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RECIPROCAL THREATS IN MULTIMARKET RIVALRY: STAKING OUT 'SPHERES OF INFLUENCE' IN THE U.S. AIRLINE INDUSTRY

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The paper investigates the outcomes of multimarket competition among U.S. scheduled airlines when the interests and positions of the airlines differ in the mutually contested markets. Asymmetry in territorial interests provides multimarket competitors with footholds in important markets of their rivals, which can be used to deter the behavior of the rivals in other markets. Evidence suggests that airlines use footholds in their rivals' important markets (particularly in their hubs) to reduce the competitive intensity of those rivals in the airlines' own important markets (their hubs), and sustain their dominant positions (or spheres of influence) in those markets. Copyright © 1999 John Wiley & Sons, Ltd.

Changes in the competitive landscape, with decreasing entry barriers and blurring industry boundaries, are making it increasingly difficult for firms to sustain valuable market positions over time (D'Aveni, 1994; Bettis and Hitt, 1995). It is therefore not strange that strategy researchers have recently turned to studying the conditions of sustainability of competitive advantage as a central research question (Porter, 1985; Lieberman and Montgomery, 1988; Ghemawat, 1991; Barney, 1991; Peteraf, 1993; Collis and Montgomery, 1995). While sustainability has become a popular topic in strategic management, most of the current attention emphasizes market structure characteristics (such as switching costs, natural monopoly conditions, network externalities) or resource-based considerations (such as imperfect imitability of resources, durability, causal ambiguity, appropriability) that make competitive erosion difficult or impossible for would-be imitators. Research has emphasized the role of the *lack of ability* of imitators or rivals to erode the market position of a firm as a necessary condition for sustainability, implicitly assuming that any rival capable of eroding the position will do so, and cannot be restrained from pursuing that course of action. In essence, the behavioral assumptions of these models of sustainability resemble those of perfect competition models, since it is implicitly assumed that rivals' motivation to attack is *independent* and *not influenced by* the potential reaction of the incumbent firm.

This paper represents a step in a different direction. As Chen (1996) suggests, both *ability* and *motivation* are drivers of competitive behavior. In contrast with past research, I emphasize that sustainability may also be due to a *lack of motivation* to attack by would-be imitators or rivals. Competitors mutually recognize the effects of their actions on each other, and feel compelled to respond to the moves of their rivals with countermoves of their own (Chen and MacMillan, 1992; Chen and Miller, 1994). As this competitive interaction evolves in the industry, firms learn

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to take into account the expected competitive responses of rivals in their evaluation of the benefits and costs of future actions. This repeated competitive interaction provides an opportunity for sustainability since, as oligopoly and game theory suggest, a firm may use strategic deterrence and threats of retaliation to influence the motivation of a rival to erode its position (Schelling, 1960; Tirole, 1990; Chen and Miller, 1994). If deterrence is successful, a firm can reduce the rival's *motivation* for attack, and sustain a market position even among rivals with the *ability* to erode it. Therefore, this paper adds to current efforts to integrate competitive and resource-based views (Peteraf, 1993; Henderson and Mitchell, 1997).

This paper studies competitive motivation in a context of multipoint or multimarket competition, 'a situation when firms compete against each other simultaneously in more than one market' (Karnani and Wernerfelt, 1985). In multimarket competition, the interactive nature of rivalry allows firms to recognize the divergent 'territorial interests' that firms have in different markets. Moreover, when firms have footholds in important territories of their rivals, they have an opportunity to signal their subordination in their rivals' territories in exchange for the rivals' subordination in the firms' important markets. In this way, norms of competitive reciprocity can emerge in the context of multimarket competition in the form of reciprocal subordination (Simmel, 1950), which may allow firms to sustain market positions in the face of capable rivals. Thus, firms can develop mutually recognized 'spheres of influence' (Edwards, 1964) sustained by implicit threats of reciprocal retaliation.

Existing empirical research in multipoint competition has focused mainly on the general concept of multimarket contact (the extent of market overlap in other markets in the industry), with little attention to the varying effectiveness of multimarket contacts when firms differ in their territorial interests. The concept of 'spheres of influence' refines the general concept of multimarket contact in two ways. First, it recognizes that multimarket contacts in markets where the rival has more to lose (i.e., markets in which the rival has important or valuable positions) are more effective at reducing rivalry from that competitor. Multimarket rivals will reduce their competitive behavior to the extent that their important markets are within reach of retaliation moves by their rivals. Second, the concept suggests that firms do not equally benefit in all their markets from threats of multimarket retaliation. Instead, threats of multimarket retaliation are deployed for defending and sustaining positions in those markets in which the firms have important interests or spheres of influence. Thus, the concept of spheres of influence suggests that the effect of multimarket contact for a firm's position in a focal market is influenced by the territorial interests of the firm and its rivals in both the focal market and other markets in which they compete. This paper provides the first systematic empirical test of whether firms are able to sustain their positions in their important markets when they have the ability to retaliate in markets important to their multipoint rivals.

MULTIPOINT COMPETITION AND DETERRENCE

Multipoint competition is quickly becoming a central area of research in competitive strategy. The case-oriented studies of multipoint competition of the 1980s (Porter, 1980, 1981, 1985; Karnani and Wernerfelt, 1985) have opened the way to recent contributions in both theoretical developments (Bernheim and Whinston, 1990; Chen, 1996) and systematic empirical testing (Barnett, 1993; Evans and Kessides, 1994; Barnett, Greve and Park, 1994; smith and Wilson, 1995; Baum and Korn, 1996; Gimeno and Woo, 1996). The effect of multipoint competition on intensity of rivalry has received the most attention to date. The *mutual forbearance* hypothesis (Edwards, 1955; Feinberg, 1984; Bernheim and Whinston, 1990) proposes that firms which are multipoint competitors (i.e., firms that have competitive contacts in multiple markets, or *multimarket contact*) will compete less intensely with one another. Multipoint competition gives a firm the option to respond to an attack by a rival not only in the challenged market, but also in other markets in which both compete. The competitive moves of multipoint competitors may therefore be interdependent and linked across markets, a condition known as *extended interdependence* (Areeda and Turner, 1979). As the rival recognizes the firm's ability to retaliate across multiple markets and develops expectations of cross-market retaliation, or 'conjectural variations' (Amit, Domowitz, and Fershtman, 1988; Feinberg, 1984; Scherer and Ross, 1990), the specter of retaliation will influence the decision-making process of the rival, reducing its motivation to act aggressively (Chen, 1996). Since the retaliatory power is reciprocal, the forbearance is mutual. The mutual forbearance hypothesis thus focuses on mutual multimarket deterrence (Barnett, 1993) due to beliefs and expectations of multimarket (or cross-market) retaliation.

Empirical research on mutual forbearance has sought to link the extent of multimarket contact (usually measured by the number of markets in which rivals compete) and the intensity of rivalry experienced by those competitors. Results have not been totally consistent; early studies found mixed support for forbearance, while recent studies have obtained more consistently supportive findings.[1] Though some of these differences may be explained on methodological grounds (longitudinal studies have shown more theoretically consistent results than cross-sectional studies), the lack of consistent findings may also reflect problems in the way these studies operationalize the predictions of the mutual forbearance hypothesis. Perhaps the greatest operationalization difficulty in mutual forbearance research is that its logic of deterrence depends on a competitor's beliefs and expectations about the likelihood and extent of multimarket retaliation by the rival, yet these beliefs and expectations have not been, and probably cannot be, empirically observed. For instance, these expectations may be tacit, socially constructed and learned through socialization or enactment processes within the industry (White, 1981; Porac *et al*., 1995; Porac and Rosa, 1996). Even when they are explicit, the expectations of response may be hinted at by complex competitive signals that are not easily captured in empirical research.[2] Researchers of mutual forbearance have thus relied on proxies to implicitly capture the multimarket retaliation threats that underlie forbearance. A commonly used proxy has been the extent of multimarket contact (a measure of the number of markets in which multipoint competitors interact), implying that firms that interact in many markets have greater multimarket retaliation opportunities than those that interact in few. However, this blunt conceptualization of retaliation opportunities does not account for the asymmetry of strategic interests that rivals may have in those points of contact. Therefore, while contacts in markets in which a rival has important strategic interests may indeed provide credible opportunities for effective multimarket retaliation (and so lead to deterrence), contacts in unimportant markets may have no such effect, or may even lead to increased rivalry. A goal of this paper is to find out how these asymmetries in market interests influence the deterrence effect of these contacts.

