2) net profit margin, (3) return on assets, and (4) sales per employee (Brealey and Myers, 1988). Finally, to assess the *scale of the operations* of the banks, we use the following seven indicators: (1) number of employees, (2) total assets, (3) gross loans, (4) total worldwide deposits, (5) total interest expenses, (6) net income, and (7) total borrowing. In our analysis, we focus on public banks in the tri-state region of New Jersey, New York, and Pennsylvania, which provides a sample of 131 banks, to illustrate the theoretical and methodological underpinnings of our research.

NORMCLUS modifications and bilinear model for strategic groups analysis

For parameter estimation, NORMCLUS provides a variety of optimization procedures, including ordinary least squares, constrained least squares, and various combinatorial optimization procedures that employ genetic algorithms (for a survey, see Rao, 1996), simulated annealing (e.g., DeSarbo, Oliver, and Rangaswamy, 1989), lambda-opt procedures (e.g., Lin and Kernighan, 1973), and heuristics such as greedy algorithms and taboo search. The selection of which combinatorial optimization procedure to use depends on the structure of the classification problem at hand (for details, see DeSarbo and Grisaffe, 1998).

The primary objective of our classification problem is to derive strategic groups that differ on the basis of the three input strategic variable batteries. In addition, we explore the interrelationships between the variables both within and among the three variable batteries. Unlike traditional cluster analysis, which would aggregate or concatenate these measures into one battery, we purposefully choose a procedure that separates them to parse out the specific variable battery patterns and allow

[9] We specify $Q = (\text{MVE} + \text{PS} + \text{DEBT})/\text{TA}$, where $Q =$ Tobin's q; MVE = (closing price of share at end of the financial year) × (number of common shares outstanding); PS = liquidating value of the firm's outstanding preferred stock; DEBT = (current liabilities − current assets) + (book value of inventories) + (long-term debt); and TA = book value of total assets.

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each variable battery to participate individually in driving the final clustering solution (for motivation, see DeSarbo and Grisaffe, 1998). Thus, differences in measurement scale and variance will not drive the derived grouping, and each battery can be weighted differentially *a priori* to reflect any theoretically known relationships. Given these objectives and the multidimensional nature of the problem, we define a multicriteria objective function, as we described for the weighted utility function method. Let $\mathbf{X}_1$ denote the liquidity/leverage strategic variable battery, $\mathbf{X}_2$ the loan strategic battery, and $\mathbf{X}_3$ the deposits strategic battery. Originally, DeSarbo and Grisaffe (1998) suggest defining:

$$f_j = |\mathbf{M}_j/\mathbf{T}_j|, \quad j = 1, \ldots, 3 \text{ variable batteries}, \tag{5}$$

where $\mathbf{M}_j$ = between-cluster sum-of-squares and cross-products for battery j; $\mathbf{T}_j$ = total sum-of-squares and cross-products for battery j; and || = the determinant operator.

Thus, f_j are eta-square measures that measure separation in the component battery cluster variables. Note that all f_i range between 0 and 1, as does the combined function U in Equation 1. Also note that these fit measures are invariant to differences in the measurement scale of the variables. Unfortunately, such eta-square measures are more appropriate for estimating partitions or nonoverlapping groups/clusters than overlapping groups/clusters (cf. Everitt, Landau, and Leese, 2001). Thus, we must modify this approach for the classification problem at hand.

In turn, let:

$i = 1, \ldots, I$ firms/banks;
$j = 1, \ldots, J$ variable batteries;
$k_j = 1, \ldots, K_j$ variables in battery j;
$r = 1, \ldots, R$ clusters/strategic groups (R is user specified);
$X_{ik}{}^j$ = the value of the kth variable in battery j for firm i;
m_{ir} = the membership of firm i in cluster r ($m_{ir} = (0, 1)$);
$\mathbf{M} = ((m_{ir}))$; and
$\mathbf{X}^j = ((X_{ik}{}^j))$.

Then, adapting the bilinear model introduced by Mirkin (1990) and later applied by Chaturvedi *et al.* (1997) for overlapping or nonoverlapping clustering:

$$\mathbf{X}^j = \mathbf{M}\mathbf{W}^j + \mathbf{error}, \quad j = 1, 2, 3 \text{ strategic variable batteries}, \tag{6}$$

where $\mathbf{W}^j$ is the matrix of generalized centroids ($\mathbf{W} = ((\mathbf{W}^j))$). Given data $\boldsymbol{X}^j$ for $j = 1, \ldots, 3$, we attempt to estimate $\mathbf{M}$ and $\mathbf{W}^j$ for $j = 1, \ldots, 3$. For the particular overlapping clustering application we address, we devise an alternating least squares estimation algorithm, in which we redefine f_j as:

$$f_j = 1 - [(\Sigma\Sigma(X_{ik}{}^j - \Sigma M_{ir} W_{rk}{}^j)^2 / (\Sigma\Sigma(X_{ik}{}^j - X^*{}_k{}^j)^2], \tag{7}$$

where $X^*{}_k{}^j$ is the mean of the k_jth variable in the jth battery. Again, all f_i range between 0 and 1, as does the combined function U in Equation 1. That is, for the strategic group application, we attempt to estimate the cluster membership indicators $\underline{\mathbf{M}} = ((m_{ir}))$ to maximize:

$$\Phi = \alpha_1 f_1 + \alpha_2 f_2 + \alpha_3 f_3, \tag{8}$$

where $f_1, \ldots, f_3$ are defined in Equation 7, $0 < \alpha < 1$ is user specified (as is R, the number of clusters), and various constraints are enforced. Then, further improvement in Equation 4 is sought with respect to the elements in $\mathbf{M}$. Appendix 1 provides the technical specifics involved in this new two-stage alternating least-squares estimation algorithm, where the first stage involves estimating $\mathbf{M}$ holding $\mathbf{W}$ fixed, and the second stage estimates $\mathbf{W}$ holding $\mathbf{M}$ fixed.

This iterative procedure terminates when no further improvement in Equation 4 can be obtained. Thus, we attempt to summarize the associations and interrelationships (not causal) among these six distinct batteries of variables, and simultaneously derive a strategic group classification that optimizes the interrelationships. That is, which taxonomy can be attained whose estimated centroids in the bilinear predictive model of Equation 6 best recover each of the variable items within each battery (i.e., quantitatively optimize Equation 4)? The optimization problem, given this bilinear predictive model, has more intuitive appeal than the eta-square measure in NORMCLUS because, similar to nonlinear regression, we estimate model

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parameters to recover the input data as closely as possible.

