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COMPETITIVE DYNAMICS OF INTERFIRM RIVALRY

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In this study, we examined how firm-specific competitive conditions influence firms' patterns of market entry and exit, focusing on two features of firms' competitive conditions: market domain overlap, which measures the potential for competition, and multimarket contact, which measures the potential for mutual forbearance. A dynamic analysis of California commuter airlines from 1979 through 1984 showed that increases in market domain overlap raised airlines' rates of market entry and exit, but increases in multimarket contact lowered them, especially in markets clearly dominated by a single airline. Thus, paradoxically, close competitors are not the most intense rivals: airlines that meet in multiple markets are less aggressive toward each other than those that meet in one or a few markets.

In the literature on interfirm competition, there are two conceptions of competition, one emphasizing the structure of markets and the other emphasizing the conduct of individual firms (Hannan & Freeman, 1989: 139–140; Porter, 1980: 3–5; Scherer & Ross, 1990: 15–16). In economic theory, for example, competition is a property of market structure whose form is determined by market forces not subject to the conscious control of individual firms. Similarly, in organizational ecology, competition occurs as largely anonymous organizations vie for a limited common pool of resources. These definitions of *competition* differ markedly from conceptions of *rivalry.* The essence of rivalry is a striving by firms for potentially incompatible positions (Caves, 1984; Scherer & Ross, 1990): "Firms feel the effects of each other's moves and are prone to respond to them" (Porter, 1980: 88). This interplay is akin to what Hannan and Freeman (1989: 140) referred to as direct competition, which occurs when firms, directly identifiable to each other, vie for the same resources.

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This study explored the relationships between firm-specific competitive conditions and patterns of interfirm rivalry. Competition may be studied at multiple analytical levels. Researchers have paid little attention to how the market positions of firms affect the dynamics of such strategic behavior, instead treating competitive conditions as properties of markets, industries, or populations (Hannan & Freeman, 1989; Scherer & Ross, 1990; Tirole, 1988). The aggregate approach to competition fails to recognize the relational nature of competition and rivalry and neglects variations in firms' strategic interactions that depend on firm-specific competitive conditions (Barnett, 1993). Yet, for organization and strategic management theory, the primary concern is firms and their relationships. Firms constantly take offensive and defensive actions in their quests for competitive advantage vis-à-vis competitors. A basic knowledge of the drivers of these strategic interactions is thus central to organization and strategic management theory (Chen & MacMillan, 1992; Smith, Grimm, & Gannon, 1992). Thus, there is a need to focus on firm-specific competitive conditions in addition to competitive conditions at the industry or population level.

In our firm-specific approach, every firm in an industry is conceived to occupy a potentially unique *market domain*—defined by activity in various product-client markets—that delineates its location in a multimarket resource space. Our definition of a market follows that of Abell, who defined a product market as "a set of goods and services that serve similar functions, are created with the use of similar technology, and are used by similar users" (1980: 17). Market domain refers to the set of markets in which a firm operates. Depending on the particular market domains they target, firms encounter different rival firms and face different firm-specific competitive conditions. We examined how firm-specific competitive conditions affect patterns of rivalry by focusing on two of their features: *market domain overlap* (Baum & Singh, 1994a, 1994b; McPherson, 1983), which measures the potential for competition at the firm level, and *multimarket contact* (Edwards, 1955; Karnani & Wernerfelt, 1985), which measures the potential for mutual forbearance at the firm-market level (i.e., one market in a firm's market domain). We also considered how market-level competitive conditions (e.g., market density) affect firms' choices about which new markets to enter and which current markets to exit. In addition, we explored the possibility that multimarket contact effects are not pervasive but depend on (1) the extent to which firms dominate particular markets and (2) the degree of concentration in a firm's markets.

Theories of interfirm competition agree that, in general, the greater the degree of overlap between a focal firm's market domain and the market domains of other firms, the greater the intensity of competition the focal firm experiences (Hannan & Freeman, 1977, 1989; Porter, 1980; Scherer & Ross, 1990; Tirole, 1988). However, firms with high market domain overlap frequently encounter each other simultaneously in multiple product or geographic markets. For example, airlines frequently vie for passengers on multiple routes, banks and retail chains compete with each other in multiple regional markets, and diversified companies meet in multiple client and product markets. As the degree of multimarket contact between firms in a given market increases, their aggressiveness toward each other in that market may be tempered by the possibility of multimarket retaliation. This tempering of aggressiveness is known as *mutual forbearance* (Edwards, 1955). Thus, firms that are close competitors may not be intense rivals.

In this research, we investigated longitudinally the influence of firm-specific competitive conditions on competitors' actions. Despite Caves's (1984: 127) appeal for research on "rivalrous moves among incumbent producers," only a few empirical studies have examined factors shaping patterns of interfirm rivalry (Chen & MacMillan, 1992; Chen & Miller, 1994; Chen, Smith, & Grimm, 1991; Cotterill & Haller, 1992; Miller & Chen, 1994; Smith et al., 1992), and even fewer have attempted to link patterns of interfirm rivalry to firm-specific competitive conditions (Barnett, 1993; Baum & Singh, in press). Moreover, although there is great interest in the dynamics of firms' strategic behavior and the evolution of competitive advantage over time, strategic interaction is typically studied at given points in time and rarely modeled dynamically (Porter, 1991). New insights into why the strategies of some firms lead to competitive superiority over time but those of others do not may therefore be gained by examining how firms' market domain overlap and multimarket contact influence the dynamics of interfirm rivalry.

The range of possible competitive actions available to firms varies from tactical moves, such as price cuts, promotions, and service improvements, which require limited, rather general resources, to strategic moves—domain changes, facilities expansions, strategic alliances, new product or service introductions—which require more substantial commitments of specific resources and are more difficult to reverse (Chen & MacMillan, 1992; Miller & Chen, 1994; Smith, Grimm, Gannon, & Chen, 1991; Smith et al., 1992). For example, market entries often require new equipment or market-specific investments in personnel, capital, and promotion (or both). By comparison, although they free resources and reduce costs, firms' market exits may require them to abandon assets, lock them out of particular markets and, more generally, raise questions about their viability. Firms' market entries and exits are key among strategic moves (Caves & Porter, 1977; Miller & Chen, 1994; Scherer & Ross, 1990; Tirole, 1988). Such competitive and countercompetitive actions represent clear, offensive challenges that invite competitor responses on the one hand, and obvious signals of retreat or acquiescence on the other (van Witteloostuijn & van Wegberg, 1992).

Given the emphasis on entry rivalry in the strategic management literature (e.g., Caves, 1982; Karnani & Wernerfelt, 1985; Porter, 1980), we think market entry provides a useful theoretical proxy for the intensity of rivalry—the higher the entry rate, the more intense the rivalry (Caves, 1984; Porter, 1980, 1985). For example, Karnani and Wernerfelt (1985) predicted that "defending" (i.e., matching an entrant's price) and "counterattacking" (reciprocal entry) would be the most likely responses of a firm to a rival's entry into its home market or markets. Although price warfare may often be the outcome of market entry, other possible outcomes include market exit by the losing firm or exit by a firm that chooses to yield to the dominant rival in that market without ever engaging in competition (Barnett, 1993; Edwards, 1955). Thus, market exit also provides a valuable proxy for the intensity of rivalry: the more intense the rivalry, the higher the rate of defensive or conciliatory market exit (Barnett, 1993; Edwards, 1955; van Witteloostuijn & van Wegberg, 1992).

Market entries and exits are also substantive because they represent the primary way in which firms define and redefine their market positions and establish or avoid market contact with each other (Cotterill & Haller, 1992; Haveman, 1993). Studying these market moves permitted us to examine how patterns of market domain overlap and multimarket contact evolved among competitors over time. Moreover, we could focus directly on the micro-macro link that is frequently ignored in social theorizing (Coleman, 1987). This focus is possible because the relationship between the emergent competitive structure and firms' actions is dynamic and iterative. The macro-level competitive structure alters the interests and opportunities individual firms perceive, moderating their patterns of market entries and exits, which in turn cumulatively alter the competitive relationships among firms and the macro competitive structure for future periods. Therefore, in this study, we examined how firms' degrees of market domain overlap affect rates of market entry and exit at the firm level and how multimarket contact affects these patterns at the firm-market level in a dynamic analysis of the California airline industry from January 1979 to December 1984.

MARKET DOMAIN OVERLAP AND INTERFIRM COMPETITION

According to strategic, economic, and ecological models, similarity in resource requirements is a major determinant of the potential for competition among firms: the more similar the resource requirements, the greater the potential for competition (Aldrich, 1979; Hannan & Freeman, 1977, 1989; Porter, 1980; Scherer & Ross, 1990; Tirole, 1988). At one extreme, firms with identical resource requirements (identical market domains) are perfect competitors. At the other, firms with distinct resource requirements (distinct market domains) do not compete at all. More formally, in organizational ecology the potential intensity of competition between firms is proportional to the overlap of their resource requirements (Hannan & Freeman, 1977; McPherson, 1983). Thus, the more similar the resource requirements of a focal firm to those of other firms, the greater the intensity of competition it is likely to experience. Below, we elaborate the more formal ecological specification of competition that underlies our conceptualization and locate market domain overlap within it.