MULTIMARKET DETERRENCE UNDER CONDITIONS OF ASYMMETRIC TERRITORIAL INTERESTS

While multipoint competition implies that a set of firms have some similarity in their product–market scope (as reflected by their overlap in multiple markets), it certainly does not imply that firms assign the same strategic importance to those markets in which they overlap. A given firm may assign different degrees of strategic importance to its different positions across multiple markets. Moreover, competitors within a given market may assign different strategic importance to their position in that market, leading to a situation of *asymmetric territorial inter-*

[1] Findings in agreement with the mutual forbearance hypothesis include Heggestad and Rhoades (1978), Scott (1982, 1991), Feinberg (1985), Martinez (1990), Hughes and Oughton (1993), Barnett (1993), Evans and Kessides (1994), Gimeno and Woo (1996, 1999), Baum and Korn (1996, 1999), Parker and Röller (1997) and Jans and Rosenbaum (1997). Findings in disagreement include Strickland (1976), Whitehead (1978), Rhoades and Heggestad (1985), Alexander (1985), Mester (1987), and Sandler (1988).

[2] Two illustrations of signals of multimarket retaliation moves show how this actually occurs in the airline industry. Nomani (1990a, 1990b) illustrated the signaling of retaliation moves through computer reservation systems in the airline industry. In that context, firms have used announcements of time-limited sales in their rivals' hubs and special letter codes to signal threats of response. In another example, after United Airlines planned to launch a short-haul start-up named U2 in Californian markets dominated by Southwest, Southwest's CEO Herb Kelleher stated in the *Wall Street Journal* what amounted to a multimarket retaliation threat to enter some lucrative markets of United: 'If they want to share our market niche, then we are going to share with them. . . . What we do will be defined ultimately by what U2 does' (O'Brian, 1994: A3). While United eventually entered the West Coast, it repositioned its shuttle away from Southwest's Californian routes (McCartney, 1996: A10).

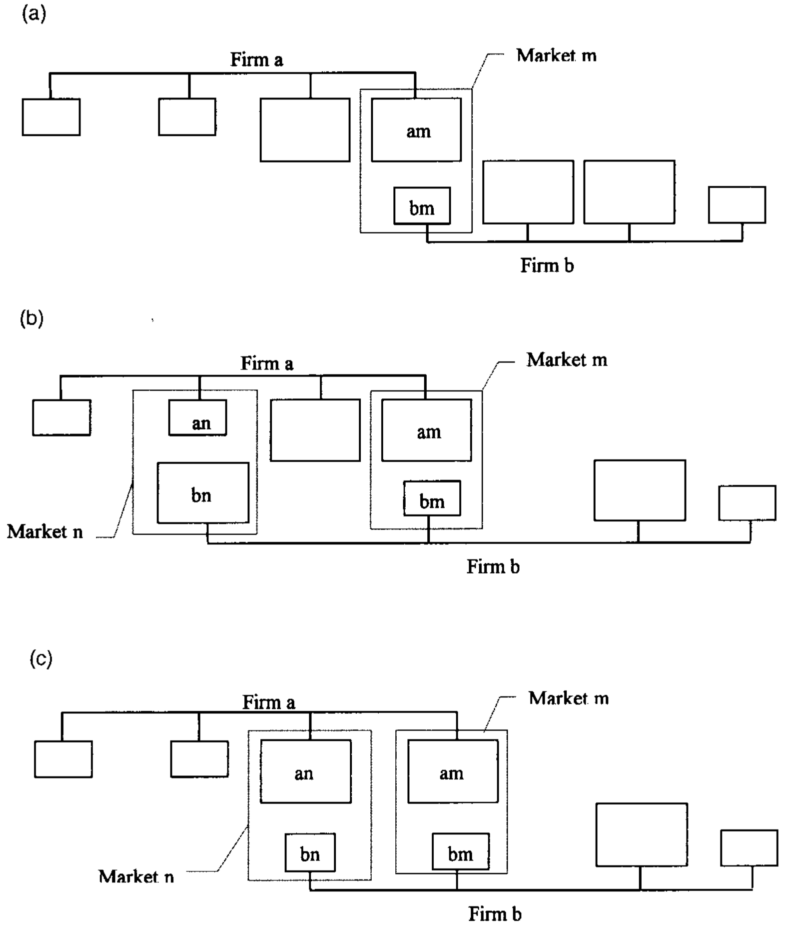

Figure 1. Multimarket contact with asymmetric territorial interests (size of squares represents importance of interests of firm in market). (a) Single-market contact with asymmetric territorial interests (no multimarket contact). (b) Multimarket contact with asymmetric and reciprocal territorial interests. (c) Multimarket contact with asymmetric and nonreciprocal territorial interests

ests. Figures 1(b) and 1(c) provide illustrations of multipoint competition between two firms (a and b) characterized by asymmetric territorial interests, since rival firms within the same market assign a different level of importance to that market. For instance, markets *m* and *n* are characterized by asymmetric territorial interests in both examples. By way of shorthand, the term *leader* refers to a firm which has strategically important interests in a market (such as firm *a* in market *m* in Figure 1), while the term *challenger* indicates a firm which does not have important interests in that market (such as firm *b* in market *m* in Figure 1).[3]

[3] No connection is intended to other uses of the terms 'leader' and 'challenger' in other literatures.

Asymmetric territorial interests and intensity of rivalry

The paper examines first the effects of multipoint competition under conditions of asymmetric territorial interests on the intensity of competitive behavior. The decision to intensify competitive action has been modeled by industrial organization economists as the decision to unilaterally 'defect' in a repeated 'prisoner's dilemma' game (Friedman, 1983; Shapiro, 1989). From that perspective, firms decide to forbear from unilateral competitive actions if the gains from a competitive move are overwhelmed by the costs of the move, including the costs from future retaliation. Since the gains from action and the costs from retaliation depend on the response by the rivals, the expectations about how rivals will react influence the cost–benefit calculation of a firm (Chen and MacMillan, 1992; Chen and Miller, 1994).

Asymmetric territorial interests influence the cost–benefit analysis that determines the intensity of competitive actions, and significantly influence the motivation to engage in competitive interaction.[4] Consider first a situation in a market with asymmetric territorial interests in which multimarket retaliation is impossible (e.g., Figure 1a). The incentive for unilateral action by the leader (the firm with important interests in the market) is not likely to be strong. Additional gains in the market, while possible, are likely to be marginal relative to its established position. At the same time, competitive actions would command substantial costs by increasing the intensity of rivalry in an important market (i.e., reducing prices or increasing costs in an important market), and involve the risk of damaging the important position in the market. Therefore, the structure of costs and incentives of unilateral action implies that, provided that challengers cooperate, leaders will have weak inducements to break peaceful coexistence by unilaterally engaging in competitive actions. This is not to say that leaders will not engage in competitive actions, however, since the ability of the leader to actually avoid competitive engagement in those markets also depends on the competitive incentives of the challengers. For the challengers, the opportunity to improve their position in the market by undertaking competitive actions becomes an incentive for competitive action, while the losses from retaliation and increased rivalry are not effective deterrents, given the challengers' current limited commitment to that market (Jacquemin and Slade, 1989). Therefore, challengers are likely to be more prone to unilateral competitive attack (Chen and Hambrick, 1995), even if they lack the competitive advantage of the leaders (Mason, Phillips, and Nowell, 1992).

The combination of these conflicting incentives by leaders and challengers determines the outcome of single-market competition under asymmetric territorial interests. Mason *et al*. (1992) provide experimental evidence that asymmetric oligopolies are more competitive than symmetric ones, other things being constant. In agreement with the previous arguments, their evidence suggests that defection is initiated by challengers, even if at a cost disadvantage. Cartel theorists (Jacquemin and Slade, 1989) have also reported this conflict as the 'chiseling' problem: the tendency of small players in collusive oligopolies to take advantage of the umbrella price set up by dominant firms and to gain share through secret discounts or other competitive moves (Caves, Fortunato, and Ghemawat, 1984). This structural tension (caused by challengers' incentives to defect) forces leaders into a trade-off between two undesirable choices. On the one hand, leaders may strongly retaliate to competitive moves by challengers (Chen and Hambrick, 1995), or even make preemptive competitive attacks (D'Aveni, 1994), to keep challengers at bay. This strategy is illustrated by the strong retaliatory responses by Procter & Gamble or Coca-Cola, and the preemptive aggressiveness of Microsoft, Hewlett-Packard, or Intel. While these strategies allow the leaders to maintain their market position in their important markets, it carries important short-term costs for the leader in terms of reduced margins and self-cannibalization (Casson, 1987: 55).[5] On the other hand, leaders may decide to avoid direct confrontation with challengers, maintaining high margins while accepting some encroachment by challengers (Caves *et al*., 1984). For instance, some national brands accept a degree of encroachment by low-price private brands without engaging in price-matching behavior. Ideally, leaders would like to avoid the encroachment by challengers in their important markets without having to engage in costly competitive wars in those markets.