In addition, we impose constraints on the final solutions. For example, we allow the search for parameters in **M** to include nonoverlapping *and* overlapping classifications for any particular bank. As an illustration, consider an analysis performed for three strategic groups. In the nonoverlapping solution, the search is performed per bank over three indicator vectors:

$$\begin{matrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1. \end{matrix}$$

In this case, each element indicates whether a particular bank (row object) appears in a designated strategic group (column), as it would in traditional cluster analysis. In an overlapping (hybrid strategic groups) solution, the search expands over the following indicator vectors:

$$\begin{matrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 1. \end{matrix}$$

Such an expanded search with overlapping strategic groups incorporates or nests the possible solutions for nonoverlapping classifications as a subset. That is, our overlapping strategic group methodology treats nonoverlapping partitions as a special case, and the structure of the input data determines the optimal $\underline{\mathbf{M}}$. This expanded search allows for single or multiple group membership for each bank. Finally, we impose a constraint to ensure the estimability of $\mathbf{W}^j$ for $j = 1, \ldots, 3$, such that **M** is of full column rank and contains sufficient numbers of firms per strategic group for the estimation.

Thus, we devise a modified version of NORMCLUS that better accommodates a taxonomy that allows for traditional and/or hybrid strategic groups. During this procedure, the analyst must consider increasing values of the numbers of strategic groups and record the respective fit measures. Much like factor analysis or principal components analysis, the number of clusters is determined by scree plots of sequential fit values, until increasing the number of strategic groups no longer produces large improvements in overall fit. What is particularly appealing about this methodology is that fit values can be calculated for each battery of variables as well as overall. We can even obtain updated or posterior estimates of the initial weights (α_j) by normalizing the variable battery fit values to sum to 1. This updating can indicate how well each battery fits, as well as their respective impact on the final classification.

ILLUSTRATIVE APPLICATION: DATA SOURCES AND MEASURES

To illustrate the proposed hybrid strategic groups framework and NORMCLUS methodology, we collected archival data from the COMPUSTAT Banks Database for the year 2001. The database consists of data on 769 banks; we were able to obtain complete data for 652 of them. Because competition in the banking industry is driven largely by geographic constraints (i.e., customers are unwilling to travel long distances to fulfill their banking needs), strategic groups research tends to focus on geographically restricted areas (e.g., McNamara *et al*., 2003; Serrano-Cinca, 1998; Zuniga-Vicente *et al*., 2004). We also verify this geographically restrictive notion of bank competition through discussions with several bank executives. Therefore, we resort to an analysis of 131 banks in the tri-state area of New Jersey, New York, and Pennsylvania to illustrate our revised NORMCLUS classification methodology.[10]

As direct input to this new classification methodology, we use the three variable batteries that represent (1) liquidity and leverage ratios, (2) product portfolio of loans, and (3) product portfolio of deposits. In addition, we employ three other variable batteries to serve as profiling variables after deriving the strategic groups: (1) market value, (2) efficiency, and (3) scale of operations. We present the descriptive statistics for these variables in Table 1 and the bivariate correlation coefficients among them in Table 2. Note that the hybrid strategic groups theoretical conceptualization and tailored bilinear combinatorial optimization classification scheme for estimation is sufficiently general enough to accommodate any specification of input variables.

[10] We use Hoover's Online database to obtain information about the location of bank headquarters to identify these 131 banks.

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Table 1. Descriptive statistics

Variable category	Variable name	Mean	S.D.
Market value ratios	Tobin's q	0.31	0.12
	Market-to-book	1.71	0.75
	Dividend yield	0.02	0.01
	Price-to-earnings	23.67	56.25
Efficiency ratios	Sales–to-total assets	0.07	0.01
	Net profit margin	0.13	0.07
	Return on assets	0.01	0.01
	Sales per employee	438.55	1756.34
Liquidity and leverage ratios	Current	0.52	0.01
	Debt-to-equity	2.39	3.76
	Total borrowing-to-total assets	0.17	0.11
	Interest expense-to-total assets	0.03	0.01
Product ratios: loans	Gross loans-to-total securities	3.04	4.68
	Gross loans-to-total assets	0.59	0.11
Product ratios: deposits	Total investment securities-to-total deposits	0.42	0.20
	Gross loans-to-total deposits	0.83	0.18
	Total borrowings–to-total deposits	0.26	0.22
	Interest expense to total deposits	0.05	0.02
Firm size	Number of employees	1.72	6.18
	Total assets	6013.40	20885.46
	Gross loans	3277.53	11280.16
	Total worldwide deposits	3698.05	12189.68
	Total interest expense	191.56	691.25
	Net income	58.54	182.34
	Total borrowing	1136.71	3424.44

EMPIRICAL RESULTS

In Table 3, we contrast the aggregate fit statistics for the revised NORMCLUS procedure with K-means and Ward's hierarchical clustering solutions for a sequence of values for the number of strategic groups. The K-means and Ward's clustering methods represent the traditional operationalization of strategic groups, in that they allow bank membership in one and only one strategic group. Again, these linear combinations of fit statistics range from 0 to 1, and the modified NORMCLUS hybrid strategic group fit is much higher than traditional strategic group solutions across all values of R. A cursory inspection of Table 3 regarding the $R = 1$ aggregate market solution (i.e., no strategic groups) across all three procedures shows uniform rejection of the notion of no strategic groups. In examining the fit measures for the hybrid strategic group solution, we find that the move from six (fit = 0.748) to seven (fit = 0.776) hybrid strategic groups provides little improvement (ascertained by scree plot). Thus, the six strategic groups solution appears to be the most parsimonious. Furthermore, it fits much better than the corresponding six strategic group solutions from the K-means and Ward's methods with only pure strategic groups (fits = 0.420 and 0.632, respectively), which offers empirical support for the notion of hybrid strategic groups. (We purposely select these two traditional cluster analyses because they attempt to optimize an objective function related to the characteristics of the input data, as does our NORMCLUS approach.)

In Table 4, we provide the decomposition of overall fit across the three variable batteries (values closer to 1 are better) for the six hybrid strategic group, modified NORMCLUS solution. We show the same decomposition for the six-cluster solutions for the K-means and Ward procedures. The modified NORMCLUS solution clearly dominates both alternative methods for all but one variable battery, which indicates overwhelming support in favor of the NORMCLUS procedure over traditional cluster analysis approaches. However, we recognize the potential bias in favor of the proposed methodology because it explicitly maximizes these fit measures.