Imagine a firm in an infinitely rich resource environment with an unlimited number of markets and no limits to growth. Define the unrestricted rate at which firm i grows under these conditions as r_i. In this hypothetical situation, the growth of firm i can be described by the following differential equation:

$$\frac{dm_i}{dt} = r_i m_i, \tag{1}$$

where m_i is the actual number of markets firm i serves. This simple equation does not describe a real firm because there are always limits to growth. One such limitation is the availability of resources. Define the carrying capacity of the environment for firm i as M_i, the number of potential markets for firm i. Now, the growth rate will be a function of the number of markets actually served, the carrying capacity, and the unrestricted growth potential:

$$\frac{dm_i}{dt} = r_i m_i \frac{M_i - m_i}{M_i}. \tag{2}$$

Equation 2 is a form of Lotka-Volterra equation in which a firm's growth rate depends on the proportion of the carrying capacity that remains unexploited (McPherson, 1983). Equation 2 does not consider competition between firm i and other firms for customers in its markets. We can take competition into account by modifying Equation 2 to reflect the proportion of firm i's carrying capacity that firm j uses:

$$\begin{aligned} \frac{dm_i}{dt} &= r_i m_i \frac{M_i - \alpha_{ij} m_j - m_i}{M_i} \\ \frac{dm_j}{dt} &= r_j m_j \frac{M_j - \alpha_{ji} m_i - m_j}{M_j}. \end{aligned} \tag{3}$$

The two formulas in Equation 3 show that the environment now contains two firms, which affect each other's growth through competition for scarce customers in common markets. The terms α_{ij} and α_{ji} are the coefficients of competition between i and j. These coefficients equal one when i and j occupy identical markets (i.e., identical market domains). They may be thought of as the proportional effect of the presence of j on the carrying capacity of i. Equation 3 can be generalized to n competitors as follows:

$$\frac{dm_i}{dt} = r_i m_i \left[M_i - \frac{\sum_{i=1} \alpha_{ij} m_j - m_i}{M_i} \right], \ \alpha_{ii} = 1. \tag{4}$$

Competition is difficult to observe directly because it is often indirect. Consequently, empirical researchers in organizational ecology typically do not use the Lotka-Volterra model to estimate alphas directly from data. Instead, they look for ways to study competition indirectly. One way to do this is to exploit the relationship between niche overlap and competition in ecological theory to obtain measures of the *potential* for competition from overlap of niches defined in terms of observed utilization of resources (Hannan & Freeman, 1989: 103). Supporting this approach, which we adopted here, research studies on banks (Banaszak-Holl, 1992), health maintenance organizations (Wholey, Christianson, & Sanchez, 1992), and life insurance companies (Ranger-Moore, Breckenridge, & Jones, 1995) all support the idea that firms of similar sizes compete more intensely (have larger negative influences on each other's growth and survival) because they use similar strategies and thus depend on similar mixes of resources. Baum and Mezias (1992) showed that hotels more similar to one another in terms of size, geographic location, and price—all related to patterns of resource utilization—compete more intensely than hotels that are less similar on these dimensions. Baum and Singh (1994a, 1994b) also showed that similarity in the ages of targeted children and geographic location increased competition among day care centers.

Market Domain Overlap and the Dynamics of Market Entry and Exit

How do firms respond to competition? Swaminathan and Delacroix (1991) suggested that firms not only respond to market overcrowding by dying (Hannan & Freeman, 1977, 1989) but also do so by searching for alternative ways to sustain themselves. Swaminathan and Delacroix (1991; cf. Delacroix, Swaminathan, & Solt, 1989) followed Hawley (1950: 201–203), who argued that firms become differentiated as competitive pressures push less-fit competitors out of the market. Losing firms are transformed either through territorial or functional differentiation by entrepreneurs seeking out distinct functions in which they hold a competitive advantage. This differentiation is adaptive because it lowers the intensity of competition by reducing the number of firms in direct competition for the underlying resource or resources, and thus, the degree of market domain overlap. This idea has been supported in studies of the California wine industry, which showed how differentiation occurred in response to competition and how migration into a neighboring market niche (table wines) lowered the competitive pressures California wineries faced (Delacroix et al., 1989; Swaminathan & Delacroix, 1991). Additional support comes from Baum and Singh's (in press) study of day care centers and Haveman's (1994) study of U.S. savings and loan companies, which reveal the sensitivity of market entry and exit patterns to changes in competition.

Since greater market domain overlap implies greater potential for interfirm competition for resources, we expected market domain overlap to be positively related to the level of firms' search for alternate ways to sustain themselves. Market entry and exit may both serve as responses to overcrowding in a firm's current market domain: Diversification into new markets can moderate competition in the current market domain, and market withdrawal (either by choice or force) can reduce competition by avoiding its direct effects. Therefore,

> *Hypothesis 1a: Firms' market entry rates are positively related to their degree of market domain overlap.*
>
> *Hypothesis 1b: Firms' market exit rates are positively related to their degree of market domain overlap.*

Market Density

Hypotheses 1a and 1b are not sensitive to the point that firms are likely to be selective about which markets they enter and exit; the hypotheses address the effects of firm-specific differences in competitive conditions but not the question of how variation in market-level competitive conditions affects choices about which new markets to enter and which current markets to exit. Haveman (1994) suggested that entry into new markets is *density dependent* (Hannan & Carroll, 1992), or dependent on the number of firms operating in the market. Haveman argued that *market density* (i.e., the number of firms operating in a market) affects both the market's perceived legitimacy and its level of competition. When market density is low, an increase in density signals the legitimacy (and viability) of the market, encouraging more firms to enter—the success of incumbent firms creates a legitimate market that others consider entering. In contrast, when market density is high, a crowding or competitive effect dominates, and further increases in market density lower the entry rate. Combined, these arguments imply an inverted U-shaped relationship between a market's density and the rate of entry into it. Haveman (1994) provided evidence of density-dependent market entry in U.S. savings and loan companies. A parallel argument can be made for market exit rates by assuming that exit is proportional to market competition and inversely proportional to market viability (Hannan & Carroll, 1992). Therefore,

> *Hypothesis 2a: Firms' rates of entry into a market are related in an inverted U-shaped manner to the number of firms in the market.*
>
> *Hypothesis 2b: Firms' rates of exit from a market are related in a U-shaped manner to the number of firms in the market.*

MULTIMARKET CONTACT AND MUTUAL FORBEARANCE

The foregoing discussion is based on the premise that a high degree of overlap between the market domains of a focal firm and other firms in the same industry results in more intense competition for the focal firm. However, firms with overlapping market domains frequently encounter each other in multiple product or geographic markets, and these encounters may influence the degree of rivalry significantly. When firms meet in multiple markets, they may hesitate to contest a given market vigorously because the prospect of an advantage in one market must be weighed against the danger of retaliatory attacks in other markets (Edwards, 1955). Of course, retaliation involving simultaneous attacks in a number of markets can be much more damaging than retaliation in a single market (Porter, 1984). Moreover, retaliation can take place in markets in which the retaliator's potential losses are small relative to the aggressor's, forcing the aggressor to bear higher costs for its rivalrous actions (Porter, 1984).

The outcome of multimarket interaction (for example, after a series of reciprocal entry moves) may therefore be a reduction in rivalry. Recognizing the interdependence of their operations, firms interacting in multiple markets are inclined to cooperate since each can gain by allowing the other to be superordinate in some markets in exchange for similar treatment in others (Edwards, 1955; Simmel, 1950). Such mutual forbearance is more likely to occur with multimarket contact because there is more scope for firms both to reward one another for not attacking and to discipline one another for aggression (Porter, 1980, 1984). A high degree of interconnectedness, which enhances firms' knowledge about each other, may also play a central role in facilitating the formation of implicit coordination agreements among multimarket competitors (DiMaggio & Powell, 1983; Oliver, 1991). Thus, the aggressiveness of multimarket firms will likely be tempered by the possibility of multimarket retaliation, and this tempering may undermine the force of potential competition, or market domain overlap (van Witteloostuijn & van Wegberg, 1992).[1]

In a theoretical analysis, Bernheim and Whinston (1990) offered the first formal evaluation of mutual forbearance. They showed that with perfect monitoring, identical firms, identical markets, and constant returns to scale, multimarket contact does not affect opportunities for tacit cooperation. However, they also established that under a variety of plausible conditions (for instance, when firm production costs, number of competitors, and demand growth rates vary across markets), multimarket contact can facilitate tacit coordination by relaxing the incentive constraints governing tacit agreements among firms.

Empirical studies of multimarket contact have generally found significant effects; however, the sign of the effect has varied. For example, in several cross-sectional multi-industry studies, Scott (1982, 1991) found higher profits where multimarket contact and concentration were high. In another cross-sectional multi-industry study, Feinberg (1985) found higher cost-price margins at moderate levels of concentration only. In longitudinal studies of bank holding companies, Heggestad and Rhoades (1978) found greater stability in the market shares of banks in local markets with greater multimarket contact, and Martinez (1990) found greater stability in the size rankings of banks in local markets with high multimarket contact. In three longitudinal analyses, Cotterill and Haller (1992) found that entry into local markets by large U.S. supermarket chains was less likely when the number of other large chains incumbent in the market was high, Barnett (1993) found that multimarket contact lowered rates of exit from state markets in the customer premises equipment service sector of the U.S. telephone industry, and Evans and Kessides (1994) found that airlines set higher fares on routes when competing carriers had higher average levels of multimarket contact.

However, several other cross-sectional studies of banks and savings and loan associations (Alexander, 1985; Mester, 1987; Strickland, 1980; White-

[1] Although the concept was developed originally in the context of large conglomerates (e.g., Edwards, 1955), mutual forbearance can exist among any multimarket firms, including single-product firms such as banks and airlines that operate in a number of distinct geographic markets (Bernheim & Whinston, 1990).

head, 1978) have shown that when multimarket contact was high, rivalry (measured as market share stability, return on assets, profits, service charges, and loan rates) was more intense, contradicting the mutual forbearance hypothesis. Still other studies have shown no effects of multimarket contact. For example, in a cross-sectional study of the effect of conglomerates' interdependence across markets on intramarket profitability, Strickland (1980) found no evidence of mutual forbearance and, in a longitudinal study, Rhoades and Heggestad (1985) found no effect of multimarket contact on performance in local banking markets.

Three limitations of multimarket contact research may account for its ambiguity. First, although "instances of forbearance should vary not so much from market to market as from relationship to relationship—even within markets" (Barnett, 1993: 254), past studies have used either market- or firm-wide indexes of multimarket contact. Such measures neglect the relational nature of multimarket contact and obscure variations in strategic interaction between particular firms in specific markets that depend on the degree to which they are multimarket rivals. Second, tests of the mutual forbearance hypothesis typically examine the effects of multimarket contact on variables only indirectly related to rivalry (e.g., firm performance and market stability). Despite the behavioral nature of interfirm rivalry, empirical research on multimarket contact has not, with few exceptions, formulated and tested models of strategic interaction (Barnett, 1993; Cotterill & Haller, 1992). Third, the assumption of the primarily cross-sectional study designs, that strategic interactions are characterized by steady-state equilibrium conditions, seems dubious (Barnett, 1993). Under disequilibrium conditions, cross-sectional analysis will result in incorrect conclusions, since observed levels of rivalry will not yet reflect current competitive conditions.

To address these limitations, in this study we measured multimarket contact at the firm-market level. The firm-market level represents one market within a particular firm's market domain. We examined the effects of multimarket contact on patterns of strategic action directly, focusing on firms' entries into and exits from each other's markets, and employed models that are explicitly dynamic, depicting the effects of multimarket contact in terms of its influence on firms' rates of market entry and exit.