[4] Asymmetric territorial interests also facilitate tacit coordination by providing contextual information and 'focal points' which allow firms to develop mutually consistent expectations and tacitly divide markets among themselves (Schelling, 1960). This tacit coordination would be difficult if rivals had equal positions in all markets (Porter, 1985: 357).

[5] The costs of these actions are forcefully illustrated by the 25 percent stock price drop when in 1993 Philip Morris cut prices of Marlboro in response to discount and private label brands (some of them owned by Philip Morris), the 10 percent drop in stock price of McDonald's in 1997 when it announced its 55¢ promotion, or America Online's operational difficulties when it cut its fees to $19.99 to match new entrants. Since these companies had dominant market positions, the price cuts resulted in large revenue losses in the short term, although the revenue loss was partially offset by gains in market share. These strategies may also have long-term benefits if they lead to the market exit of rivals or the development of an aggressive reputation that would deter future challengers and potential entrants.

In that context, multimarket competitive strategies offer a valuable opportunity for a leader to retaliate and discipline the challengers without incurring the costs of a competitive war in its important markets. In particular, the focal-market leader would benefit from multimarket contacts with the challengers in markets in which those challengers have important strategic interests (i.e., where they are leaders), such as the home markets of foreign rivals (Watson, 1982), or markets on which the rivals are highly dependent for revenues (Porter, 1980; Karnani and Wernerfelt, 1985; smith and Wilson, 1995). These contacts would give the leader a credible and effective threat of retaliation, since carrying out the threat would seriously harm the important interests of the rival without being too costly to implement.

This theoretical development highlights how the general predictions of multimarket contact are refined in the context of asymmetric territorial interests. It suggests that the effectiveness of multimarket contacts depends on the firms' interests in the focal and contact markets. Asymmetry in the focal market indicates that multimarket contacts are valuable for focal-market leaders to deter encroachment by challengers. Thus, multimarket contacts may benefit leaders more than challengers. In addition, asymmetric territorial interests in the contact markets can provide opportunities for retaliation in markets in which the focal-market challengers are leaders. These observations suggest that not all multimarket contacts are equally effective. The most effective contacts should be those in which the focal-market challengers are leaders in the contact market, or *reciprocal multimarket contacts* in the terminology of this paper. In Figure 1(b), firms *a* and *b* have reciprocal multimarket contacts (since the roles in one market are reversed in another). *Nonreciprocal multimarket contacts*, as reflected in Figure 1(c), represent situations in which firms have the same role in the focal and contact markets. Theoretical predictions about the competitive behavior of leaders and challengers can be developed using these concepts.

Effects on competitive behavior of focal-market challengers

Compare the situation faced by firm *b* in market *m* in Figures 1(a) and 1(b). As a challenger in market *m*, firm *b* is likely to experience a motivation to increase its competitive behavior towards the focal-market leader (firm *a*). However, theory predicts that the focal-market challenger would be less likely to act aggressively in market *m* if the leader (firm *a*) has opportunities for multimarket retaliation in markets important to the focal-market challenger (for instance, in market *n*, where firm *b* is a leader). This suggests that, everything else being constant, firm *b* would exhibit less intense competitive behavior in market *m* in the situation depicted in Figure 1(b) (in which there is reciprocal multimarket contact) than in the situation in Figure 1(a) (in which there is no multimarket contact). Thus, focal-market challengers are likely to behave less aggressively in the focal market when reciprocal multimarket contacts exist, since those reciprocal multimarket contacts would give their rival (the focal-market leader) an opportunity to respond in markets in which the focal-market challengers have important territorial interests.

> *Hypothesis 1a: The intensity of competitive behavior displayed by a challenger will be lower if it has reciprocal multimarket contacts with the focal-market leader.*

It could be argued that support for Hypothesis 1a might not be due to the particular effectiveness of reciprocal multimarket contact, but simply to the well-reported effect of multimarket contact on reducing intensity of rivalry (Evans and Kessides, 1994; Gimeno and Woo, 1996; Baum and Korn, 1996). If multimarket contacts were equally effective regardless of reciprocity, then it would be expected that the effects of reciprocal and nonreciprocal multimarket contacts would not be statistically different. However, Bernheim and Whinston's (1990) work suggests that multimarket contacts are not valuable *per se*, but only under specific conditions.[6] In their analysis, reciprocal

[6] Bernheim and Whinston's (1990) game theoretical model investigates the conditions in which some level of collusion can be sustained among multipoint competitors that could not be sustained among single-point competitors. For simplicity, the model assumes a two-firm two-market context, with no entry, and assumes away economies of scope or demand spillovers across markets. They find that multimarket contact will not enhance collusion among identical firms with equal positions in identical markets with constant returns-to-scale, because the increase in retaliation power afforded by multiple markets is balanced by a proportional increase in incentives to defect. Multimarket contact facilitates collusion if there are differences in market structure across markets or asymmetries

asymmetries enhance collusion possibilities by providing the incentives for a challenger to collude even in a market context in which it would otherwise defect. Therefore, Bernheim and Whinston's model suggests that the forbearance effect of reciprocal contacts (as in Figure 1b) would be greater than that of nonreciprocal contacts (as in Figure 1c). In a situation such as Figure 1(c), the focal-market challenger has little to gain by forbearing in the focal market, since its important territories are out of the reach of the multimarket rival. Therefore, a direct comparison between the effects of reciprocal and nonreciprocal multimarket contacts would explicitly examine whether forbearance is due to a general multimarket contact effect or is specifically due to the pattern of reciprocity in the multimarket threats.

> *Hypothesis 1b: The intensity of competitive behavior displayed by a challenger will be lowered more by reciprocal multimarket contacts with the focal-market leader than by nonreciprocal multimarket contacts with it.*

Effects on competitive behavior of focal-market leaders

The patterns of multimarket contact may also have an effect on the intensity of competitive behavior engaged in by the focal-market leader (firm *a* in market *m* in Figure 1). Without opportunities for multimarket retaliation, the leader might be compelled to act aggressively to match or even preempt aggressive moves by challengers. However, if the leader is able to deter competitive actions by the challenger through multimarket retaliation, its incentives to behave aggressively in an important market decrease accordingly. Having blocked the competitive threat by challengers, the leader will likely deescalate its own competitive behavior in order to improve its margins in that important market. Thus, conditions that deter the focal-market challengers from competing aggressively (Hypothesis 1) are also expected to decrease the intensity of competitive behavior of the focal-market leader. In Figure 1, the intensity of competitive behavior exhibited by the focal-market leader when it has reciprocal multimarket contacts (Figure 1b) would likely be lower than both that of a focal-market leader without multimarket contacts (Figure 1a) and than that of a focal-market leader with nonreciprocal multimarket contacts (Figure 1c), everything else being constant.

> *Hypothesis 2a: The intensity of competitive behavior displayed by a leader will be lower if it has reciprocal multimarket contacts with the focal-market challengers.*

> *Hypothesis 2b: The intensity of competitive behavior displayed by a leader will be lowered more by reciprocal multimarket contacts with the focal-market challengers than by nonreciprocal multimarket contacts with them.*

Together, Hypotheses 1 and 2 stress the positive-sum (as opposed to zero-sum) nature of competitive interaction in oligopolistic contexts. When the focal-market leader can reduce the challengers' motivation to attack through multimarket deterrence, both the leader and the challengers will decrease the intensity of their competitive behavior.

Spheres of influence and sustainability of market positions

In addition to influencing the intensity of rivalry, multipoint competition under conditions of asymmetric territorial interests is also expected to influence the firms' ability to maintain dominant market positions (as measured by their market share) in their important markets. This prediction also differentiates this model from the general multimarket contact model, which has no implication for equilibrium market shares of asymmetric rivals.