Our particular interest centers on the pattern of fit values with respect to the variable battery

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Table 2. Bivariate correlation coefficients

Variable name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Tobin's q																								
Market-to-book ratio	0.38*																							
Dividend yield	0.22*	0.10																						
Price-to-earnings ratio	−0.05	−0.05	−0.18*																					
Sales-to-total assets	0.15	0.33*	0.20*	0.02																				
Net profit margin	0.24*	0.39*	0.26*	−0.27*	−0.09																			
Return on assets	0.26*	0.43*	0.29*	−0.24*	0.11	0.97*																		
Sales per employee	0.04	0.00	0.04	−0.02	−0.15	0.03	−0.01																	
Current ratio	0.05	−0.14	−0.09	−0.01	−0.02	0.36*	0.36*	−0.08																
Debt-to-equity ratio	0.20*	−0.05	−0.06	−0.04	0.09	−0.63*	−0.66*	0.05	−0.40*															
Total borrowing-to-total assets	0.80*	−0.14	0.19*	−0.03	−0.09	−0.12	−0.14	0.07	−0.21*	0.41*														
Interest expense-to-total assets	0.23*	−0.35*	0.07	0.11	0.03	−0.59*	−0.58*	−0.07	−0.38*	0.59*	0.58*													
Gross loans-to-total securities	−0.07	0.15	0.03	0.01	0.08	0.04	0.06	−0.05	−0.09	−0.04	−0.10	−0.05												
Gross loans-to-total assets	−0.25*	−0.08	−0.09	0.14	0.12	−0.02	0.01	−0.24*	0.01	−0.11	−0.24*	0.08	0.39*											
Total investment securities-to-total deposits	0.46*	−0.22*	0.15	−0.11	−0.29*	−0.02	−0.09	0.21*	0.01	0.25*	0.61*	0.28*	−0.48*	−0.72*										
Gross loans-to-total deposits	0.41*	−0.11	0.05	0.07	0.03	−0.02	−0.01	−0.17*	−0.00	0.15	0.52*	0.40*	0.39*	0.65*	−0.22*									
Total borrowings-to-total deposits	0.80*	−0.12	0.19*	−0.04	−0.08	−0.08	−0.10	0.05	−0.19*	0.39*	0.98*	0.55*	−0.07	−0.24*	0.61*	0.52*								
Interest expense−to-total deposits	0.57*	−0.26*	0.16	0.04	−0.01	−0.37*	−0.37*	−0.04	−0.27*	0.52*	0.85*	0.88*	−0.01	−0.09	0.48*	0.55*	0.86*							
Number of employees	0.18*	0.39*	0.11	−0.00	0.22*	−0.03	0.01	−0.03	−0.13	0.02	0.04	−0.04	0.39*	−0.14	−0.23*	0.09	0.07	0.09						
Total assets	0.17	0.37*	0.10	−0.01	0.15	−0.01	0.02	−0.02	−0.15	0.03	0.06	−0.02	0.39*	−0.12	−0.22*	0.13	0.09	0.11	0.97*					
Gross loans	0.14	0.33*	0.11	−0.02	0.10	−0.01	0.01	−0.02	−0.15	0.04	0.06	−0.01	0.45*	−0.06	−0.24*	0.19*	0.09	0.12	0.95*	0.99*				
Total worldwide deposits	0.17	0.39*	0.09	−0.01	0.17	−0.00	0.02	−0.02	−0.14	0.02	0.04	−0.04	0.34*	−0.13	−0.22*	0.10	0.07	0.09	0.96*	0.99*	0.97*			
Total interest expense	0.14	0.32*	0.11	−0.01	0.13	−0.03	−0.01	−0.02	−0.15	0.04	0.07	0.01	0.39*	−0.10	−0.20*	0.15	0.10	0.14	0.96*	0.99*	0.99*	0.98*		
Net income	0.29*	0.54*	0.07	−0.02	0.20*	0.11	0.15	−0.02	−0.13	0.02	0.07	−0.09	0.38*	−0.17	−0.21*	0.09	0.10	0.07	0.85*	0.89*	0.85*	0.90*	0.84*	
Total borrowing	0.28*	0.35*	0.09	−0.02	0.10	0.01	0.03	−0.02	−0.17	0.09	0.20*	0.02	0.40*	−0.13	−0.14	0.22*	0.24	0.20*	0.92*	0.91*	0.92*	0.89*	0.90*	0.83*

* $p < 0.05$

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Table 3. NORMCLUS fit values for varying numbers of strategic groups

Number of strategic groups	*K*-means	NORMCLUS	Ward's method
1	0.000	0.121	0.000
2	0.167	0.297	0.203
3	0.259	0.507	0.334
4	0.299	0.598	0.425
5	0.395	0.682	0.568
6	0.420	0.748	0.632
7	0.452	0.776	0.669

Table 4. Decomposition of fit for six strategic group solution

Variable battery	Goodness of fit		
	NORMCLUS	Ward's method	*K*-means
Liquidity and leverage ratios	0.576	0.597	0.309
Product portfolio: loans	0.882	0.689	0.442
Product portfolio: deposits	0.788	0.610	0.510
Overall	0.748	0.632	0.420

decomposition for the modified NORMCLUS solution. We achieve much higher fit values for the deposit and loan batteries compared with those for the liquidity and leverage ratio battery. The 0.882 and 0.788 fit values for the loan and deposit batteries directly indicate that such variables successfully classify banks into strategic groups on the basis of externally observed variables from COMPUSTAT. Initially, we use equal weights (*a priori*) for each battery ($1/3 = 0.333$), then update the normalized posterior weights as 0.256, 0.393, and 0.351 for variable batteries 1, 2, and 3. (We also conduct a 'traditional analysis' through NORMCLUS in which we constrain the resulting classifications to partitions with no overlap. The resulting fit value deteriorated to 0.575, which means the hybrid overlapping solution provides a 30.1 percent better overall fit than the traditional, nonoverlapping classification using the same procedure.)[11]

To understand the composition of the six strategic groups obtained by the modified overlapping NORMCLUS procedure, we report descriptive statistics regarding performance (market value and efficiency ratios), strategic (liquidity and leverage, product loan, and product deposit ratios), and firm characteristics (i.e., firm size) variables for each of the six strategic groups.[12] As we show in Table 5, differential profiles for market value ratios exist for the banks in our sample. Firms in Strategic Group 2 (SG2) have the highest Tobin's *q* and lowest price-to-earnings ratio, whereas firms in SG1 and SG3 involve the highest price-to-earnings ratios, and firms in SG5 have the highest market-to-book values. For the efficiency ratios, the only difference among the strategic groups occurs for sales per employee; firms in SG2 emerge at the top, and firms in SG1 and SG6 are the lowest. The differences among the strategic groups for liquidity and leverage ratios appear primarily with respect to the debt-to-equity ratio and total borrowing-to-total assets ratio for which SG2 and SG4 achieve the highest two ratios and thus represent the most leveraged banks.