Multimarket Contact and the Dynamics of Market Entry and Exit

The mutual forbearance hypothesis implies that rivalry will be weaker among multimarket competitors. Specifically, as multimarket contact between a focal firm i and another firm j increases, the likelihood that i and j will behave aggressively toward each other decreases. Thus, the foregoing discussion of multimarket contact has important implications for patterns of competitive and countercompetitive market entry and exit moves (van Witteloostuijn & van Wegberg, 1992). Table 1 summarizes our basic arguments.

In markets in which multimarket contact is low, each firm has an incentive to establish a foothold in at least some of the same markets as other firms in order to signal its ability to engage effectively in multimarket retalia-

TABLE 1
Effects of Multimarket Contact on Rates of Market Entry and Exit

Multimarket Contact	Market Entry Rate	Market Exit Rate
Low	Stimulated by • Aggressive interactions among firms that meet in one or only a few markets • Incentive to establish a foothold to signal ability to counterattack	Stimulated by • Aggressive interactions among firms that meet in one or only a few markets
High	Suppressed by • Recognition of mutual dependence and potential for multimarket retaliation • Live-and-let-live agreements that have evolved	Suppressed by • Decreased aggressiveness that follows recognition of mutual dependence and potential for multimarket retaliation • Live-and-let-live agreements that have evolved

tion should it come under attack (Karnani & Wernerfelt, 1985). However, as multimarket contact increases and firms recognize their competitive interdependence, each firm has an incentive to avoid entering a new market that is currently occupied by firms that it already meets in multiple markets to discourage potential multimarket retaliation as well as to honor any tacit superordination-subordination agreements that have evolved (Edwards, 1955; Simmel, 1950).

At the same time, as multimarket contact increases, each multimarket firm has an incentive to remain in markets it occupies with firms it meets in multiple markets to signal its ability to respond swiftly to rivalrous actions in a given market as well as to impose multimarket retaliation in response to aggressive actions in other markets. The likelihood of a firm's exiting a market may also decline as increases in multimarket contact with its competitors in that market diminish the aggressiveness of its competitors. Conversely, as a result of mutual forbearance, multimarket firms may tend to behave aggressively toward firms they meet in one or only a few markets (Barnett, 1993). If multimarket firms forbear from aggressive behavior toward each other, their competitive resources may be directed toward those rivals they meet in one or a few markets. Thus, multimarket firms can have low multimarket contact with other firms, multimarket as well as nonmultimarket, and when they do, they may be fierce rivals. Therefore,

> *Hypothesis 3a: Firms' entry rates into a market will be lower when potential entrants have high multimarket contact with the incumbents in that market.*

> *Hypothesis 3b: Firms' exit rates from a market will be lower when incumbents have high multimarket contact in that market.*

Spheres of Influence

Hypotheses 3a and 3b rest on the assumption that multimarket contact effects are ubiquitous. Is the fact that firms compete simultaneously in multiple markets sufficient to evoke mutual forbearance? A basic premise of the mutual forbearance hypothesis is that firms interacting in multiple markets are inclined to cooperate since each can gain by allowing the other to be superordinate in its dominant market or markets in exchange for similar treatment in its own dominant market or markets (Edwards, 1955; Simmel, 1950). For example, Edwards reasoned that firms have an incentive to stake out certain markets or "spheres of influence" in which they dominate competition and to refrain from competing aggressively in the spheres of their multimarket rivals—as long as their own spheres are similarly respected. A firm's sphere of influence includes all markets in which it has the largest market share. Some firms have no spheres of influence because they are subordinate actors in all markets in which they operate. The greater the number of firms with spheres of influence, the more prevalent reciprocal subordination and superordination and thus, mutual forbearance, become. This implies that multimarket contact effects may not be pervasive but may depend on the extent to which firms dominate particular markets. Therefore,

> *Hypothesis 4a: Multimarket contact lowers entry rates most in markets dominated by a single firm.*
>
> *Hypothesis 4b: Multimarket contact lowers exit rates most in markets dominated by a single firm.*

Market Concentration

Like mutual forbearance arguments, oligopoly theory is also concerned with interfirm coordination. In oligopoly theory, collusion (tacit or purposive) among firms is viewed as occurring because firms recognize their mutual dependence. However, in oligopoly theory, coordination derives from market concentration (small numbers of sellers, each with market power), not from multimarket contact or reciprocal superordination-subordination agreements (Scherer & Ross, 1990: 315). For example, Stocking contended that "the well-known monopolistic solutions of division of markets and division of fields . . . the-live-and-let-live policy can readily be brought within the scope of oligopoly theory. The problem apparently is one of fewness of sellers or relative, not absolute, size" (1955: 355). Thus, by creating barriers to entry on the one hand, and increasing possibilities for interfirm coordination on the other, increasing concentration in a market lowers rates of entry into and exit from the market (Scherer & Ross, 1990). In its strongest form, this view implies that multimarket firms behave in each market like independent firms and that rivalry in a given market is determined solely by factors within that market (Stocking, 1955: 355). These arguments suggest

> *Hypothesis 5a: Firms' entry rates into a market are negatively related to concentration in that market.*

Hypothesis 5b: Firms' exit rates from a market are negatively related to concentration in that market.

By comparison, "linked oligopoly" theory (Solomon, 1970) presents a view more similar to mutual forbearance. It suggests that an important determinant of performance in oligopolistic markets is the degree of linkage between that market and others, or firms' presence in multiple markets. Solomon argued that markets must be viewed as linked clusters if the behavior of multimarket firms is to be understood. Thus, like the mutual forbearance perspective, linked oligopoly theory assumes that multimarket firms coordinate their operations across markets and that this coordination affects the intensity of rivalry. Consequently, considering only the structure of individual markets may be misleading because multimarket contact may reduce rivalry, even in unconcentrated markets (Heggestad & Rhoades, 1978).

Taken together, these arguments suggest that the structure of particular markets within which firms meet, especially the degree of concentration in those markets, is likely to affect the relationship between multimarket contact and mutual forbearance. In particular, it seems likely that mutual forbearance will be more feasible in concentrated markets. The explanation for this hypothesis is that it is easier for oligopolists who are also multipoint rivals to collude and forbear from intense rivalry—even easier than it is for multipoint rivals in less concentrated markets to do so. Thus, multimarket contact can potentially strengthen oligopolistic coordination within specific markets. Theoretical analysis (Bernheim & Whinston, 1990), empirical research, (Scott, 1982, 1991), and experimental research (Phillips & Mason, 1992) support the idea that mutual forbearance will be greatest when market concentration is high. The foregoing arguments suggest

Hypothesis 6a: Multimarket contact lowers entry rates most in highly concentrated markets.

Hypothesis 6b: Multimarket contact lowers exit rates most in highly concentrated markets.

METHODS

Data Description

The hypotheses were tested using data describing the route (i.e., city-pair markets) changes of all commuter air carriers based in the state of California from January 1, 1979, the start of the first year after deregulation, to December 31, 1984.[2] Thus, following other studies of the airline industry (e.g., Borenstein, 1989; Chen & MacMillan, 1992; Evans & Kessides, 1994; Gimeno & Woo, 1994; Miller & Chen, 1994; smith & Wilson, 1995), we defined

[2] The sample also includes two certificated regional airlines (Air California and Pacific Southwest), which we include because they served many of the same routes as the commuter air carriers and, thus, are potential rivals of them. In a supplementary analysis, we found that removing these two airlines from the analysis did not change our main findings substantively.

commuter air carriers' markets in geographic terms. We compiled the event histories for each airline using the *Official Airline Guide (North American Edition)*. The guide contains detailed information on the routes of airlines serving North America. It is the most comprehensive historical listing of commuter air carriers and their routes. The Bernheim-Whinston (1990) conditions, outlined above, suggest the airline industry is ideal for testing mutual forbearance. Airlines compete with each other in a number of different routes. The degree of airport dominance by specific carriers varies across airports and so, consequently, do production costs. In addition, there are cross-route differences both in the number of operating firms and the rate of demand growth. As we describe below, the nature of competition among commuter air carriers provides further evidence that they are a useful setting in which to examine effects of market domain overlap and multimarket contact on firms' patterns of market entry and exit.

The study period begins several months after the Airline Deregulation Act of 1978, amending the Federal Aviation Act of 1958, was passed by Congress on October 24, 1978. Deregulation represented a significant environmental change for commuter air carriers, and much speculation surrounded its anticipated effects on them (see, for example, Molloy [1985] and Oster [1981]). Commuter air carriers were generally exempt from the economic oversight of formal regulation even prior to the passage of the Airline Deregulation Act—they were exempted from Civil Aeronautics Board price and entry regulation just after World War II and required to file only minimal traffic reports, provided they operated aircraft that carried 30 or fewer passengers (Bailey, Graham, & Kaplan, 1985; Molloy, 1985). This exemption was continued with the beginning of deregulation. Nonetheless, even though the requirements facing these carriers did not change substantially as a direct result of deregulation, it had important ramifications for them.

Some effects of deregulation on the commuter airlines have been indirect, through its lifting of restrictions on certificated interstate and national air carriers. After deregulation, certificated carriers were given "the opportunity to enter new markets or exit those which are no longer economic . . . It allows [certificated] carriers to realign their routes to meet changes in demand while capitalizing on new market opportunities" (Regional Airline Association, 1982: 22). The deregulation act made it easier for certificated airlines to both enter new markets and exit old markets, giving them added flexibility to respond to and shape their competitive environment by modifying their route networks and prices (Bailey et al., 1985). As certificated airlines have changed their domains by withdrawing from situations in short-haul and small community markets that are not profitable for them, commuter air carriers have had the opportunity to enter vacated markets and provide replacement service with excellent results. However, "since these same routes were attractive to other commuter airlines, competition intensified even as fares were decreasing" (Sarathy, 1985).

The act also included provisions aimed directly at commuter air carriers: To avoid the potential discontinuance of service in some small communities in danger of being abandoned by larger airlines, the law provided incentives for commuter carriers to serve these communities. These incentives included subsidies for operating at essential air service (EAS) points and eligibility to receive Federal Aviation Administration equipment loan-guarantees. However, Bruning and Oberdick observed that "from mid 1978 to mid 1981, each time a certificated carrier left a short-haul market, a commuter airline entered to serve in its place approximately 84 percent of the time" (1982: 80). Thus, the anticipated loss of service to small communities was not as great a problem as anticipated. Much of the service previously provided by certificated airlines was assumed by the commuter carrier industry (Bailey et al., 1985). Ivey and Engardio (1986) reported that as a result, "Competition grew fierce. 'It became a dog-eat-dog business,' says Arthur M. Horst, president of Suburban Airlines, Inc." (1986: 175). Indeed, D'Aveni (1994: 2) deemed the airline industry to be characterized by "hypercompetition" with competitive advantages rapidly created and eroded.