The 'spheres of influence' hypothesis (Edwards, 1964) suggests that multipoint competitors can develop a tacit agreement by which each firm recognizes the territorial interests of the other, leading to a tacit creation of spheres of influence.[7] In this situation, each firm tacitly

in firms' advantages across markets. This paper focuses on the second theoretical finding.

[7] Edwards stated that in multimarket competition '[e]ach [competitor] may informally recognize the other's primacy of interests in markets important to the other, in the expectation that its own important interests will be similarly respected. Like national states, the great conglomerates may come to have recognized spheres of influence . . .' (Edwards, 1964). While the term 'spheres of influence' is most often used in

avoids expanding into the other's territories, and focuses instead on exploiting its own territories. This would decrease the erosion of market share of firms in their important markets. In the extreme case, firms may even partially or totally pull out from their rivals' territories, in the expectation that their rivals will reciprocate in kind.[8] As long as this were done mutually, firms would have clear economic incentives to trade market share in markets in which they do not have territorial interests for market share in their own important markets (Bae, 1989; Bernheim and Whinston, 1990). Therefore, the spheres of influence hypothesis suggests that leaders that have reciprocal multimarket contacts with challengers (and therefore have footholds in the challengers' spheres of influence) would be able to maintain higher equilibrium market shares in their important markets than otherwise.

Bernheim and Whinston's (1990) game theoretical treatment of multipoint competition again provides some insight into the conditions leading to spheres of influence. Asymmetric competitive advantages by firms in different markets and high fixed costs are two situations in which spheres of influence are likely to evolve in multipoint competition, since firms find it profitable to specialize in those markets in which they have an initial competitive advantage or have already sunk costs. In the model, firms are willing to give up market share in markets in which they do not have these advantages as 'side payments' to obtain market share in those markets in which they have an initial advantage. Thus, initial differences in territorial interests can be further leveraged by multimarket retaliation threats, which encourage further specialization. The mechanism of spheres of influence may create a path-dependent system in which firms improve their market positions in those markets in which they were initially strong.

Empirical research of the spheres of influence hypothesis is still at an early stage. Ma and Jemison (1994) have studied the effect of spheres of influence on market share instability over four loan segments in banking markets defined at the county level. They found that the aggregate market share instability over these four segments was lower if different banks had the leading share in each segment. The aggregate measurement of the dependent variable, however, makes it difficult to draw conclusions about the effect of spheres of influence on the market shares of specific firms in specific markets. Baum and Korn (1996) observed that multimarket contact had a stronger negative effect on route entry and exit by California commuter airlines in markets in which the dominant incumbent has a large market share. While this result is in general agreement with the predictions of spheres of influence, the analysis only provides insight into the effect of asymmetric interests in the focal market, and does not distinguish between reciprocal and nonreciprocal multimarket contacts. Therefore, while existing results suggest some predictive validity for the spheres of influence hypothesis, they do not provide a systematic testing of its implications.

The implications of the spheres of influence hypothesis is that firms will maintain higher equilibrium market shares in those markets in which they have important territorial interests if they have retaliation opportunities in markets in which their rivals have important interests. That is, leaders will have higher equilibrium market shares if they have reciprocal multimarket contacts with their challengers. Since market share is a relative measure, a higher equilibrium market share by the leader will be associated, by definition, with a lower equilibrium market share by the challengers, and vice versa. For this reason, a single hypothesis about the leader's equilibrium market share is presented. Therefore, for a given initial level, market share for a leader will adjust toward a higher equilibrium market share for those firms with reciprocal multimarket contacts (Figure 1b) than for those with either no multimarket contact (Figure 1a) or nonreciprocal multimarket contacts (Figure 1c).

Hypothesis 3a: The market share held by a leader will adjust towards a higher equilibrium

the literature (Edwards, 1964; Bernheim and Whinston, 1990; Ma and Jemison, 1994; Baum and Korn, 1996), the idea has also been discussed under labels such as 'reciprocal subordination and superordination' (Simmel, 1950; Barnett, 1993), 'mutual foothold equilibrium' (Karnani and Wernerfelt, 1985; smith and Wilson, 1995), and 'exchange of threats equilibrium' (Casson, 1987; Graham, 1990).

[8] The logic of spheres of influence is perhaps best reflected in an old quote by Du Pont officials related to their competition in multiple product and geographic markets over the interwar (1918–39) period: 'It is sound business procedure to restrict ourselves to a certain degree to those markets in which we have advantage over foreign competitors so long as those competitors restrict themselves to other markets in which they have economic advantage' (Edwards, 1944: 19).

market share if it has reciprocal multimarket contacts with the focal-market challengers.

Hypothesis 3b: The market share held by a leader will adjust toward a higher equilibrium market share if it has reciprocal multimarket contacts with the focal-market challengers than if it has nonreciprocal multimarket contacts with them.

CONCEPTUALIZATION OF ASYMMETRIC TERRITORIAL INTERESTS

Multipoint competition literature has not systematically determined which dimensions best describe the importance of the strategic interests of a firm in a market, or which dimensions are used by firms to outline spheres of influence. Three general dimensions (market share dominance, market dependence, and resource centrality) drawn from the theoretical literature are proposed as preliminary definitions of spheres of influence, and their empirical applicability may be determined by the predictive validity of the results.

Market share dominance

Past research has most often used market share to predict strategic territorial interests and to define spheres of influence (Ma and Jemison, 1994; Baum and Korn, 1996). Both Porter (1980) and Karnani and Wernerfelt (1985) indicate that cross-parry (or counter-attack) reactions might be particularly effective when market shares are widely divergent, thus suggesting that market share asymmetries influence the cost and effectiveness of an attack. Both recommend multipoint competitors to maintain small market shares (footholds) in those markets in which their rivals have dominant market share, as a deterrence mechanism. Casson (1987) formally studies the asymmetry of competitive incentives under market share asymmetry. A challenger with low market share can easily undercut without much cost to its own interests, while a response in kind by the large share leader would be very costly to implement. Cartel 'chiseling' is also associated with market share asymmetry (Jacquemin and Slade, 1989). Therefore, market share asymmetry is likely to lead to asymmetric competitive incentives and potential conflict that could be resolved through multimarket deterrence.

Market dependence

A problem of using market share dominance to define spheres of influence is that it ignores the differences in market sizes and firm sizes. Thus, the position of a large firm in a small market may be strategically unimportant, even if it has the dominant market share. This problem leads to the consideration of market dependence measures of strategic importance. Watson (1982), Karnani and Wernerfelt (1985), and smith and Wilson (1995) have suggested that asymmetries in market dependence facilitate effective multimarket retaliation. Feinberg (1985), Alexander (1985) and Chen (1996) have implicitly agreed by using dependence as an *a priori* weight for the importance of multimarket contacts. When a firm is highly dependent on a market, an aggressive competitive action in that market will have costly effects for the firm. A challenger with low dependence will suffer few direct costs from initiating competitive attack (smith and Wilson, 1995). In this way, asymmetries in market dependence may influence competitive incentives to attack or forbear. Moreover, since firms may be more aware of their competitors in markets in which they are highly dependent (Chen and MacMillan, 1992), multimarket contacts in those markets may increase mutual awareness of possibilities of multimarket retaliation, thereby increasing the effectiveness of multimarket deterrence.

Resource centrality

Bernheim and Whinston (1990) have suggested that spheres of influence occur because of the underlying differences in the competitive advantage of firms. Even if spheres of influence are eventually characterized by market share or dependence asymmetries, it is asymmetries in competitive advantage that make these spheres emerge in the first place. Resource-based theorists have suggested that competitive advantage is due to the underlying resources and capabilities of the firm (Barney, 1991; Peteraf, 1993). For multiproduct or multimarket firms, key resources may underlie the competitive advantage of the firm in multiple markets. Yet, these resources may provide advantage in only a narrow set of product or market applications, either because of their limited scope of application or geographical limits. As a result, units within the firm may differ in their ability to draw advantage from these key firm-wide resources. This idea is captured in the concept of resource centrality, defined as the strength of the link between the unit and the firm's key underlying firm-wide resources.

Units with high resource centrality may better reflect those markets to which the firm has a long-term commitment. Since the key resources do not change quickly, resource centrality may provide a more stable delineation of spheres of influence than delineation based on revenue patterns. Moreover, as Bernheim and Whinston (1990) suggest, spheres of influence outlined in terms of underlying competitive advantage provide strong motivation for specialization, since a firm has the incentive to give up market share in markets in which it does not have an underlying advantage in exchange for market share gains in those in which it does.