For the product portfolio of loans, SG2 provides the lowest values of ratios of gross loans to total securities, whereas SG4 provides the highest. For gross loans to total assets, firms in SG1 score much lower than the remaining five groups which have similar values. For the product portfolio of deposits for which we put total deposits in the denominator as opposed to the numerator, we find that SG3 is the highest for three of the four ratios, with the exception of gross loans to total deposits, for which firms in SG4 lead the pack. Finally, with regard to the descriptors of firm size and scale of operations, we find the largest banks belong to SG4, whereas the smallest scale of operations occurs for banks in SG6.

[11] Fit is poorer than the nonoverlapping partitions derived from *K*-means and Ward's methods because explicit identification constraints need to be imposed in our methodology for minimum cluster size to estimate **M**, whereas no such constraints are needed in *K*-means and Ward's methods.

[12] A series of independent sample *t*-tests comparing members with nonmembers of the six strategic groups for the two performance batteries reveals a statistical difference ($p < 0.05$, two-tailed test) for (1) Tobin's *q* for SG1, SG2, SG4, SG5, and SG6; (2) market-to-book value ratio in SG5; (3) net profit margin in SG1, SG3, and SG5; and (4) return on assets in SG1, SG2, SG3, and SG5.

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Table 5. Descriptive statistics for NORMCLUS six strategic group solution

Variable category	Variable name	Strategic groups					
		S1 ($n = 62$)	S2 ($n = 43$)	S3 ($n = 98$)	S4 ($n = 42$)	S5 ($n = 84$)	S6 ($n = 91$)
Market value ratios	Tobin's q	0.33	0.41	0.31	0.38	0.29	0.30
		(0.13)	(0.11)	(0.12)	(0.10)	(0.11)	(0.10)
	Market-to-book	1.69	1.57	1.68	1.75	1.83	1.66
		(0.84)	(0.72)	(0.66)	(0.66)	(0.81)	(0.60)
	Dividend yield	0.03	0.03	0.02	0.03	0.02	0.02
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Price-to-earnings	27.99	15.02	25.80	21.10	17.85	23.62
		(73.43)	(6.85)	(64.86)	(43.83)	(15.49)	(60.29)
Efficiency ratios	Sales-to-total assets	0.07	0.07	0.07	0.07	0.07	0.07
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Net profit margin	0.12	0.12	0.12	0.13	0.14	0.14
		(0.08)	(0.09)	(0.07)	(0.05)	(0.06)	(0.06)
	Return on assets	0.01	0.01	0.01	0.01	0.01	0.01
		(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
	Sales per employee	267.56	825.12	290.57	319.04	487.90	275.59
		(114.43)	(3050.50)	(125.45)	(128.59)	(2193.68)	(106.99)
Liquidity and leverage ratios	Current	0.52	0.52	0.52	0.52	0.52	0.53
		(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
	Debt-to-equity	2.31	4.47	2.72	3.26	1.61	1.65
		(5.17)	(5.92)	(4.26)	(1.71)	(1.17)	(1.35)
	Total borrowing-to-total assets	0.12	0.28	0.18	0.25	0.13	0.14
		(0.10)	(0.09)	(0.12)	(0.10)	(0.09)	(0.10)
	Interest expense-to-total assets	0.03	0.04	0.03	0.03	0.03	0.03
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Product ratios: loans	Gross loans-to-total securities	3.47	1.51	2.48	4.82	2.44	3.07
		(6.4139)	(0.71)	(1.41)	(7.74)	(1.9633)	(3.75)
	Gross loans-to-total assets	0.29	0.51	0.60	0.64	0.58	0.61
		(0.09)	(0.11)	(0.09)	(0.09)	(0.10)	(0.09)

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Table 5. (*Continued*)

Variable category	Variable name	Strategic groups					
		S1 ($n = 62$)	S2 ($n = 43$)	S3 ($n = 98$)	S4 ($n = 42$)	S5 ($n = 84$)	S6 ($n = 91$)
Product ratios: deposits	Total investment securities-to-total deposits	0.39	0.62	0.42	0.40	0.40	0.38
		(0.20)	(0.19)	(0.19)	(0.21)	(0.16)	(0.17)
	Gross loans-to-total deposits	0.77	0.85	0.85	1.00	0.76	0.84
		(0.13)	(0.23)	(0.17)	(0.14)	(0.15)	(0.17)
	Total borrowings-to-total deposits	0.17	0.48	0.28	0.42	0.20	0.22
		(0.18)	(0.22)	(0.24)	(0.23)	(0.16)	(0.18)
	Interest expense-to total deposits	0.04	0.06	0.05	0.06	0.04	0.04
		(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Firm size	Number of employees	1.59	1.86	0.99	2.52	1.55	0.97
		(7.17)	(5.79)	(3.41)	(6.56)	(4.71)	(3.54)
	Total assets	5675.85	6139.85	3597.21	8924.39	4939.88	3221.83
		(26051.60)	(14129.83)	(9650.73)	(19470.76)	(13605.38)	(9720.89)
	Gross loans	3234.76	3040.27	2122.76	5399.32	2573.98	1942.86
		(14500.33)	(7386.85)	(5534.40)	(11756.00)	(6704.23)	(5594.14)
	Total worldwide deposits	3363.06	3582.93	2300.46	5141.46	3250.13	2118.98
		(14726.69)	(8178.23)	(5681.58)	(10381.59)	(8579.67)	(5772.66)
	Total interest expense	191.86	205.67	118.13	291.83	142.74	103.29
		(891.64)	(473.38)	(326.72)	(649.53)	(400.43)	(326.24)
	Net income	43.09	56.03	34.87	87.48	56.40	30.25
		(174.81)	(116.29)	(83.34)	(179.80)	(171.90)	(77.65)
	Total borrowing	816.95	1745.82	890.77	2266.15	989.81	714.12
		(3507.16)	(3889.39)	(2698.08)	(4728.40)	(2935.55)	(2599.45)