Between January 1979 and December 1984, 25 commuter air carriers were founded and 24 failed. The date of an airline's founding was defined as the year in which it first appeared in the *Official Airline Guide.* An airline was defined to have failed in the year it ceased to fly any routes. At the start of 1979, 15 commuter carriers were operating in California. We confirmed the founding dates for these left-censored carriers with archival records (Davies, 1982). Therefore, the final sample for the analysis included 40 airlines. During the observation period, these 40 airlines entered 272 California routes, 187 of which (68.8%) they had exited by the end of 1984.[3] Route entries were defined as occurring in the first year the *Guide* reported an airline as flying a given route. Route exits were defined as occurring in the first year an airline was no longer reported as flying a given route. Because entry dates for 182 routes commuter air carriers served in January 1979 were unknown, they could not be included in the route exit analysis.

Dependent Variables and Analysis

We tested the hypotheses using parametric models of firm change and failure (Amburgey, Kelly, & Barnett, 1993). A multivariate point-process approach was used to model the competing risks of market domain change and failure (Amburgey, 1986). In the analysis, market entry and market exit were each modeled as competing risks to firm failure (but not to each other). At each point in time, an airline is at risk of failure (by virtue of being alive) as well as of entering or exiting markets. And the risks are competing: if an airline fails it cannot simultaneously enter or exit markets, and if an airline enters or exits markets it cannot simultaneously fail. Therefore, in each year of its existence an airline was treated as having simultaneous risks of

[3] Although the analysis included only routes flown within California to permit accurate measurement of multimarket contact, California airlines' market contacts on interstate routes were included in all computations.

(1) entering one or more new routes or failing and (2) exiting one or more current routes or failing. Operationally, we specified each rate in terms of the instantaneous transition rate:

$$r_{jk}(t) = \lim_{\Delta_t \to O} q(t,t + \Delta t)/\Delta t, \tag{5}$$

where q is the probability of a given firm's experiencing a market entry (exit) between t and $t + \Delta t$, conditional on being at risk for the event at t. Rate models have the advantages of being flexible in specification and reducing the effects of the right-censoring problem (Tuma & Hannan, 1984). The models we estimated were of the following general form:

$$r_k(t) = \exp\ (\beta_k X_t), \tag{6}$$

where X_t is a vector of the values of the time-varying covariates and β_k is a vector of parameter estimates indicating the effects of the covariates on the rate of market entry (exit). In this model, market entry and exit rates are assumed to be log-linear functions of the covariates X_t, an assumption that avoids negative predicted rates. We used a multiple-spells formulation of this model to permit inclusion of time variation in the covariates. In the multiple-spells formulation, the event-history for each firm was broken down into yearly observations in which the firm was at risk of market entry or exit. Each of these spells was treated as right-censored unless a market change occurred or the firm failed. We used RATE (Tuma, 1980) to estimate the vector of parameters β_k by the method of maximum likelihood.

Estimating market entry and exit models poses a problem. Normally, the unit of analysis in event-history studies is the founding or failure of firms. However, in our analysis of market entry and exit the unit of analysis is the *firm-market*. That is, data from each firm's activities in multiple markets (i.e., routes) are pooled. As a result, the actions of multimarket firms are overrepresented (Barnett, 1993). For example, if a multimarket firm enters (exits) m routes in a strategic maneuver, these data would treat that single move as m independent route entries (exits). This treatment would bias ordinary maximum-likelihood estimates severely. One approach to this problem would be to assume that all market entries (exits) by the same firm are independent. However, this assumption is clearly problematic for the current study since the multimarket contact hypotheses presume a firm's coordination of behavior across multiple markets. Another approach is to treat the problem as a sampling issue (Barnett, 1993). Multimarket firms can be treated as oversampled according to the number of markets they simultaneously enter (exit). Oversampling can be corrected during model estimation by using standard weighting methods to discount oversampled cases in proportion to their extent of oversampling (Hoem, 1985). For example, each of the m markets mentioned in the above scenario would be given a weight of $1/m$ in the likelihood calculations. Although this approach, which we use here, does not eliminate the problem of nonindependence, it does correct for the overrepresentation of multimarket strategic moves.

Estimating market entry models poses an additional problem. Although the set of routes a given airline is at risk of exiting at any point in time is clear (i.e., the routes it is flying at the time), the set of routes an airline is at risk of entering at any point in time is not so obvious. Consequently, the route entry analysis requires specification of the set of routes an airline is at risk of entering at each point in time. The problem is that we have no way to identify, a priori, which of the thousands of possible routes (i.e., combinations of California destinations) that have not been served previously are at risk of experiencing a pioneering entry. Since we can only determine this retrospectively, we cannot study first entries legitimately. Therefore, in this study, we defined the set of routes at risk of entry for each airline as all those routes that any airline in the sample had ever flown *previously* but did not fly currently.[4] This definition of the entry risk set is clearly more tenable than defining each airline as at risk of entering *all* possible routes, which would bias estimates severely by including literally thousands of yearly observations for routes that have no risk of experiencing an entry by any airline. It also has the advantage of avoiding any dependence between the definition of the risk set and the events under study (e.g., defining the entry risk set as all routes ever served during the observation period), which can also bias estimates severely. However, it does have the disadvantage of requiring the exclusion of *pioneering* entries from the route entry analysis. This limitation is mitigated somewhat by the smallness of the number of pioneering route entries resulting from route entry as compared to airline foundings. Of the 272 route entries observed in California, 49 were pioneering entries. Therefore, the final sample for the analysis of route entry contains 223 nonpioneering route entries.[5]

Independent Variables

Our two main independent variables were market domain overlap, measured at the firm level, and multimarket contact, measured at the firm-market level.

Market domain overlap. To test Hypotheses 1a and 1b, we measured potential competition for each airline according to similarity in market domains. We defined market domains on the basis of activity in various product-client markets. The product that airlines are offering their clients is assistance in transporting them from one place to another. The clients that we are referring to are those people who want to get from one location in California to another and who have a need for speed and are not very price sensitive;

[4] We are grateful to William Barnett and Michael Hannan for suggesting this specification of the entry risk set.

[5] As a result of this complication, the sample sizes differ for the analyses of market entry and exit. For market exit, the sample includes 1,014 annual airline/route observations: the yearly number of routes served by all airlines between 1979 and 1984. For market entry, the sample includes 12,286 annual airline/route observations: the yearly number of nonpioneering routes at risk of being entered by all airlines between 1979 and 1984.

thus, they are willing to pay for air travel as opposed to means on land. So an airline's market domain refers to the set of markets or route network it serves. Our measure of the potential competition for a focal firm i is computed by aggregating the market domain overlaps of the focal firm with all other firms in the industry. More formally, *market domain overlap* for firm i at time t is defined as:

$$\textit{Market Domain Overlap}_{it} = \sum_{j \neq i} \frac{\sum_{m}(D_{imt} \times D_{jmt})}{\sum_{m} D_{imt}}, \tag{7}$$

where m denotes a given market in a set of potential markets M, D_{imt} is an indicator variable set equal to one if firm i is active in market m at time t and to zero otherwise, and D_{jmt} is an indicator variable set equal to one if firm j is active in market m at time t and to zero otherwise. Market domain overlap provides an indirect estimate of the term $(\Sigma_{i=1}\alpha_{ij}m_j - m_i)/M_i$ in Equation 4 by measuring the potential for competition faced by a given firm using the aggregate of the proportions of firm i's market domain that are occupied jointly by all other firms j (Baum & Singh, 1994a, 1994b; McPherson, 1983). Market domain overlap can vary from zero, where there is no potential competition for resources between a focal firm and others in the industry, to the number of firms in the industry (minus one), when the focal firm potentially competes with all others for all its resources. Thus, greater market domain overlap implies greater potential for competition between a focal firm and others in the industry. This approach gives a simple way of measuring the potential competition for underlying resources faced by different firms in an industry or population. We computed yearly values for market domain overlap for each airline (multiplied by 100 for rescaling) based on the routes it operated in at the start of each observation year.

Market domain overlap is considerably finer-grained than aggregate measures of the potential for competition. Aggregate measures (e.g., population density, market concentration) are based on the assumption that each firm is affected equally by competition and obscure variations in competitive intensity that depend on the degree to which firms' market domains intersect. By comparison, market domain overlap incorporates these variations directly: depending on the market domains they target, firms encounter different rival firms, different competitive conditions, and thus different potentials for competition.

Table 2a shows example market domain overlap computations for three imaginary airlines, Bold, Dot, and Dash, whose current market domains (route networks) are illustrated in Figure 1.[6] In Table 2a, we summarize the number of routes on which Bold, Dot, and Dash meet each other (i.e., $\Sigma_m D_{imt} \times D_{jmt}$),

[6] The numbered communities are used to illustrate computations of multimarket contact below.

FIGURE 1
Route Networks for Imaginary Airlines Bold, Dot, and Dash

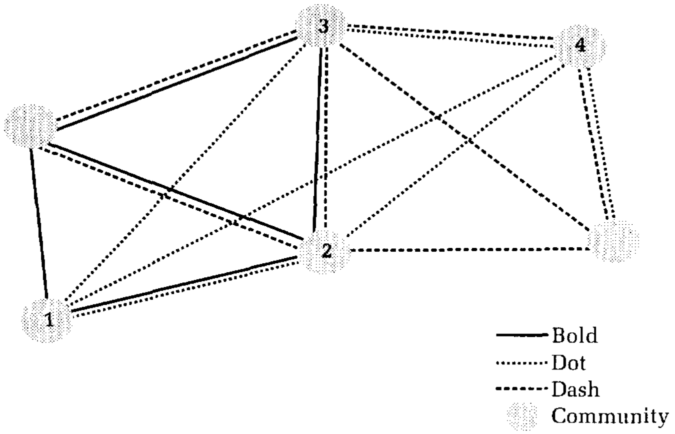


TABLE 2a
Market Domain Overlap Computations for Imaginary Airlines Bold, Dot, and Dash

$\Sigma_m D_{imt} \times D_{jmt}$	Bold	Dot	Dash
Bold	n.a.	1	3
Dot	1	n.a.	2
Dash	3	2	n.a.
$\Sigma_j\Sigma_m D_{imt} \times D_{jmt}$	4	3	5
$\Sigma_m D_{imt}$	5	6	7
Market domain overlap$_{it}$	.800	.500	.714

sum these contacts for each airline (i.e., $\Sigma_j\Sigma_m D_{imt} \times D_{jmt}$), and divide the total contacts by the number of routes served by the focal airline (i.e., $\Sigma_m D_{imt}$) to compute firm-specific values of market domain overlap. For example, Bold, the smallest airline, serves five routes, one of which is also served by Dot, and three of which are also served by Dash. Therefore, Bold's market domain overlap is (1 + 3)/5, or .800.