RESEARCH METHODS

Sample

The U.S. airline industry provides an ideal context for studying competitive interaction in general (Chen, Smith and Grimm, 1992; Chen and MacMillan, 1992; Chen and Miller, 1994; Miller and Chen, 1994), and multipoint competition in particular (Evans and Kessides, 1994; smith and Wilson, 1995; Baum and Korn, 1996; Chen, 1996; Gimeno and Woo, 1996). There are several factors that make this industry ideal for this study. First, highly detailed data are collected by the Department of Transportation (DOT) from all the carriers. The DOT data bases used in this study were the Ticket Price Origin and Destination Survey (DB1A), the Service Segment data, and the Form 41 reports. Second, the airline industry is made up of discrete markets (city-pair markets) with little or no cross-elasticity of demand. City-pair markets are defined from a demand-side perspective as the set of customers demanding air travel between a given pair of cities, irrespectively of how that demand is satisfied in terms of the trip structure (direct flight, one-stop flight). Third, the industry is characterized by substantial asymmetry of interests not only in market shares and market dependence, but also in resource centrality due to hub-and-spoke networks in the industry (Borenstein, 1989). Finally, air transportation was the primary business of almost all of the airlines, which controls for the effects of diversification and multimarket contact outside the industry. The centralized way in which competitive decisions are made in the airline industry makes it likely that managers recognize and take into account the multimarket reactions to their moves, a necessary condition for mutual forbearance.

A sample of city-pair markets in the U.S. scheduled passenger airline industry for the fourth quarters of 1984 through 1988 (five time periods) was selected to test the hypotheses. All city-pair markets considered between cities are at least 100 miles apart (to control for substitution by ground transportation), with at least 10 passengers a day and with at least one incumbent for each year.[9] A firm was considered to be an incumbent if it had at least a 5 percent share of the market or carried at least 10 passengers a day. Since this study focuses on competition, observations of monopoly markets were deleted from the sample. These procedures yielded an unbalanced panel data sample describing the activities of 48 airlines across 2,897 markets for five periods. The unit of analysis was defined as the *airline-route*: the position as incumbent that a given airline i has in a given city-pair market m. For the rest of this paper, the subscripts i, m, and t refer to the airline, city-pair market, and time period of the observation, respectively. This overall sample included 14,120 airline-routes followed over 5 years, yielding 44,271 observations.

Operationalization of spheres of influence

Three alternative dimensions were described earlier for delineating strategically important airline-routes. *Market Share Dominance* (MS) is operationalized as the market share of a focal airline-route in terms of passengers transported, and *Market Dependence* (MD) as the percentage of overall firm revenues obtained by the focal airline-route. *Resource Centrality* (RC) is operationalized in terms of the airline-route reliance

[9] The markets included in the sample capture over 90 percent of the scheduled passenger traffic in the United States, with some underrepresentation of markets with very low demand.

on the firm's important 'hub positions' in airports. Hub positions have been identified as critical resource commitments and sources of rents in this industry (Bailey and Williams, 1988; Borenstein, 1989, 1991). Strong positions in airports are costly to develop and difficult to redeploy, and provide local efficiency rents and market power advantages which are exploited in city-pair markets originating in that airport (Berry, 1990; Borenstein, 1989, 1991). Therefore, *Resource Centrality* is operationalized as the percentage of overall firm enplanements that take place at either of the two cities of the city-pair market.

Using these three dimensions, I identified for each market and year which firm had the highest territorial interests in the market in terms of market share dominance, market dependence, and resource centrality. Such a firm is considered to be the leader in the market in terms of that dimension, while the remaining incumbents are considered to be challengers. While this classification of leaders and challengers is somewhat arbitrary, it has the advantage of being applicable to every market and is likely to lead to more conservative inferences.[10] The classification is implemented quantitatively by defining three dummy variables for each observation, indicating whether the airline-route *im* is considered a leader in that dimension at period *t*. Leader(MS)_{imt} equals 1 if firm *i* is market share leader in market *m* at period *t*, and 0 otherwise. Leader(MD)_{imt} equals 1 if firm *i* obtained a greater proportion of its revenues from market *m* at period *t* than any of its rivals, and 0 otherwise. Leader(RC)_{imt} equals 1 if the proportion of enplanements at both end cities of market *m* at period *t* are greater for firm *i* than for any of its rivals. Three complementary dummy variables, $\text{Challenger(MS)}_{imt}$, $\text{Challenger(MD)}_{imt}$, and $\text{Challenger(RC)}_{imt}$, are equal to 1 if firm *i* is an incumbent in market *m* at time *t* but is not a leader, and is 0 otherwise. These complementary dummies thus represent an airline-route position as an incumbent challenger.

There are 13,297 observations for which each Leader dummy variables equals 1. The three alternative definitions of important territorial interests overlap to some extent, but not to the point of being redundant. Among those airline-routes classified as leaders according to market share, 70.90 percent were also classified as leaders according to market dependence, and 52.85 percent were classified as leaders according to resource centrality. Among those classified as leaders according to market dependence, 61.00 percent were also classified as leaders according to resource centrality.

The six dummy variables are later incorporated into the definition of the multimarket contact independent variables. They are also used for defining subsamples of the overall sample that focus on the competitive behavior and market share sustainability of leaders and challengers. For each of the three alternative dimensions of spheres of influence, subsamples of leaders and challengers are selected. Thus, six alternative subsamples of the overall sample are used: Market Share Challengers, Market Dependence Challengers, Resource Centrality Challengers, Market Share Leaders, Market Dependence Leaders, and Resource Centrality Leaders.[11]

Measurement

Dependent variables

The intensity of competitive behavior is inversely captured by Yield_{imt}, defined as the average price level actually charged by the airline-route in a time period divided by the distance of the market.[12] This operationalization differs from other

[10] An alternative specification could define leaders and challengers if the gap in their interests was above some arbitrary level. This would imply that some markets would not have a leader, and would not be included in the analysis. Moreover, that sample selection would be systematically biased against unconcentrated markets or markets with firms with similar interests. Theoretically, a more demanding classification of leaders would likely strengthen the results, since it would identify asymmetric territorial interests in a more restrictive way. The arbitrary classification used in this paper may weaken the magnitude and significance of coefficients, and therefore provide a more conservative test of the hypotheses.

[11] This split-sample design allows all variables, not just the independent variables, to have a different coefficient for leaders and challengers. While an alternative design could have been used, in which only the effects of certain independent variables are allowed to vary between leaders and followers, the split-sample design provides a more conservative test, since the contact measures will not capture possible misspecification of other control variables.

[12] Relying on actual prices rather than announced or advertised prices is important, because airlines can easily change actual prices by changing the availability of seats to different fare categories without necessarily changing their advertised prices for those categories.

competitive dynamics research (Chen, 1996; Grimm and Smith, 1997), which has used information on actions or changes (e.g., price changes) to measure competitive behavior. I consider that firms behave competitively not just when they lower their yields, but also when they keep these yields low.[13] Therefore, lower yields indicate more intense competitive behavior, and vice versa. The yield measure (also known as revenue per passenger-mile) is a widely used measure of pricing in the industry. Dividing the price by distance serves to homogenize prices across markets of different distances (facilitating the use of linear methods) and to reduce possible heteroscedasticity. The second dependent variable, Market Share_{imt}, represents the market share of the airline-route measured as the passengers transported by the airline-route divided by all passengers transported in the market.

Independent variables

Multiple measures of multimarket contact have been proposed in the literature (Scott, 1982; Feinberg, 1985; Evans and Kessides, 1994). The most common and simple among these are count measures that add up the number of markets in which firms in the focal market compete outside the focal market (Heggestad and Rhoades, 1978; Evans and Kessides, 1994; Baum and Korn, 1996; Gimeno and Woo, 1996). The average multimarket contact of the firm with each of its focal-market rivals is used when the focal firm competes with multiple rivals in the focal market. Since a firm faces different rivals in different markets, multimarket contact differs across firms and markets.

Some researchers have argued that count measures may be too simplistic, and that counts should be weighted by the strategic importance of the contacts (Feinberg, 1985; Chen, 1996), standardized by the number of markets served by the firm (Baum and Korn, 1996), or corrected by the possibility of random contacts (Scott, 1982). Without agreement about which corrections to use, however, this trend has led to substantial differences in measurement that hinder generalization and comparisons between studies. To avoid this, the paper uses a simple count measure of multimarket contact, similar to the ones used by Evans and Kessides (1994) and Gimeno and Woo (1996) in the context of the airline industry, and empirically determines (instead of assuming *a priori* in a weighting scheme) whether multimarket contacts in strategically important markets have a greater effect on forbearance and sustainability.