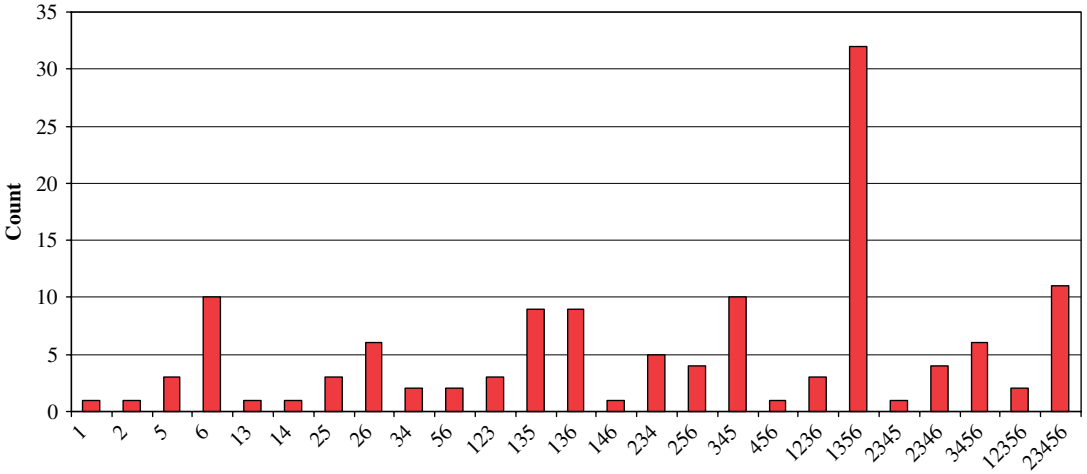

Figure 2. Strategic group membership. The numbers on the *x*-axis indicate to which strategic groups the banks belong. For example, 26 means the six banks in that bar belong to Strategic Groups 2 and 6, and 345 implies that the four banks belong to Strategic Groups 3, 4, and 5. This figure is available in color online at www.interscience.wiley.com/journal/smj

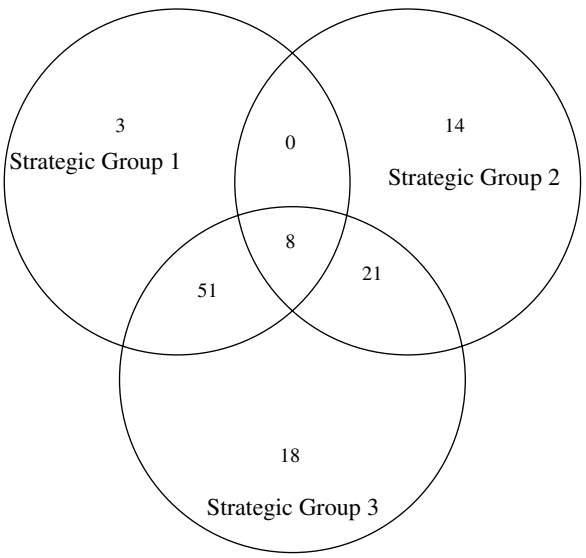

Figure 3. Example of hybrid and pure strategic groups competitive structures for Tri-State Banks Data. This classification reveals 80 hybrid strategic group firms in Strategic Groups 1, 2, and 3. The 51 hybrid strategic group firms belong to Strategic Groups 1 and 3 and thus compete with the firms in these two strategic groups. However, 8 of the 51 firms have membership in Strategic Group 2 as well, so they also compete with firms in Strategic Group 3

DISCUSSION

Overview

The concept of strategic groups offers the primary means to identify strategic recipes and assess competitive market structures, because firms within strategic groups compete more intensely with one another than do firms across strategic groups. Recent literature has begun to focus on differences in firms within strategic groups and distinguish core firms that closely resemble the group's strategic identity from secondary firms that selectively differentiate themselves (e.g., McNamara *et al.*, 2003; Peteraf and Shanley, 1997; Reger and Huff, 1993). Building on this literature, we conceptualize hybrid strategic groups that blend the strategic recipes of pure strategic groups to

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emerge with their own unique strategic postures and develop a levels theorization of competition, according to which competitive market structures vary between pure and hybrid strategic group firms. We develop a revised NORMCLUS, constrained, multi-objective classification procedure for assessing hybrid strategic groups. We illustrate the proposed hybrid strategic group framework and NORMCLUS methodology on the basis of archival data about 131 banks in the tri-state region, and find that a hybrid solution of six strategic groups outperforms traditional cluster analysis solutions that estimate only pure strategic groups with nonoverlapping clusters.

Limitations

Before interpreting the findings and elaborating on the contributions of our research, it is critical to recognize its limitations. Primarily, we are limited in our empirical illustration by the data that were used to identify hybrid strategic groups. One, we were limited in using the COMPUSTAT data which only contains data on public banks. Two, COMPUSTAT has limited data on bank strategy related variables. On the one hand, no collection of variables is able to capture every aspect of strategy, while on the other hand, such a limitation needs to be recognized. All work in strategic groups suffers from potential limitations of *omitted variables* given the proprietary nature of several strategy variables that are not available to researchers. For example, with respect to advertising and promotion, it is extremely rare that the researcher gains access to advertising budgets, media vehicles, advertising copy, promotion mix allocations, etc. for a complete set of competing firms, which are important strategic variables that help define competition among a typical set of firms. Nonetheless, this limitation does not take away from the theoretical and methodological contributions of our research, which we elaborate on subsequently.

Implications

To interpret the optimal six-hybrid strategic groups solution more clearly and discern the competitive market structures for the banks in our sample, we present the details of this solution in Figures 2–4. In Figure 2, we report the cross-classification of the banks into pure and hybrid strategic groups, which results in 25 strategic group configurations: four pure-group configurations, six dual pure-group/hybrid-group configurations, eight triple pure-group/hybrid-group configurations, five quadruple pure-group/hybrid-group configurations, and two quintuple pure-group/hybrid-group configurations. Only a few banks (15) belong to and follow the recipes of pure strategic groups. Solitary firms belong to both pure and hybrid strategic groups (e.g., National Australia Bank in SG1, Westpac Banking in HG14). Furthermore, the percentage of banks that blend recipes from four or more strategic groups exceeds the number of banks that blend strategies from either two or three strategic groups. In Appendix 2, we depict the classifications of these 131 banks into the various strategic groups.

Similar to Figure 1(B), we can use a Venn diagram to represent the competition between firms for select strategic groups. In Figure 3, we present one such case for the first three strategic groups of banks in our sample and thereby confirm that banks blend competitive strategies. From this analysis, certain trends emerge: many firms blend strategies from SG1 and SG3 ($n = 59$) and SG2 and SG3 ($n = 29$), and firms that blend strategies for SG1 and SG2 ($n = 8$) also incorporate the strategies of SG3. Such insights into the nature of hybrid strategic groups would be impossible without the consideration of nonoverlapping strategic groups (see Figure 1A). From a competitive perspective, Figure 3 also provides some macro information about how banks may be competing. The 51 banks that blend strategies from SG1 and SG3 compete more intensely than they do with the other banks represented in Figure 3. For these 51 banks, the next level of competition comes from banks in either the two pure strategic groups (SG1 and SG3) or the eight banks that blend strategies from SG1, SG2, and SG3.