Multimarket contact. A measure of multimarket contact must capture the potential for strategic interactions between firms. It is not enough that the absolute number of contact points between firms be high; it is necessary that the firms perceive the contact as being an important part of their competitive environment. For example, a firm that meets another in $m - 1$ of its m markets is likely to view its contact as more important than a firm that meets another in m of a much larger number of markets. Yet a count measure would imply that the contact between the first pair is less than the contact between the second pair. Thus, measures of multimarket contact that merely count the number of markets in which firms meet are inappropriate—they lack a metric or scaling that captures the importance of the contacts to the focal firm. Therefore, to exploit the relationship between multimarket contact and recognition of competitive dependence appropriately, we scaled the number of multimarket contacts by the number of markets firm i serves at time t (Mester, 1987; Scott, 1982). To test Hypotheses 3a and 3b, we measured the multimarket contact of firm i in market m at time t as follows:

$$Multimarket\ Contact_{imt} = \frac{\sum_{j \neq i}\sum_{m}(D_{imt} \times D_{jmt})}{\sum_{m} D_{imt} \times N_{MMCt}},\ for\ all\ j \sum_{m} (D_{imt} \times D_{jmt}) > 1, \quad (8)$$

where N_{MMCt} is the number of firms j that contact the focal firm i in market m that are multimarket contacts (i.e., that firm i encounters in at least one market other than m), and all other terms are as defined above. Thus, multimarket contact for firm i in market m is measured as the average market domain overlap with other firms j encountered in market m and one or more additional markets. Multimarket contact can vary from zero, where there is no multimarket contact between firm i and other firms in market m, to M, the total number of firm i's markets, when firm i engages all other firms in market m in all M of its own markets. This *firm-market* level measure of multimarket contact, which is much finer-grained than past marketwide and firmwide indexes, attends to the relational nature of multimarket contact and accounts explicitly for variations in interactions between firms that depend on the degree to which they are multimarket rivals in specific markets. We assigned market-specific values of multimarket contact for each airline and route in the risk set (multiplied by 100 for rescaling) on the basis of the routes airlines flew at the start of each observation year.

Table 2b shows computations of multimarket contact for three routes flown by the imaginary airlines illustrated in Figure 1. In Table 2b, for each route we summarize the number of routes on which Bold, Dot, and Dash meet (or potentially meet) each other in more than one route (i.e., $\Sigma_m D_{imt} \times D_{jmt}$ for all j where $D_{imt} \times D_{jmt} > 1$), sum these contacts for each airline (i.e., $\Sigma_j \Sigma_m D_m \times D_{jmt}$), and divide the total contacts by the number of routes the focal airline serves multiplied by the number of multimarket competitors it faces on the route (i.e., $\Sigma_m D_{imt} \times N_{MMCt}$) to compute firm-market specific values of multimarket contact. For example, on route 2–3, Bold has one multimarket competitor (Dash), which it meets in three routes. Therefore, since Bold serves five routes, its multimarket contact on route 2–3 is 3/(5 × 1), or .600.

Measuring other independent variables. To test Hypotheses 2a and 2b, we defined *market density*$_{mt}$ for each route as the number of airlines serving route m at the start of each year. To permit the hypothesized curvilinear effects, this variable was specified as a quadratic by including both linear and squared terms (divided by 10 for rescaling).

In a regional industry such as airlines, the hub-and-spoke method of delivery and airport dominance convey significant regional cost advantage to the dominant airline (Evans & Kessides, 1994). Airlines' production costs will therefore tend to differ across markets, and spheres of influence centered

TABLE 2b
Multimarket Contact Computations for Imaginary Airlines Bold, Dot, and Dash[a]

$\Sigma_m D_{imt} \times D_{jmt}$ for All j $\Sigma_m D_{imt} \times D_{jmt} > 1$	Route 1–2	Route 2–3	Route 3–4
Bold	Dot 0	Dot 0	***Dot 2***
	Dash 0	Dash 3	***Dash 4***
$\Sigma_j\Sigma_m D_{imt} \times D_{jmt}$	0	3	***6***
$\Sigma_m D_{imt} \times N_{MMCt}$	$5 \times 0 = 0$	$5 \times 1 = 5$	***6 × 2 = 12***
Multimarket contact$_{imt}$, Bold	0	.600	***.500***
Dot	Bold 0	***Bold 2***	Bold 0
	Dash 0	***Dash 3***	Dash 2
$\Sigma_j\Sigma_m D_{imt} \times D_{jmt}$	0	***5***	2
$\Sigma_m D_{imt} \times N_{MMCt}$	$6 \times 0 = 0$	***7 × 2 = 14***	$6 \times 1 = 6$
Multimarket contact$_{imt}$, Dot	0	***.313***	.333
Dash	***Bold 4***	Bold 3	Bold 0
	Dot 7	Dot 0	Dot 2
$\Sigma_j\Sigma_m D_{imt} \times D_{jmt}$	7	3	2
$\Sigma\Sigma_m D_{imt} \times N_{MMCt}$	***8 × 2 = 16***	$7 \times 1 = 7$	$7 \times 1 = 7$
Multimarket contact$_{imt}$, Dash	***.438***	.429	.286

[a] Values in ***italics*** address route entry: they represent the implications of the focal airline entering the route in question.

on airport dominance are likely to arise. Therefore, to test Hypotheses 4a and 4b, which predict a moderating influence of spheres of influence on mutual forbearance, we defined *dominant share*$_{mt}$ for each route m as the maximum proportion of routes connecting to the origin and destination of that route flown by any airline at the start of each year and included its interaction with *multimarket contact*$_{imt}$ in the analysis.

To test Hypotheses 5a and 5b, we defined *market concentration*$_{mt}$ for each route m using the Herfindahl index for that route at the start of each year (×100 for rescaling) defined as follows:

$$Market\ Concentration_{mt} = \sum_{i=1}^{N_t} S^2_{imt}, \tag{9}$$

where S_{imt} is the proportion of routes connecting to the origin and destination of route m flown by airline i at time t and N_t is the total number of airlines having routes connecting to the origin and destination of route m at time t. To test Hypotheses 6a and 6b, which predict moderating effects of market concentration on mutual forbearance, we included a *concentration*$_{mt}$ × *multimarket contact*$_{imt}$ interaction term in the analysis.

Control Variables

To rule out plausible alternative explanations, we controlled for characteristics of airlines and environment that might influence airlines' route entry and exit rates. These controls are similar to those used in earlier research on firms' market entry and exit rates (Barnett, 1993; Baum & Singh, in press;

Cotterill & Haller, 1992; Haveman, 1993, 1994; Mitchell, 1989) and studies of U.S. airlines (Borenstein, 1989; Evans & Kessides, 1994; Gimeno & Woo, 1994; Miller & Chen, 1994; Smith et al., 1992). All control variables were time varying and measured at the start of each observation year.

Firm and firm-route level characteristics. To control for the increases in structural inertia that Hannan and Freeman (1984) predicted accompany firm aging and growth, the *airline age*$_{it}$, defined as the natural logarithm of the number of years since the year of airline *i*'s founding, and the *airline size*$_{it}$, defined as the total number of routes flown by airline *i* at the start of each year, were included in the analysis. To control for an influence of liability of newness (Hannan & Freeman, 1984; Stinchcombe, 1965) on a airline's newly established routes, we also included the *route age*$_{imt}$, defined as the natural logarithm of the number of years since the year airline *i* entered route *m* in the analysis of route exit. We used natural logarithms for airline age and route age since previous research suggests this transformation best represents the functional form of duration dependence in exponential models (Hannan & Freeman, 1989).

Rates of market entry and exit can also vary with the strategic importance of markets to particular firms (Mitchell, 1989). We controlled for the effects of the strategic importance of routes to an airline using two variables. The first, *route centrality*$_{imt}$, was defined as the proportion of airline *i*'s routes that connect with the origin and destination of route *m* at the start of each year (×100 for rescaling). The second, *route share*$_{imt}$, was defined as the proportion of all airlines' routes that connect to the origin and destination of route *m* that are flown by airline *i* at the start of each year (×100 for rescaling).

Managers' past experience in taking actions may influence their current actions (Levitt & March, 1988). Firms that have recently taken action may be more likely to take action than firms that have not (Amburgey et al., 1993; Amburgey & Miner, 1992; Miller & Chen, 1994). We controlled for effects of an airline's recent route entry and exit activity on its current patterns of entry and exit by including *route entries*$_{it}$ and *route exits*$_{it}$, the number of routes entered and exited by airline *i* in the prior year.

Past performance may also influence patterns of firm action. On the one hand, success may make managers complacent and failure may provide an incentive for action (Cyert & March, 1963). On the other hand, poor performance may lead managers to persist in a course of action to vindicate their prior decisions (Staw, Sandelands, & Dutton, 1981). We measured each airline's performance, *performance*$_{it}$, using the annual passenger load factor for airline *i* (i.e., the percent of seats filled) (Schefczyk, 1993). Because passenger load factor data were published by the Civil Aeronautics Board for only 15 of the study airlines, we present a subsample analysis to control for performance effects (Table 5, models 6 and 8). Lastly, to control for the possibility that left-censored airlines—those founded prior to the January 1979—had different patterns of route entry and exit than those founded afterward, we included a *founded before deregulation* dummy variable, coded 1 for airlines founded before 1979, and 0 otherwise.