Hypothesis 1 requires the calculation of pairwise multimarket contacts for a challenger in a focal market with the leader in that market, differentiating between reciprocal and nonreciprocal multimarket contacts. Reciprocal multimarket contact for a challenger in a focal market is measured as the number of markets outside the focal market in which the challenger meets the focal-market leader and in which the focal-market challenger is the leader. For each dimension of airline-route territorial interests D (either market share dominance, market dependence or resource centrality), this variable is constructed as follows. Four conditions must be simultaneously met for a focal-market challenger to have one reciprocal multimarket contact with a focal-market leader: (a) that the focal firm i is a challenger in the focal market m, (b) that another firm j is a leader in the focal market, (c) that firm i is a leader in another market n, and (d) that the focal-market leader j is present in that market n. By using dummy variables to represent each condition, the product of these four dummies equals 1 only when all four conditions are met. The total number of reciprocal multimarket contacts is calculated by summing over all other firms and markets. Using the previously defined dummy variables, and the dummy variable Incumbent_{imt} (which equals 1 if firm i is an incumbent in market m at period t, and equal to 0 otherwise), the measure is operationalized as:

$$\text{Reciprocal MMC}_{\text{Challenger}}(D)_{imt} = \sum_{j\neq 1}\sum_{n\neq m} \text{Challenger}(D)_{imt} \times \text{Leader}(D)_{jmt} \times \text{Leader}(D)_{int} \times \text{Incumbent}_{jnt}$$

where $D \in$ {Market Share, Market Dependence, Resource Centrality}.

[13] It could be argued that whether yields are high or low should be determined with respect to a benchmark. By including a fixed-effect intercept for each market (discussed in the methods section), I control for market-specific differences in yields. This is statistically equivalent to a within-market analysis of yields. The market-specific intercepts also control for the fact that short-distance markets tend to have higher yields than long-distance markets, because costs increase with mileage at a decreasing rate.

Similarly, nonreciprocal multimarket contact for a challenger in a focal market is measured by the number of markets outside the focal market in which the challenger meets the focal-market leader and in which the focal-market challenger is also a challenger.

$$\text{Non-Reciprocal MMC}_{\text{Challenger}}(D)_{imt} = \sum_{j\neq 1}\sum_{n\neq m} \text{Challenger(D)}_{imt} \times \text{Leader}(D)_{jmt} \times \text{Challenger}(D)_{int} \times \text{Incumbent}_{jnt}$$

The sum of reciprocal and nonreciprocal multimarket contact for a challenger leads to total multimarket contact, which is simply the total number of markets in which the focal market challenger meets the focal-market leader outside the market.

$$\text{Total MMC}_{\text{Challenger}}(D)_{imt} = \text{Reciprocal MMC}_{\text{Challenger}}(D)_{imt} + \text{Non-Reciprocal MMC}_{\text{Challenger}}(D)_{imt}$$

Hypotheses 2 and 3 focus on the effect of multimarket contact on leader forbearance and sustainability. Since leaders may meet any number of challengers in the focal market, the average of all pairwise multimarket contacts of the leader with all the focal-market challengers is measured, discriminating between reciprocal and nonreciprocal contacts. The average reciprocal multimarket contact for a leader is the average number of markets in which the leader meets the focal-market challengers in other markets in which the focal-market challengers are leaders. For instance, if a leader has two challengers in the focal market, and has 100 reciprocal multimarket contacts with the first and 300 with the second, the average reciprocal multimarket contact equals the average, 200. Similarly, average nonreciprocal multimarket contact for a leader is measured as the average number of markets in which the leader meets the focal-market challengers in other markets in which the focal-market challengers are also challengers.

$$\text{Reciprocal Avg MMC}_{\text{Leader}}(\text{D})_{\text{imt}} = \left(\sum_{j\neq 1}\sum_{n\neq m} \text{Leader}(D)_{imt} \times \text{Challenger}(D)_{jmt} \times \text{Incumbent}_{int} \times \text{Leader}(D)_{jnt}\right) \Big/ \left(\sum_{j\neq 1} \mathit{Challenger}(D)_{jmt}\right)$$

$$\text{Non-Reciprocal Avg MMC}_{\text{Leader}}(D)_{imt} = \left(\sum_{j\neq 1}\sum_{n\neq m} \text{Leader}(D)_{imt} \times \text{Challenger}(D)_{jmt} \times \text{Incumbent}_{int} \times \text{Challenger}(D)_{jnt}\right) \Big/ \left(\sum_{j\neq 1} \text{Challenger}(D)_{jmt}\right)$$

The sum of these two measures equals the total average multimarket contact, which measures the average number of markets in which the focal-market leader meets the focal-market challengers outside the focal market.

$$\text{Total Avg MMC}_{\text{Leader}}(D)_{imt} = \text{Reciprocal Avg MMC}_{\text{Leader}}(D)_{imt} + \text{Non-Reciprocal Avg MMC}_{\text{Leader}}(D)_{imt}$$

Control variables

Other variables are included to control for the effects of factors that have a well-reported influence on yields and market shares in the airline industry. These include (1) controls for heterogeneous *service attributes* (circularity of flight, being direct flights, frequency of flights, percentage of first/business class passengers, and percentage of round trip tickets), (2) controls for *market attributes* (cost of inputs, and market size), (3) controls for the *cost position in the airline-route* (load factor, scale of the firm, presence at end cities, and hub-and-spoke network effects), (4) controls for *market structure* (market concentration, number of potential entrants and hub concentration at the end cities) and *firm-specific market power* (firm's share of enplanements at the end hub and its share of passengers in the city-pair market).[14] In addition, it might be conjectured that reciprocal contacts are more

[14] Of course, market share is not a control variable in the market share equation. Lagged market share is used, to account for the partial adjustment process of market shares.

likely when well-established (but higher-cost) firms compete with other well-established firms, rather than with smaller (but more cost-efficient and competitive) firms, which might have smaller market shares. To control for this alternative explanation, two control variables are included which account for the average market share of the focal firm outside the focal market, and the average market share of the rival(s) outside the focal market. The definitions of all control variables are provided in Table 1.

Statistical methods

Given the structure of the data as an unbalanced panel data set, panel data analysis techniques are used (Hsiao, 1986; Baltagi, 1995). For the yield equation, I specify an equation of yield as a function of independent ($\mathbf{X}_{imt}$) and control ($\mathbf{Z}_{imt}$) variables:

$$\text{Yield}_{imt} = \alpha + \beta'\mathbf{X}_{imt} + \delta'\mathbf{Z}_{imt} + \upsilon_{imt}$$

Since the panel data are composed of multiple observations from each airline, each market and each time period, there is a potential for nonindependence of errors. For instance, unobserved firm-specific factors (e.g., corporate reputation, frequent flyer programs, firm-specific pricing routines) may influence observations from the same firm and produce correlated errors across these observations. Similarly, unobserved market-specific factors (e.g., landing or slot restrictions, tourist or business markets) may influence observations from the same market and generate correlated errors across these observations. The same could occur for observations obtained in the same time period, which could all be influenced by unobserved industry-wide demand or supply shocks. To account for this potential misspecification, the compound error term is divided among firm-specific, market-specific, and time-specific components, plus a residual error (Evans and Kessides, 1994).

$$\upsilon_{imt} = \phi_i + \mu_m + \tau_t + \epsilon_{imt}$$

These components are modeled using a fixed-effects intercept specification, also known as the Least Squares Dummy Variable (LSDV) model. Three sets of dummy variables are included, representing each firm, each market, and each time period. This method avoids some sources of non-independence of errors common in panel data and reduces cross-sectional heterogeneity bias (Hsiao, 1986: 5).[15] In addition to the fixed effects, I checked for market-wide heteroscedasticity and autocorrelation of the residuals (ϵ_{imt}) using a maximum-likelihood heteroscedasticity test (Greene, 1990: 422), and the Bhargava, Franzini, and Narendranathan (1982) modification of the Durbin–Watson autocorrelation test for fixed effect panel models. Based on the results of these tests, a two-stage correction was implemented: heteroscedasticity was corrected in the first stage through weighted least squares, and autocorrelation in the second stage through a Prais–Winsten transformation using the first-order autocorrelation coefficient. None of these transformations modify the substantive results of the paper.[16]

While the analysis of sustainability is couched in terms of equilibrium market shares, these shares are not directly observable. Observable changes in market share may not immediately reflect shifts in equilibrium market share. As a result, market share changes may not immediately reflect the full impact of changes in the independent variables on equilibrium market share. To account for this, I use a dynamic model known as the partial adjustment model (Johnston, 1972; Tuma and Hannan, 1984), which poses that observed changes in market share serve to adjust actual market share to the equilibrium market share (which is a function of time-varying independent and control variables), but that such an adjustment process does not completely take place within a single time period. Thus, market share gains are expected to occur when the lagged market share is below the equilibrium market share, and market share erosion is expected to occur in the opposite case. The partial adjustment model is specified as:

[15] The fixed-effect specification was preferred to the alternative random-effects specification because the firm-specific, market-specific and time-specific effects were likely to be correlated with the independent variables. In that case, the random-effects specification yields biased estimates (Mundlak, 1978).