To develop a micro-level understanding of competitive market structures for our hybrid strategic groups solution, we can derive competitive maps for firms in a pure strategic group such as SG5, as well as for firms in a hybrid strategic group such as HG13 (i.e., a blend of pure strategic groups SG1 and SG3). In Figure 4(A), we display the competition between firms in SG5 (i.e., Bank of New York, Bridge Bancorp, and Jeffersonville Bancorp), all headquartered in New York State. For these three banks, the next level of competition comes from other banks that blend strategies from SG2 with those of other strategic groups,

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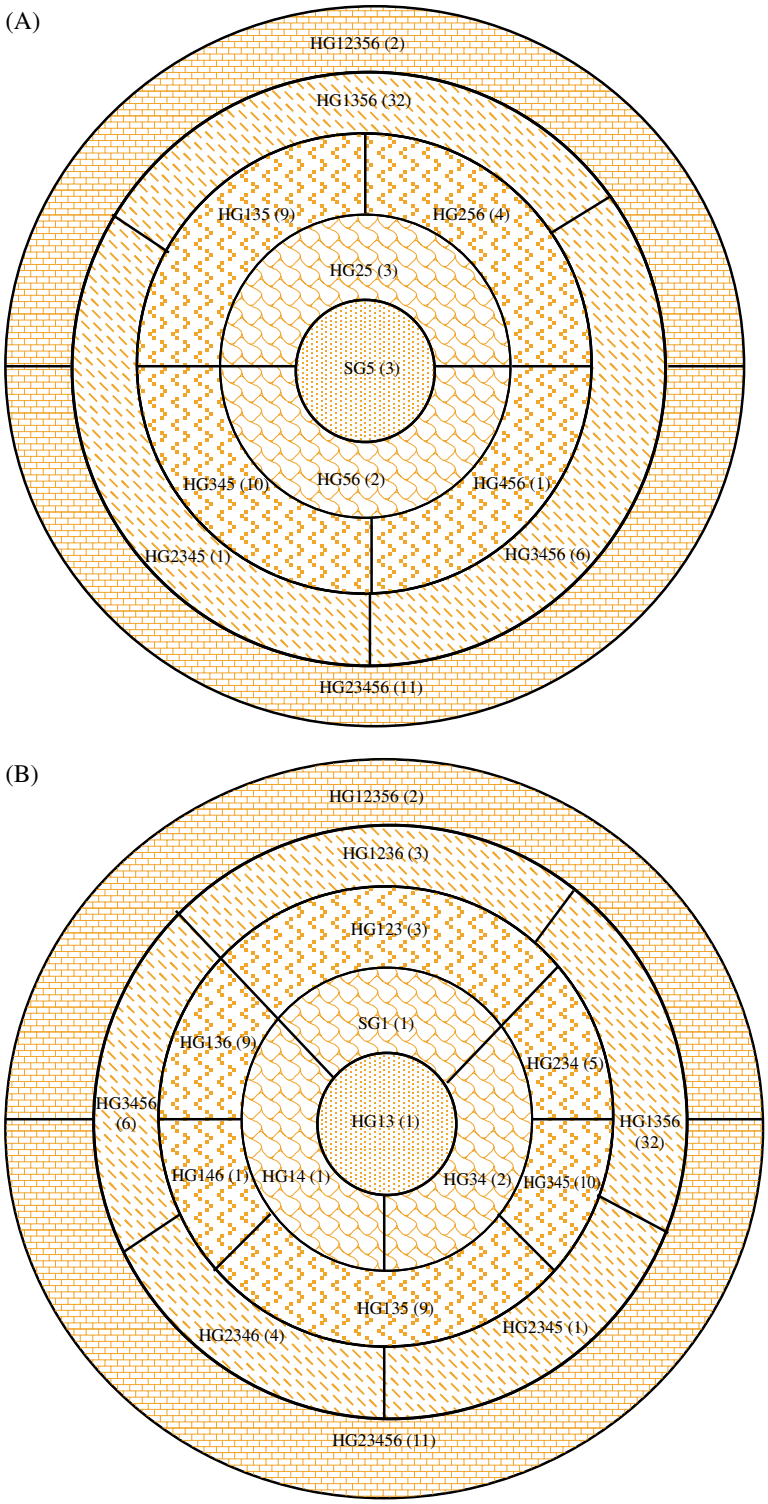

Figure 4. Example of pure and hybrid strategic group. (A) Competition for core group 5. (B) Competition for secondary group 13. SG, pure strategic group; HG, hybrid strategic group. Numbers in parentheses denote number of banks in the strategic group configuration. For example, SG5 implies pure strategic group 5; HG25 implies a mixture of pure strategic groups 2 and 5 that form hybrid strategic group 25. This figure is available in color online at www.interscience.wiley.com/journal/smj

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which in this case would be HG25 ($n = 3$) and HG56 ($n = 2$). We also chart the next level of competition, which comes from firms in strategic groups that blend the strategies of SG5 with two other strategic groups—for the banks in our sample, HG135 ($n = 9$), HG256 ($n = 4$), HG345 ($n = 10$), and HG456 ($n = 1$). Similarly, we can identify the subsequent level of competition that comes from firms that blend recipes from SG5 with those from three other strategic groups, as well as the final level of competition, which emerges from firms that blend strategies of SG5 with those of four other strategic groups.

Along similar lines, we can assess 'competition' explicitly for these derived hybrid strategic groups. We present the results for HG13, which consists of a solitary bank (i.e., Progress Bank Corp.), in Figure 4(B). For this bank, the first level of competition comes from hybrid groups that blend strategic recipes from at least one of the two pure strategic groups (SG1 or SG3) with another pure group or from banks in SG1 ($n = 1$, National Australia Bank) and SG3 (no bank). The relevant hybrid groups are HG14 ($n = 1$, Westpac Banking) and HG34 ($n = 2$, Ocean First Financial Corp. and Prestige Bancorp). Thus, we conclude that Progress Bank Corp. competes with the four banks listed in SG1, HG14, and HG34, but follows strategies that are not identical. Of course, if the strategies were completely identical, the banks would belong to the same pure or hybrid strategic group. Similarly, we can construct the hierarchy of competition for Progress Bank Corp. Unlike extant research, in which either no or all firms compete with solitary firms, the hybrid strategic groups conceptualization enables us to provide a more refined definition of competition. For Progress Bank Corp., we identify 100 competitors from our sample of 131 banks. Of these 100, the first-level competition comes from four banks, second-level competition from 37 banks, third-level competition from 46 banks, and the final level of competition comes from the remaining 13 banks.