Route characteristics. To control for the possibility that the number of prior entries into and exits from a particular route signaled the fertility or hostility of that route, we included *route entries*$_{mt}$ and *route exits*$_{mt}$, the numbers of entries to and exits from route m by all airlines other than airline i in the previous year. Indeed, research indicates that U.S. airlines often imitate the competitive actions of their rivals (Smith et al., 1992). We also included a *feeder route* dummy variable, coded 1 if a route originated or terminated at one of seven airports (Burbank, Los Angeles, Ontario, Palm Springs, Sacramento, San Diego, and San Francisco) served by interstate airlines and 0 otherwise, to control for the possibility that the existence of feeder routes influenced market entry and exit patterns.

Route-level and aggregate munificence. Finally, since the capacity of an environment to support airline services is likely to influence route entry and exit rates, we also controlled for two measures of the munificence of particular routes as well as for two more general indicators of aggregate economic performance in California that may affect the demand for airline services. We defined *potential demand*$_{mt}$ as the total population residing at the origin/destination (county or district) of route m in 1981 (logged to normalize the distribution). To control for effects of government incentives to serve small communities on rates of route entry, we included an *essential air service (EAS) points* dummy variable, coded 1 for routes connected to the 17 California communities designated as EAS points during the 1979–84 period and 0 otherwise. The aggregate indicators were the *California state gross product* (logged to normalize the distribution) and *California state unemployment* rate at the start of each year.

Table 3 presents means, standard deviations, and correlations for all independent and control variables. To deal with any multicollinearity problems that might arise, we tested the significance of groups of variables in comparisons of nested regression models instead of relying only on significance tests for individual coefficients (Kmenta, 1971: 371).

RESULTS

Tables 4 and 5 report maximum-likelihood estimates for the analysis of California airline route entry and route exit rates. Model 1 in Table 4 provides a baseline model of California airline route entry rates that includes the firm, route, and environment-level control variables. The fit of model 2, which includes market domain overlap, market density, and multimarket contact variables, is a significant improvement over that of model 1 ($\Delta\chi^2$ = 76.08, 4 *df*, $p < .05$). Models 3 and 4 repeat this analysis for route exit rates. Model 4 again shows significant improvement over the model 3 baseline ($\Delta\chi^2$ = 44.05, 4 *df*, $p < .05$).

Supporting Hypotheses 1a and 1b, the significant positive estimates for *market domain overlap*$_{it}$ indicate that as market domain overlap increased, raising the intensity of competition, airlines' rates of entry into new routes and exit from current routes both increased. The significant positive linear and negative squared estimates for the quadratic specifications of *market*

TABLE 3
Means, Standard Deviations, and Pearson Correlations[a]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. ln (airline age$_{it}$)	2.16	0.85																				
2. ln (route age$_{imt}$)	0.51	0.54	.31																			
3. Founded before deregulation	0.62	0.48	.53	.22																		
4. Airline size$_{it}$	20.81	13.98	.53	.27	.30																	
5. Route centrality$_{imt}$ × 100	11.59	11.40	−.26	.05	.08	−.26																
6. Route share $_{imt}$ × 100	34.37	34.17	.13	.13	−.01	.10	.26															
7. Route exits$_{it}$	3.67	5.12	.12	.29	−.13	.26	−.09	−.01														
8. Route entries$_{it}$	6.46	9.00	.12	.33	.01	.63	−.18	.16	.34													
9. Log (potential demand$_{mt}$)	6.13	0.57	.26	.10	.12	.15	.08	−.33	.06	.00												
10. Log (gross state product)	5.55	0.05	−.09	.32	−.24	.08	−.08	−.06	.35	.40	−.02											
11. State unemployment	8.17	1.52	.05	−.29	.19	−.14	.08	.03	−.40	−.50	.01	−.90										
12. Market density$_{mt}$	1.24	0.98	.20	.28	.11	.20	.12	−.19	.03	.05	.40	−.02	−.01									
13. Concentration$_{mt}$ × 100	54.68	32.17	.34	.16	.17	.22	.05	−.66	.10	−.04	.38	.02	−.01	.34								
14. Dominant share$_{mt}$ × 100	32.97	17.04	.09	.09	.12	.02	.03	−.70	−.01	−.08	.51	.10	.03	.26	.61							
15. Route exits$_{mt}$	0.22	0.49	−.03	.09	.01	−.02	.02	−.19	−.00	.01	.16	−.19	.12	.39	−.17	−.19						
16. Route entries$_{mt}$	0.54	0.84	−.03	.17	−.07	.07	.07	−.02	.25	.29	.12	−.01	.03	.43	−.14	−.01	.15					
17. Market domain overlap$_{it}$ × 100	30.27	17.72	.36	.24	.29	.19	−.01	−.17	.16	−.00	.14	−.19	.08	.26	−.26	−.20	.14	−.01				
18. Multimarket contact$_{imt}$ × 100	3.91	9.23	.18	.23	.08	.16	.08	−.14	.07	.01	.23	−.03	.01	.52	−.27	−.20	.15	.20	.23			
19. Essential air service point	0.39	0.49	−.21	−.04	.01	−.13	−.00	.12	−.06	.09	−.14	−.06	.06	−.25	.29	.14	−.06	−.11	−.09	−.16		
20. Performance$_{it}$	45.43	9.65	.49	.06	.34	.40	−.18	.09	.05	.06	.17	.32	−.27	.29	.04	−.07	−.05	.42	−.11	.15	−.21	
21. Feeder route	0.33	0.46	.21	.11	.13	.10	.00	−.46	.02	−.02	.43	.04	−.04	.30	−.43	−.49	.15	.09	.16	.20	−.31	.12

[a] Correlation coefficients >.065 are significant at $p < .05$. The sample contained 1,014 airline/route year observations included in the route exit analysis. The correlations for the performance variable are based on the 604 airline/route year observation subsample.

TABLE 4
Maximum-Likelihood Estimates of California Airline Route Entry and Exit[a]

Variable	Route Entry 1	Route Entry 2	Route Exit 3	Route Exit 4
Constant	−17.11	−14.47	52.59*	61.88*
	(20.45)	(20.77)	(18.97)	(19.77)
ln (airline age$_{it}$)	.226*	.194*	−.433*	−.423*
	(.091)	(.099)	(.148)	(.152)
ln (route age$_{it}$)	—	—	.887*	.849*
			(.216)	(.228)
Airline size$_{it}$	−.025*	−.021*	.017*	.012*
	(.007)	(.010)	(.006)	(.006)
Route centrality$_{imt}$ × 100	.018*	.019*	.007	.001
	(.008)	(.009)	(.005)	(.006)
Route share$_{imt}$ × 100	.037*	.044*	.017*	.024*
	(.012)	(.016)	(.005)	(.008)
Route exits$_{it}$	−.031*	−.029*	−.013	−.011
	(.016)	(.018)	(.018)	(.018)
Route entries$_{it}$	−.023*	−.017	−.006	.001
	(.013)	(.018)	(.008)	(.008)
Founded before deregulation	.144	.291	−.254	−.494*
	(.330)	(.332)	(.273)	(.290)
Performance$_{it}$	—	—	—	—
Log (potential demand$_{mt}$)	.219*	.211*	−.329*	−.323*
	(.117)	(.120)	(.146)	(.149)
Feeder route	.433	.052	.112	−.120
	(.339)	(.357)	(.188)	(.193)
Essential air service point	.171*	.166*	−.111	−.037
	(.059)	(.061)	(.151)	(.152)
Route exits$_{mt}$	.279*	.244*	−.028	−.038
	(.108)	(.114)	(.137)	(.168)
Route entries$_{mt}$	−.223	−.221	.149	.033
	(.182)	(.188)	(.100)	(.099)
Concentration$_{mt}$ × 100	.006*	.009*	.006	−.007
	(.002)	(.004)	(.006)	(.005)
Dominant share$_{mt}$ × 100	−.008*	−.010*	−.015*	−.017*
	(.004)	(.006)	(.007)	(.008)
Log (gross state product)	−.783	−1.609	−10.010*	−11.700*
	(4.881)	(5.235)	(3.531)	(3.690)
State unemployment	−.295*	−.312*	.109	.087
	(.161)	(.167)	(.141)	(.144)
Market domain overlap$_{it}$ × 100		.013*		.011*
		(.003)		(.004)
Market density$_{mt}$		.271*		1.257*
		(.116)		(.250)
(Market density$_{mt}$)^2/10		−1.229*		−1.780*
		(.513)		(.499)
Multimarket contact$_{imt}$ × 100		−.018*		−.015*
		(.008)		(.008)
χ^2	432.44	508.52	99.87	143.92
df	16	20	17	21
$\Delta\chi^2$	n.a.	76.08*	n.a.	44.05*
Number of yearly spells	12,286	12,286	1,014	1,014
Number of events	223	223	187	187

[a] Standard errors are in parentheses.
* $p < .05$

$density_{mt}$ in both analyses suggest inverted U-shaped relationships between market density and rates of entry into and exit from that market. This supports Hypothesis 2a but contradicts Hypothesis 2b, which predicts a U-shaped relationship between market density and route exit rates. Ironically, this means that airlines were more likely to enter unstable, emerging markets, even though the exit rate was also potentially high, and less likely to enter crowded but more stable markets where the exit rate was low. However, supporting Hypotheses 3a and 3b, the estimates for *multimarket* $contact_{imt}$ are significant and negative in both models. Thus, as multimarket contact increased and raised the potential for multimarket retaliation, rates of both route entry and exit declined, suggesting that mutual forbearance was at work. Finally, the estimates for $concentration_{mt}$ do not support Hypotheses 5a and 5b, which predict that by facilitating interfirm coordination, market concentration will lower entry and exit rates in concentrated markets. Although the effect of route concentration on route entry contradicts the prediction from oligopoly theory, it is consistent with observations of airline industry analysts (e.g., Levine, 1987) and with Carroll's (1985) resource partitioning model, that market concentration creates opportunities for new, specialized entrants.

Models 5 and 7, shown in Table 5, add the multimarket contact interactions to the analyses. Each model provides a significant improvement over its predecessor (model 5 vs. 2, $\Delta\chi^2 = 12.02$, 2 *df*, $p < .05$; model 7 vs. 4; $\Delta\chi^2 = 8.01$, 2 *df*, $p < .05$).[7] In these models, the *multimarket* $contact_{imt}$ by *dominant* $share_{mt}$ coefficients are significant and negative in both models, supporting Hypotheses 4a and 4b. However, the estimates for the *multimarket* $contact_{imt}$ by *market* $concentration_{mt}$ interactions are insignificant in both models, failing to support Hypotheses 6a and 6b. These findings indicate that market domination by a single firm—but not market concentration—facilitated mutual forbearance, supporting Edward's (1955) idea that firms stake out spheres of influence in which they dominate competition and refrain from competing aggressively in the spheres of their multipoint rivals. Thus, this analysis supports neither the strong form of the oligopoly theory hypothesis, in which coordination among firms in a market is solely a function of concentration in that market, nor the weak form of the hypothesis, in which coordination in a market among multimarket competitors is facilitated by concentration in that market.