[16] Significant evidence of market-wise heteroscedasticity was found, although the correction does not seem to modify the results in a major way. Autocorrelation was also significant, but the autocorrelation coefficients were rather small, ranging between −0.08 and 0.09. Such a small autocorrelation is unlikely to bias the results, even if it had been left uncorrected.

Table 1. Definition of control variables used in the study

Controls for heterogeneous service attributes	
Frequency_{imt}	Number of flights per day by firm i serving city-pair market m in period t
$\text{Round Tickets}_{imt}$	Percentage of round trip tickets of all the firm's tickets sold in the airline-route
Class_{imt}	Percentage of first and business class tickets in the airline-route
$\text{Direct Flights}_{imt}$	Percentage of passengers flying direct (without connection) in the airline-route
Circularity_{imt}	Circularity of the firm's flights in the market (actual miles traveled by passengers divided by direct distance between the cities)
Controls for market attributes	
$\text{Cost of Inputs}_{mt}$	Index of changes in the cost of labor and fuel inputs: the Standard Industry Fare Level (calculated by FAA and adjusted by changes in cost of inputs) divided by market distance
Market Size_{mt}	Total number of passengers traveling the market with any airline
Controls for the cost position of the firm in the airline market	
Firm Size_{imt}	Number of passengers carried by the firm in all other markets (outside the market m under study)
$\text{Hub Economies}_{imt}$	Average number of enplanements by the firm at both end-cities
$\text{Network Economies}_{imt}$	Percentage of the passengers traveling the segments serving a city-pair which are not flying that city-pair. If passengers in city-pair market A–B fly two segments A–C and C–B, these passengers will be flying with other passengers in these segments who are not flying A–B. The higher the percentage of those passengers relative to city-pair passengers, the higher the network economies for the city-pair market
Load Factor_{imt}	Distance-weighted average of the load factors of the segments of the market
Controls for market structure	
$\text{Market Concentration}_{mt}$	Herfindahl–Hirshman index of concentration of enplanements in city-pair market m at period t
$\text{Potential Entrants}_{mt}$	Number of potential entrants (firms with presence at both end-cities that do not serve the city-pair) in market m at period t
$\text{Hub Concentration}_{mt}$	Average of the Herfindahl–Hirshman index of concentration of total enplanements at both end-cities of market m at period t
Controls for firm's dominance within the market	
Hub Share_{imt}	Average of the firm's share of total enplanements at both end-cities
$\text{Market Share}_{imt}$	Firm i's share of total passengers transported in city-pair market m at period t
Average market shares outside focal market	
Average market share outside market_{imt}	Average market share of firm i in all other city-pair markets served by the airline except market m, at period t
Average market share outside $\text{market}_{\text{Leader}}(D)_{imt}$	Average market share of the market's leader (in terms of market share, market dependence, or resource centrality) in all other city-pair markets served by that airline except market m, at period t (D = MS, MD, RC)
Average market share outside $\text{market}_{\text{Challengers}}(D)_{imt}$	Average for all challengers (in terms of market share, market dependence, or resource centrality) of their average market share in all other city-pair markets served by those airlines except market m, at period t (D = MS, MD, RC)

$$\text{Market Share}_{im,t} - \text{Market Share}_{im,t-1} = r \cdot (\text{Market Share}^*_{im,t} - \text{Market Share}_{im,t-1})$$

where

$$\text{Market Share}^*_{imt} = \alpha + \beta' \mathbf{X}_{imt} + \delta' \mathbf{Z}_{imt} + \upsilon_{imt}$$

and, as before

$$\upsilon_{imt} = \phi_i + \mu_m + \tau_t + \epsilon_{imt}$$

In this model, $\text{Market Share}^*_{imt}$ represents the equilibrium market share predicted by the model, which is not directly observed, and r is the rate of adjustment of the process. A high r represents a fast adjustment process, while a low r represents high inertia in market shares and a long adjustment process. Substitution yields the empirical specification for Hypothesis 3:

$$\text{Market Share}_{im,t} = r\cdot\phi_i + r\cdot\mu_m + r\cdot\tau_t + r\cdot\beta'\mathbf{X}_{imt} + r\cdot\delta'\mathbf{Z}_{imt} + (1-r)\cdot\text{Market Share}_{im,t-1} + e_{imt}$$

Since some control variables may be correlated to current market share by construction, lagged values of those variables are used.[17] As before, the firm-specific, market-specific and time-specific effects are modeled as fixed-effects intercepts. A problem with the above specification is that the estimates of the lagged dependent variable may be rendered inconsistent by the inclusion of the market-specific fixed-effects (Nickell, 1981; Baltagi, 1995). The solution involves taking first differences within the market and using an instrumental variable estimator for the first-differenced lagged dependent variable, as suggested by Arellano and Bond (1991).[18] Heteroscedasticity-robust standard errors and the associated Wald tests are presented (White, 1980; Arellano, 1987).

FINDINGS

Table 2 presents the descriptive statistics and zero-order correlation matrix for the dependent and control variables in the overall sample. Since the independent variables are specific to leaders and challengers, they only have meaningful values for their respective subsamples. Table 2, therefore, also presents descriptive statistics and correlations for the independent variables in their respective subsamples. A substantial correlation exists between reciprocal and nonreciprocal multimarket contacts that could lead to concerns of multicollinearity. To evaluate the effect of multicollinearity on the coefficients, two alternative analyses were carried out which suggest that the results presented below are not unduly influenced by multicollinearity.[19]

Effects on intensity of competitive behavior

The results for Hypotheses 1a and 1b are presented in Table 3. Since these hypotheses test the effect of multimarket contacts on the intensity of competitive behavior exhibited by challengers, the three alternative challenger subsamples are used. Table 3 presents, for each alternative subsample, a model including only the control variables (Models 1.1, 1.4, and 1.7), another including total number of contacts (Models 1.2, 1.5, and 1.8), and the final model disaggregating contacts as reciprocal and nonreciprocal (Models 1.3, 1.6, and 1.9). Relevant tests and statistics are presented at the bottom of each column. Four tests are presented for each final model. The first determines whether the effects of reciprocal and nonreciprocal multimarket contact are both simultaneously equal to zero (this test is equivalent to testing whether the inclusion of both multimarket contact variables significantly increases the regressions' R^2). The second tests whether the effect of reciprocal multimarket contact equals zero (associated with Hypothesis 1a), while the third tests if the effect of nonreciprocal multimarket contact is zero. The fourth test examines if the effects of reciprocal and nonreciprocal

[17] Market share equals the passengers transported by the firm in the market divided by the total number of passengers traveling the market. Market size equals the number of passengers in the market. Frequency, load factor, network economies, hub economies, hub share and hub concentration are partly a function of the number of passengers served by the firm in the market. Market concentration is a function of market share. Therefore, all these variables, which are partly correlated with market share by construction, are lagged in the partial adjustment model.

[18] The instrument set for a given first-differenced lagged dependent variable (e.g., Market Share$_{im,t-1}$ − Market Share$_{im,t-2}$) includes all the available levels of the lagged dependent variable at $t-2$ or earlier (e.g., Market Share$_{im,t-n}$, $n = 2, 3, \ldots t-1$).