Likewise, our results can provide insights into rivalries between firms, such as that between the Bank of New York and Mellon Bank, which is documented in the popular press (e.g., Motley Fool Web site gives an investor perspective: http://www.fool.com/News/mft/2006/mft06041825.htm, accessed April 25, 2006). The recent attempts of the Bank of New York to take over Mellon Bank have taken on the proportions of a soap opera (see http://money.cnn.com/1998/04/22/deals/mellon/, accessed April 25, 2006) and included a proposal for the Mellon Bank of New York (e.g., http://www.recordonline.com/1998/04/04–23-98/bankmerg.htm, accessed April 25, 2006). Our results show that the Bank of New York belongs to SG5, along with two other banks, and Mellon Bank belongs to HG25, along with two other banks. Thus, we find some differences in the strategies these two banks follow but also recognize that they compete (i.e., HG25 (Mellon Bank) blends SG1 and SG5 (Bank of New York)).

Finally, we identify the patterns that the banks in our sample use to blend strategic recipes from the six pure groups. As we show in Table 6, we identify considerable asymmetries in pure strategic group memberships. For example, the conditional probability of belonging to pure strategic group SG4, given that the firm is in pure strategic group SG5, is 0.35, nearly half the probability that it would belong to pure strategic group SG5, given that the firm is in pure strategic group SG4 (i.e., 0.69). This finding seems to suggest that SG5 firms are more likely to borrow competitive recipes from SG4 than are SG4 firms to borrow from SG5. This table of asymmetric strategic group memberships helps clarify the underlying pattern of the blending of strategic recipes in our sample.

Further research

Our research also raises several compelling research issues that urgently need to be addressed.

Table 6. Asymmetries in strategic group membership

		SG_c					
		1	2	3	4	5	6
SG_r	1	1.00	0.19	0.60	0.05	0.51	0.52
	2	0.13	1.00	0.30	0.50	0.25	0.33
	3	0.95	0.67	1.00	0.93	0.85	0.74
	4	0.03	0.49	0.40	1.00	0.35	0.25
	5	0.69	0.49	0.72	0.69	1.00	0.64
	6	0.76	0.70	0.68	0.55	0.69	1.00

SG_c and SG_r denote pure strategic group column and row, respectively. Numbers reflect the probability of observing the row strategic group given the column strategic group, or $P(SG_r|SG_c)$. For example, the probability a firm is in SG5 given it is in SG4 is 0.537. Asymmetry in strategic group membership occurs when $P(SG_r = n1|SG_c = n2) \neq P(SG_r = n2|SG_c = n1)$. Thus, when $n1 = 4$ and $n2 = 5$, the two probabilities are 0.537 and 0.611, exhibiting asymmetrical strategic group membership.

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Foremost, the issue of the dynamics of hybrid strategic groups is intriguing and theoretically compelling. Our research proposes the notion of hybrid strategic groups, so we do not delve into hybrid strategic group dynamics from either a theoretical or methodological perspective. If we were to speculate, pure groups (or even a single group, consistent with the industrial organization perspective) exist initially, and over time, blending occurs as more firms enter the industry and attempt to differentiate themselves. This blending could be driven by firm-level (e.g., innovative competitors with new business models) and environmental (e.g., changes in demand or technology) factors. Such a dynamic approach might indicate when deliberate decisions are involved in blending strategic recipes and when such blending occurs accidentally. Hybrid strategic group dynamics would also aid in assessing other important strategic issues such as the extent to which hybrid strategic groups is a strategic posture in its own right, or only a transition into one of the pure types. We hope this research compels scholars to explore the dynamics that underlie the formation of hybrid strategic groups further. Finally, another area for future consideration concerns the application of fuzzy classifications for modeling hybrid strategic groups.

CONCLUSION

Our research makes important theoretical and methodological contributions. From a theoretical standpoint, we extend an emerging theorization that characterizes firms as core, secondary, and solitary (McNamara *et al*., 2003; Reger and Huff, 1993) to propose the existence of pure and hybrid strategic groups and thereby develop competitive market structures (Figure 1B–D). Thus, similar to research that has used the notion of pure strategic groups to develop insights into competition among firms (e.g., Fiegenbaum *et al*., 2001; Smith *et al*., 1997), we use the notion of hybrid strategic groups to develop theoretical insights into competition among firms (Figures 1C, D, and 4). We also conceptually argue and empirically demonstrate that it is possible to derive competitive market structures for solitary firms—for example, we identify the 100 competitors of Progress Bank Corp.—whereas traditional literature would reason that solitary firms either do not compete with any firms or compete with all firms. From a methodological viewpoint, we devise a new approach for overlapping clustering through our modification of the NORMCLUS procedure. This methodology is the only multi-criterion classification procedure available for constrained classification permitting overlapping clusters that accommodates analyses of separate variable batteries. It also is sufficiently flexible to permit nonoverlapping and/or overlapping strategic groups. As we demonstrate, allowing for overlapping strategic groups nests the traditional nonoverlapping solution as a special case, and, as a result, our proposed methodology outperforms two well-known traditional clustering procedures. In addition, our new methodology may be applied in any strategic group context across any industry, given data availability. The procedure could be adapted easily to incorporate managerial perceptions or other forms of survey data as well as additional variable batteries. These contributions thus emphasize the merits of hybrid strategic groups and the benefits of the proposed NORMCLUS estimation procedure over traditional cluster analysis.

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APPENDIX 1: THE ALTERNATING LEAST-SQUARES ESTIMATION ALGORITHM

In stage one of this alternating least-squares algorithm, we wish to estimate the binary classification matrix **M**, holding **W** fixed. For this particular application, we devise a modified lambda-opt combinatorial optimization procedure (cf. Lin and Kernighan, 1973), with the following general steps:

A. Set $J = 0$; select n from $(1, 2, \ldots, I)$.
B. Set the maximum number of iterations (MAXIT); generate a random map of the sequence $1, \ldots, I$, indicating the order in which customer cluster memberships are altered. Evaluate Φ, and let $\Phi^* = \Phi$.
C. For n customers, change their cluster memberships randomly (i.e., alter n row vectors in $\mathbf{M} = ((m_{ir}))$, and check for the feasibility of all constraints. Iterate until feasibility is attained.
D. Set $J = J + 1$.
E. Evaluate Φ to improve. If there is improvement, set $\Phi = \Phi^*$, store the **M** that resulted from that solution, estimate **W** as discussed in Equation 9, and go to step B. If there is no improvement, return to previous **M, W**, and Φ^* values and go to step C, unless $J >$ MAXIT, in which case output the best solution.