Notably, the introduction of the interaction terms in models 5 and 7 caused the main effects for *multimarket* $contact_{imt}$ to become insignificant in the analyses. This suggests that the effects of multimarket contact on airlines'

[7] We also examined the possibility that multimarket contact effects depended on the focal airline's dominance of a market (e.g., Simmel, 1950), or on the centrality of a market to an airline's market domain. However, including terms for the interaction of multimarket contact with *route* $share_{imt}$ and *route* $centrality_{imt}$ did not improve the fit of either model 3 or model 7 significantly.

TABLE 5
Maximum-Likelihood Estimates of California Airline Route Entry and Exit[a]

Variable	Route Entry 5	Route Entry 6	Route Exit 7	Route Exit 8
Constant	−16.11	−19.22	59.88*	45.21*
	(21.11)	(32.76)	(19.89)	(22.00)
ln (airline age$_{it}$)	.192*	.436*	−.429*	−.390*
	(.100)	(.182)	(.152)	(.160)
ln (route age$_{it}$)	—	—	.794*	.688*
			(.229)	(.252)
Airline size$_{it}$	−.021*	−.028*	.015*	.008
	(.010)	(.008)	(.006)	(.007)
Route centrality$_{imt}$ × 100	.020*	.013*	.007	−.005
	(.010)	(.004)	(.006)	(.008)
Route share$_{imt}$ × 100	.045*	.081*	.024*	.020*
	(.017)	(.010)	(.008)	(.010)
Route exits$_{it}$	−.027*	−.022*	−.014	−.009
	(.018)	(.012)	(.018)	(.020)
Route entries$_{it}$	−.016	−.001	−.002	−.004
	(.018)	(.011)	(.008)	(.009)
Founded before deregulation	.255	.801*	−.433	−.143
	(.334)	(.437)	(.292)	(.342)
Performance$_{it}$	—	.020*	—	.008
		(.011)		(.011)
Log (potential demand$_{mt}$)	.209*	.364*	−.303*	−.241
	(.121)	(.216)	(.150)	(.166)
Feeder route	.208	.111	−.093	−.121
	(.366)	(.431)	(.194)	(.199)
Essential air service point	.165*	.171	−.076	−.281*
	(.063)	(.212)	(.152)	(.171)
Route exits$_{mt}$	.242*	.327*	−.013	−.275
	(.115)	(.130)	(.168)	(.207)
Route entries$_{mt}$	−.212	−.119	.023	.049
	(.188)	(.157)	(.100)	(.119)
Concentration$_{mt}$ × 100	.009*	.011*	−.003	.003
	(.004)	(.005)	(.007)	(.008)
Dominant share$_{mt}$ × 100	−.004	−.003	−.008	−.008
	(.008)	(.013)	(.009)	(.010)
Log (gross state product)	−1.601	−1.341	−11.400*	−8.742*
	(5.237)	(5.862)	(3.704)	(4.099)
State unemployment	−.311*	−.231	.111	.077
	(.169)	(.196)	(.144)	(.150)
Market domain overlap$_{it}$ × 100	.014*	.013*	.013*	.016*
	(.004)	(.007)	(.004)	(.006)
Market density$_{mt}$	.293*	.441*	1.276*	1.656*
	(.118)	(.297)	(.252)	(.333)
(Market density$_{mt}$)^2/10	−1.203*	−1.965*	−1.775*	−2.323*
	(.515)	(.551)	(.500)	(.739)
Multimarket contact$_{imt}$ × 100	−.020	−.020	−.018	−.016
	(.014)	(.018)	(.017)	(.020)

TABLE 5 (continued)

Variable	Route Entry 5	Route Entry 6	Route Exit 7	Route Exit 8
Multimarket contact$_{imt}$ × concentration$_{mt}$ × 100	.000 (.002)	.001 (.002)	.001 (.002)	.001 (.003)
Multimarket contact$_{imt}$ × dominant share$_{mt}$ × 100	−.003* (.001)	−.004* (.002)	−.007* (.003)	−.009* (.004)
χ^2	520.54	361.02	151.93	128.14
df	22	23	23	24
$\Delta\chi^2$	12.02*	n.a.	8.01*	n.a.
Number of yearly spells	12,286	5,216	1,014	604
Number of events	223	154	187	123

[a] Standard errors are in parentheses. Models 5 and 7 include all 40 airlines. Models 6 and 8 include the subsample of 15 airlines for which performance (i.e., passenger load factor) data were available.

* $p < .05$

route entry and exit rates is fully mediated by the share of the dominant airline on a route. Although this is possible, the inflated standard errors and similar coefficient estimate sizes in both models suggest multicollinearity as an alternative explanation. Finally, in the subsample analyses in models 6 and 8, which control for prior performance, support for the hypotheses is unaltered.

The effects of market domain overlap, market density, and multimarket contact on rates of route entry and exit are of substantial magnitude. These effects are shown graphically in Figures 2, 3, and 4a and 4b, which give multipliers of route entry and exit rates as functions of market domain overlap, market density, and multimarket contact, respectively. In the figures, a multiplier of greater (less) than one indicates that the rate implied by a given level of the independent variable is increased (decreased) relative to an estimate based on the minimum value of the variable by a factor equal to the multiplier. Figure 2 shows the plot of the effects of market domain overlap on route entry and exit rates. As the figure shows, there is a fourfold increase in airlines' rates of entry and exit as market domain overlap increases from zero to one (i.e., from none to an average of one competitor per route). Figure 3 gives the effects of market density on route entry and exit rates. Although the effects of market density on route entry and exit rates share a similar overall curvilinear pattern, the substantive implications differ considerably. Route entry rates increase 30 percent as market density increases from zero to two but then decline to one-third the original rate when market density reaches five and to one-tenth the original rate when it reaches six. By comparison, route exit rates increase eightfold as market density increases from one to four, and then decline back toward the original rate.[8] Thus, increases in

[8] The computations for the exit rate begin at a market density of one since unserviced routes have no exit risk.

FIGURE 2
Market Domain Overlap

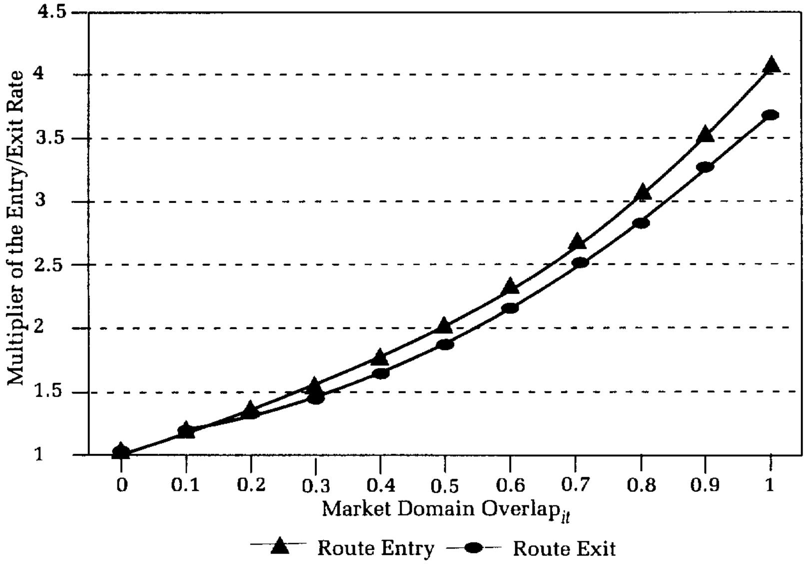


FIGURE 3
Market Density

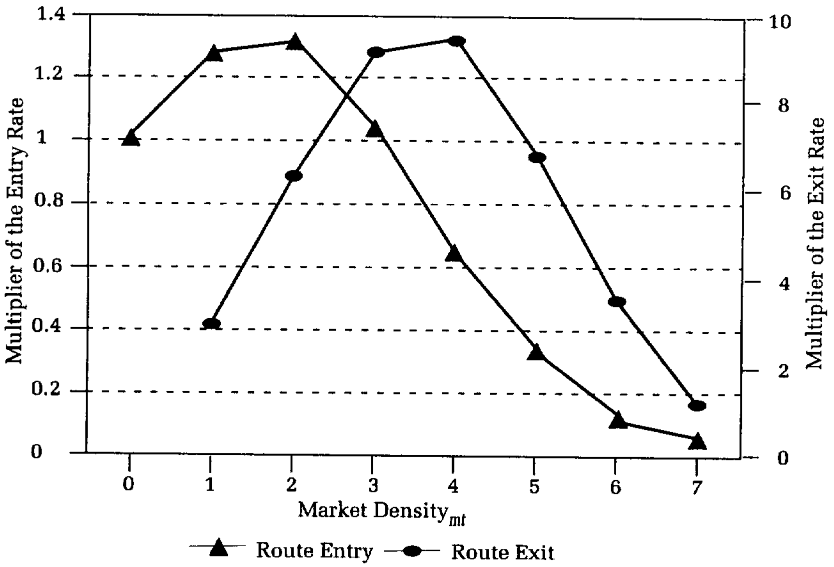


FIGURE 4a
Multimarket Contact, Route Entry

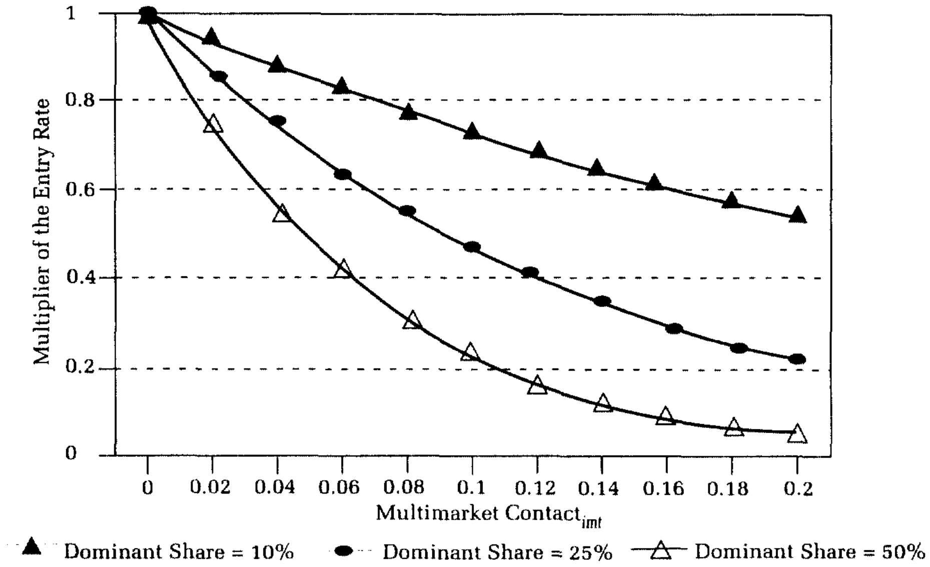
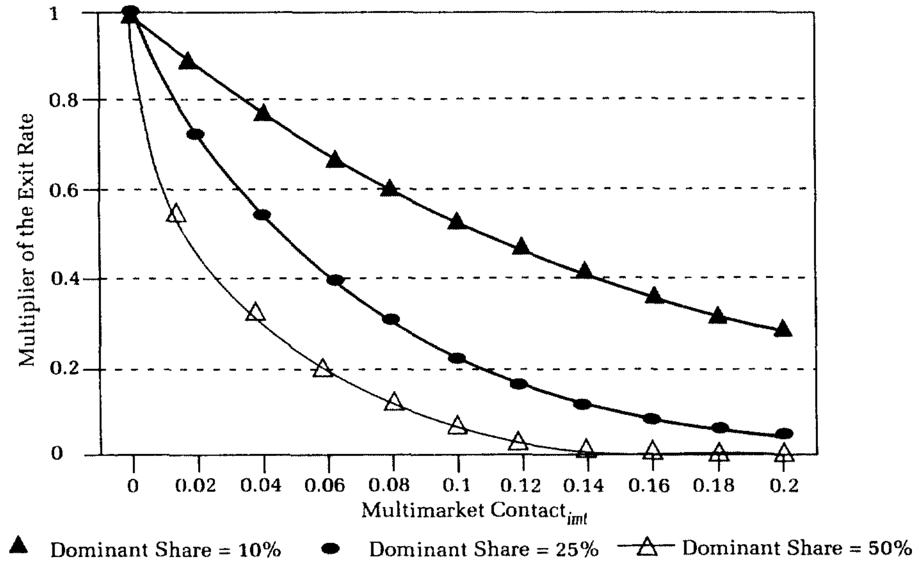


FIGURE 4b
Multimarket Contact, Route Exit



market density mainly suppress route entry and mainly stimulate route exit. Figures 4a and 4b show the complex implications of the interaction between multimarket contact and dominant share variables. As the figures show, as airlines' multimarket contact on a given route increases from 0 to .2 (i.e., from an airline having no multimarket rivals to, on average, meeting rivals in one-fifth of its other routes), rates of entry into and exit from that route decline, and the decline is more pronounced for route exit. The figures also illustrate that the decline is faster and larger for both entry and exit when the service on the route is dominated by a single airline.

Several of the organizational and environmental control variables also influenced market entry and exit rates significantly. Route entry rates increased as airlines aged but decreased as they grew in size. Age and size affected rates of route exit oppositely. In addition, exit rates were higher for routes that had been flown for longer durations, suggesting that older services, or older routes themselves, may become obsolete. The greater the centrality of a potential route to an airline (the greater the proportion of the airline's routes that connect with the origin/destination of the route), the higher the rate of route entry. The greater an airline's share on a route (the larger the proportion of all routes that connect to the origin/destination of the route that are flown by the airline), the higher the rates of both route entry and exit. These effects of centrality and share on route entry rates suggest that California airlines were in the process of constructing networks of interconnecting routes and hubs during the observation period (Borenstein, 1989). Airlines that exited from a large number of routes in the prior year had lower route entry rates in the current year. In contrast to recent repetitive momentum arguments (e.g., Amburgey & Miner, 1992), an airline's prior numbers of entries and exits did not increase its rate of current actions of the same type. However, increases in the number of prior exits lowered current rates of route entry. The coefficients for passenger load factor (see models 6 and 8) indicate that, among subsample airlines, high performers tended to expand their operations into new markets, and although poor performers were not more likely to stay in their current routes (Staw et al., 1981), they were not stimulated to action either (Cyert & March, 1963).

Among the environmental control variables, airlines were significantly more likely to enter and significantly less likely to exit routes with a high potential demand. Airlines were also significantly more likely to enter routes that were connected to EAS points but were not less likely to exit EAS routes. Thus, the EAS incentive program appears to have succeeded in attracting airlines to smaller communities in California but not in establishing a high level of service stability. The number of exits from a route in the prior year appears to signal opportunity, increasing the rate of route entry significantly. Lastly, among the aggregate economic indicators, increases in the gross state product are associated with lower rates of route exit, and higher state unemployment rates are associated with lower rates of route entry.

DISCUSSION AND CONCLUSION

The purpose of this article was to investigate links between firm-specific competitive conditions and the dynamics of interfirm rivalry—a research question central to organization and strategic management theory. We emphasized market domain overlap and multimarket contact as two key features of firm-specific competitive conditions that shape patterns of interfirm interaction. In support of the idea that firms respond to competition by engaging in search for alternative ways to sustain themselves, the results show that the greater the degree of market domain overlap an airline was exposed to, the higher its route entry and exit rates. In addition to these effects of firm-specific competition, market-specific competitive conditions also affected airlines' choices about which new markets to enter and which current markets to exit. Replicating Haveman's (1994) density-dependent market entry findings was our finding that when market density was low, increases encouraged more airlines to enter, but when market density was high, further increases lowered the entry rate. Our parallel prediction for market exit rates was not supported, although route exit rates were sensitive to market density.

Supporting the mutual forbearance hypothesis, which predicts that when firms meet in multiple markets they hesitate to contest a given market vigorously, the results show that airlines had lower route entry and exit rates for routes on which they had high multimarket contact with incumbents. And, consistent with the idea that firms interacting in multiple markets reciprocally yield in each other's spheres of influence, multimarket contact effects were strongest when a market was clearly dominated by a single airline. Thus, airlines that appear to be close competitors (have high market domain overlap) are not necessarily the most intense rivals: airlines that meet in multiple markets behave less aggressively toward each other than those that meet in one or only a few markets. Notably, these findings suggest that multimarket contact conferred a competitive advantage on California airlines by providing a buffer against potentially expensive search for new routes and start-up costs as well as disruptive effects of exiting current routes.

Several implications and directions for future research follow from the results of this study, as well as from some of its limitations. First, because the findings of this study are based on firms in a single, geographically bounded industry over a six-year period, it is possible that the results reflect some factors specific to the industry, geographic region, or period under study. Future replications of this study in other settings are needed to address this possibility. Second, although this study provides evidence that firms' market positioning influences their patterns of market entry and exit in predictable ways, a key assumption that remains untested is that these patterns of interaction facilitate their success and coexistence. Future research is needed to examine how market domain overlap and multimarket contact influence the effects of market entry and exit on firm success and survival. Do firms' market-level responses to high market domain overlap systematically lower market domain overlap and improve their performance? Do firms that engage in mutual forbearance in markets in which they have high multimarket contact achieve greater success and enhance their survival prospects? The results shown in Table 3 provide some indirect evidence of performance advantages of mutual forbearance: multimarket contact is positively correlated (.15) with passenger load factor. Such extensions of this research would help specify more fully how market domain overlap and multimarket contact shape firm success, strategic superiority, and industry evolution.

Third, our approach to market entry and exit highlights the dynamic and iterative relationship between firms' actions and competitive context over time: firms' entries into and exits from each other's markets modify the very competitive structure that influences the actions. Thus, we focus directly on the *micro-macro* link that is often ignored in social theorizing (Coleman, 1987). The macro-level competitive structure alters individual firms' perceptions of interests and opportunities, which moderate patterns of firms' market entries and exits, which in turn collectively alter the macro competitive structure for future periods. Competitive structures are thus maps both *of* and *for* strategic action (Barley, Freeman, & Hybels, 1992). Because structural conditions of competition influence patterns of interfirm rivalry over time, longitudinal data like those used here have the advantage of permitting links between firm-specific competitive conditions and interfirm rivalry to be studied as they unfold dynamically. This study, along with several recent others (Barnett, 1993; Haveman, 1993, 1994), demonstrates that dynamic models and methods from organizational theory can be readily applied to the study of firms' strategic behavior. We think longitudinal research on the dynamics of rivalry adds considerable value, going beyond traditional cross-sectional studies that examine interfirm interaction at a given point in time. Future research linking competition and rivalry, and strategic interaction more generally, will benefit from the use of longitudinal study designs and the application of dynamic modeling techniques.

Fourth and finally, a research question central to the literature on strategic groups is how the existence of such groups influences patterns of interfirm rivalry and firm performance. According to strategic groups theory, interfirm rivalry is greater between firms in different strategic groups than between firms within the same strategic group (Caves & Porter, 1977; Porter, 1979). Although strategic groups research has examined extensively how firms' performance in an industry depends on their relative locations (i.e., group memberships) within an industry environment (for reviews, see McGee and Thomas [1986] and Thomas and Venkatraman [1988]), research directly examining patterns of rivalry between firms within and across strategic groups, although supportive, is limited (Barnett, 1993; Cool & Dierickx, 1993; Peteraf, 1994). One possible explanation for the predicted pattern of within- and across-group interfirm rivalry is that the pattern reflects differences in the degree of multimarket contact firms experience within the same and across different strategic groups (Peteraf, 1994). Research on how strategic group membership influences firms' structural conditions of competition may therefore help explain patterns of within- and between-group rivalry as well as differences in the performance of firms in different strategic groups. It may also help further advance the integration of ideas from theories of interfirm competition and interfirm rivalry begun here.

In this research we highlighted how attending to variation in firms' market domain overlap and multimarket contact helps combine ideas on competition and rivalry from organization and strategic management theory. We think studying systematic links between firm-level strategies and patterns of interfirm competition and rivalry can enable a productive dialogue between researchers in macro-organization theory and strategic management focused on industry and population-level phenomena and researchers in strategic management interested primarily in firm-level phenomena.

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