The two-stage alternating least-squares estimation procedure devised to estimate **M** and **W** initially uses a combinatorial optimization procedure to find improvement in Equation 4 with respect to the binary elements in **M**, holding **W** fixed. If improvement is found, $\mathbf{W}^j$ is estimated in one step, holding the current estimate of M fixed, by

$$\mathbf{W}^j = (\mathbf{M}'\mathbf{M})^{-1}\mathbf{M}'\mathbf{X}^j. \quad (9)$$

APPENDIX 2: STRATEGIC GROUP MEMBERSHIP

Firm name	Strategic group configuration
NATIONAL AUSTRALIA BK-ADS	1
THISTLE GROUP HLDGS CO	2
BANK OF NEW YORK CO INC	5
BRIDGE BANCORP INC	5
JEFFERSONVILLE BANCORP	5
CODORUS VALLEY BANCORP	6
FULTON FINANCIAL CORP	6
GOUVERNEUR BANCORP	6
OMEGA FINL CORP	6
PAMRAPO BANCORP INC	6
PROVIDENT BANCP MONTEBELLO	6
ROME BANCORP INC	6
ROYAL BANCSHARES/PA -CL A	6
S and T BANCORP INC	6
TROY FINANCIAL CORP	6
PROGRESS FINL CORP	13
WESTPAC BANKING -SPON ADR	14
CENTER BANCORP INC	25
FMS FINANCIAL CORP	25
MELLON FINANCIAL CORP	25
FINGER LAKES BANCORP INC	26
FIRST COMMONWLTH FINL CP/PA	26
GA FINANCIAL INC	26
HUDSON CITY BANCORP	26
ONEIDA FINANCIAL CORP	26
WEST ESSEX BANCORP	26
OCEANFIRST FINANCIAL CORP	34
PRESTIGE BANCORP INC	34
BRIDGE VIEW BANCORP	56
BRUNSWICK BANCORP INC	56
ESB FINANCIAL CORP	123
ROSLYN BANCORP INC	123
USABANCSHARES.COM INC	123
ALLIANCE FINANCIAL CORP/NY	135
CNB BANCORP INC	135
COMMUNITY BK SYS INC	135
DNB FINANCIAL CORP	135
FIRST COLONIAL GROUP INC	135
LONG ISLAND FINANCIAL CORP	135
SUN BANCORP INC/NJ	135
THREE RIVERS BANCORP INC	135

(*continued overleaf*)

Firm name	Strategic group configuration
TRUST CO NJ JERSEY CITY	135
BSB BANCORP	136
CHESTER VY BANCORP INC	136
COMMUNITY FINL GROUP INC	136
INTERVEST BANCSHARES CORP	136
LAUREL CAP GROUP INC	136
NORTHWEST BANCORP INC	136
PARKVALE FINL CORP	136
REPUBLIC FIRST BANCORP INC	136
WILLOW GROVE BANCORP INC	136
CNBC BANCORP	146
ASTORIA FINL CORP	234
FIDELITY BANCORP INC/PA	234
PATRIOT BANK CORP	234
WVS FINANCIAL CORP	234
YARDVILLE NATIONAL BANCORP	234
BERKSHIRE BANCORP INC	256
FIRST LONG ISLAND CORP	256
PHSB FINANCIAL CORP	256
STERLING BANCORP/NY	256
ARROW FINL CORP	345
CARVER BANCORP INC	345
FIRST NIAGARA FINANCIAL GRP	345
GREATER COMMUNITY BANCORP	345
NORTH FORK BANCORPORATION	345
NSD BANCORP INC	345
PATHFINDER BANCORP INC	345
SUSQUEHANNA BANCSHARES INC	345
UNITED NATIONAL BANCORP/NJ	345
VALLEY NATIONAL BANCORP	345
BRYN MAWR BK CORP	456
AMERISERV FINANCIAL INC/PA	1236
FIRST KEYSTONE FINL INC	1236
HARLEYSVILLE SVGS FINL CORP	1236
1ST CONSTITUTION BANCORP	1356
CNB FINL CORP PA	1356
COMM BANCORP INC	1356
COMMERCIAL NATL FINL CP/PA	1356
COMMUNITY BANCORP/NJ	1356
EVANS BANCORP INC	1356
FINANCIAL INSTITUTIONS INC	1356
GREENE COUNTY BANCORP INC	1356
HARLEYSVILLE NATL CORP/PA	1356
HUDSON UNITED BANCORP	1356
INTERCHANGE FINL SVCS CP/NJ	1356
LAKELAND BANCORP INC	1356
LIBERTY BANCORP INC/NJ	1356
MID PENN BANCORP INC	1356
N B T BANCORP INC	1356
NORWOOD FINANCIAL CORP	1356
PEAPACK-GLADSTONE FINL CORP	1356
PENNS WOODS BANCORP INC	1356
PENNSYLVANIA COMM BANCORP	1356
PSB BANCORP INC	1356
PULASKI BANCORP INC	1356
SOUND FEDERAL BANCORP	1356
STATE BANCORP/NY	1356
STERLING FINANCIAL CORP	1356
SUFFOLK BANCORP	1356
SUSSEX BANCORP	1356
SVB FINANCIAL SERVICES INC	1356
TOMPKINSTRUSTCO INC	1356
TRUSTCO BANK CORP/NY	1356
UNITY BANCORP INC	1356
UNIVEST CORP	1356
VISTA BANCORP INC	1356
STATEN ISLAND BANCORP INC	2345
DIME COMMUNITY BANCSHARES	2346
FLUSHING FINANCIAL CORP	2346
PENNFED FINANCIAL SVCS INC	2346
WARWICK CMNTY BANCORP INC	2346
COMMONWEALTH BANCORP INC	3456
F N B CORP/FL	3456
FIRST CHESTER CNTY CORP	3456
HUDSON RIVER BANCORP INC	3456
INDEPENDENCE CMNTY BK CORP	3456
M and T BANK CORP	3456
CITIZENS and NORTHERN CORP	12,356
HUDSON VALLEY HLDG CORP	12,356
ALLIED IRISH BANKS -SP ADR	23,456
FIRST SENTINEL BANCORP INC	23,456
GREENPOINT FINANCIAL CORP	23,456
LEESPORT FINANCIAL CORP	23,456
NEW YORK CMNTY BANCORP INC	23,456
NORTHEAST PA FINL CORP	23,456
PENNROCK FINANCIAL SVCS	23,456
SOVEREIGN BANCORP INC	23,456
SUN BANCORP	23,456
TF FINANCIAL CORP	23,456
U S B HOLDING INC	23,456

A strategic group configuration of 5 implies the banks belongs to core Strategic Group 5; a strategic group configuration of 1356 implies that the firms belong to a secondary strategic group that blends the strategies of core Strategic Groups 1, 3, 5, and 6.