[19] It should be noted that, while multicollinearity renders coefficients less precise, they are still the best linear unbiased estimators. Two alternative analyses were carried out to evaluate the robustness of the results to the multicollinearity between reciprocal and nonreciprocal multimarket contact. First, to check that the results were not unduly influenced by the particular specification of the multimarket contact effects, a new specification was tried which used total number of contacts and percentage of reciprocal contacts over all contacts as independent variables. These two variables are only moderately correlated. The coefficient of the second variable (percentage of reciprocal contacts) captures whether reciprocal and nonreciprocal contacts differ in their effects. This alternative specification reached the same substantive results as the test of Hypotheses 1b, 2b and 3b presented here in all cases. Second, for all the specifications, reciprocal multimarket contact was added by itself. In all cases, reciprocal multimarket contacts had a positive and statistically significant effect, in agreement with the results presented below.

Table 2. Descriptive statistics and correlation matrix

		Descriptive statistics			Pearson correlations																				
	Sample/subsample	*N*	Mean	S.D.	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]			
[1] Market Share	Total sample	44,271	0.27	0.21																					
[2] Yield	Total sample	44,271	0.17	0.09	0.21																				
[3] Frequency	Total sample	44,271	3.25	1.95	0.14	0.22																			
[4] Round Tickets	Total sample	44,271	0.82	0.20	0.08	−0.12	−0.06																		
[5] Class	Total sample	44,271	0.01	0.03	0.02	0.14	0.05	0.01																	
[6] Direct Flights	Total sample	44,271	0.17	0.37	0.30	0.28	0.07	−0.13	−0.01																
[7] Circularity	Total sample	44,271	1.09	0.16	−0.25	0.24	0.06	−0.11	0.06	−0.24															
[8] Cost of Inputs	Total sample	44,271	0.16	0.04	0.14	0.76	0.23	−0.31	−0.01	0.43	0.17														
[9] Market Size/100,000	Total sample	44,271	0.34	0.95	−0.14	−0.02	0.32	−0.15	0.00	0.37	−0.07	0.15													
[10] Firm Size/1,000,000	Total sample	44,271	5.63	2.52	0.08	0.03	0.11	0.27	0.12	−0.14	0.02	−0.14	−0.12												
[11] Hub Economies/100,000	Total sample	44,271	1.95	2.91	0.26	0.15	0.22	0.07	0.04	0.57	−0.15	0.10	0.22	0.19											
[12] Network Economies	Total sample	44,271	0.88	0.23	−0.22	−0.16	−0.04	0.20	0.03	−0.86	0.22	−0.40	−0.46	0.22	−0.31										
[13] Load Factor	Total sample	44,271	0.57	0.09	0.06	−0.39	0.05	0.11	−0.03	−0.17	−0.03	−0.40	0.00	0.05	0.07	0.18									
[14] Market Concentration	Total sample	44,271	0.36	0.14	0.38	0.31	0.07	−0.07	0.01	0.18	0.07	0.29	−0.07	0.01	0.10	−0.10	−0.08								
[15] Potential Entrants	Total sample	44,271	3.06	2.25	−0.05	0.07	0.19	−0.12	−0.01	0.42	−0.05	0.22	0.29	−0.16	0.23	−0.41	−0.04	0.05							
[16] Hub Concentration	Total sample	44,271	0.25	0.10	0.16	0.25	0.05	0.05	−0.01	0.09	0.03	0.14	−0.13	0.11	0.16	0.06	−0.13	0.32	−0.10						
[17] Hub Share	Total sample	44,271	0.15	0.11	0.61	0.34	0.20	0.01	0.07	0.31	−0.04	0.24	−0.09	0.21	0.51	−0.11	0.06	0.33	−0.05	0.28					
[18] Average market share outside market	Total sample	44,271	0.29	0.06	0.23	0.20	0.09	−0.13	0.05	0.01	0.00	0.20	−0.07	0.17	0.03	−0.01	0.02	0.14	−0.04	0.08	−0.35				
																							[19]	[20]	[21]
[19] Average market share outside market$_{\text{Leader}}$(MS)	Market Share Challengers	30,974	0.30	0.05	0.05	0.19	0.08	−0.13	0.04	0.11	0.07	0.30	0.05	−0.03	0.04	−0.09	−0.08	0.17	0.03	0.08	0.11	0.07			
[20] Total MMC$_{\text{Challenger}}$(MS)/100	Market Share Challengers	30,974	3.92	2.78	0.18	−0.06	0.04	0.32	0.07	−0.17	−0.08	−0.26	−0.16	0.60	0.12	0.25	0.07	−0.04	−0.21	0.08	0.10	0.06	−0.14		
[21] Reciprocal MMC$_{\text{Challenger}}$(MS)/100	Market Share Challengers	30,974	1.04	0.91	0.22	0.01	0.05	0.25	0.09	−0.14	−0.06	−0.19	−0.15	0.62	0.12	0.21	0.05	0.00	−0.18	0.09	0.17	0.23	−0.11	0.93	
[22] Non-Reciprocal MMC$_{\text{Challenger}}$(MS)/100	Market Share Challengers	30,974	2.88	1.96	0.15	−0.09	0.03	0.33	0.05	−0.18	−0.09	−0.28	−0.16	0.56	0.12	0.25	0.07	−0.06	−0.21	0.08	0.06	−0.03	−0.15	0.99	0.86
																							[23]	[24]	[25]
[23] Average market share outside market$_{\text{Leader}}$(MD)	Market Dependence Challengers	30,974	0.28	0.08	0.03	0.21	0.01	−0.11	0.04	−0.02	0.10	0.26	−0.14	0.01	−0.09	0.02	−0.12	0.24	−0.10	0.15	0.10	0.07			
[24] Total MMC$_{\text{Challenger}}$(MD)/100	Market Dependence Challengers	30,974	3.17	2.63	0.11	−0.01	−0.06	0.24	0.04	−0.19	−0.07	−0.22	−0.23	0.46	0.00	0.25	0.04	0.14	−0.23	0.16	0.06	0.05	0.05		
[25] Reciprocal MMC$_{\text{Challenger}}$(MD)/100	Market Dependence Challengers	30,974	0.61	0.61	0.02	0.02	−0.07	0.18	0.05	−0.17	−0.06	−0.16	−0.19	0.15	−0.05	0.22	0.02	0.18	−0.19	0.16	0.03	0.11	0.08	0.87	
[26] Non-Reciprocal MMC$_{\text{Challenger}}$(MD)/100	Market Dependence Challengers	30,974	2.56	2.13	0.12	−0.02	−0.05	0.25	0.04	−0.18	−0.07	−0.22	−0.23	0.53	0.01	0.25	0.04	0.12	−0.23	0.15	0.07	0.03	0.04	0.99	0.79
																							[27]	[28]	[29]
[27] Average market share outside market$_{\text{Leader}}$(RC)	Resource Centrality Challengers	30,974	0.28	0.07	0.06	0.20	−0.04	−0.07	0.04	−0.10	0.11	0.19	−0.23	0.01	−0.22	0.10	−0.11	0.16	−0.11	0.13	0.07	0.07			
[28] Total MMC$_{\text{Challenger}}$(RC)/100	Resource Centrality Challengers	30,974	3.34	2.68	0.15	−0.01	−0.02	0.27	0.07	−0.17	−0.06	−0.21	−0.23	0.50	0.04	0.25	0.02	0.08	−0.22	0.17	0.09	0.04	0.05		
[29] Reciprocal MMC$_{\text{Challenger}}$(RC)/100	Resource Centrality Challengers	30,974	0.70	0.63	0.11	0.00	−0.04	0.23	0.03	−0.16	−0.05	−0.18	−0.21	0.33	−0.01	0.23	0.02	0.11	−0.22	0.17	0.06	0.08	0.08	0.90	
[30] Non-Reciprocal MMC$_{\text{Challenger}}$(RC)/100	Resource Centrality Challengers	30,974	2.64	2.13	0.15	−0.01	−0.01	0.27	0.08	−0.17	−0.06	−0.21	−0.23	0.53	0.05	0.25	0.02	0.07	−0.21	0.16	0.09	0.02	0.04	0.99	0.84
																							[31]	[32]	[33]
[31] Average market share outside market$_{\text{Challengers}}$(MS)	Market Share Leaders	13,297	0.29	0.04	0.08	0.17	0.00	−0.11	0.07	−0.05	0.07	0.21	−0.08	−0.13	−0.12	0.02	−0.13	0.10	−0.09	0.09	0.03	0.12			
[32] Total MMC$_{\text{Leader}}$(MS)/100	Market Share Leaders	13,297	4.02	2.37	−0.05	−0.07	0.00	0.33	0.18	−0.30	0.02	−0.32	−0.18	0.71	0.05	0.39	0.06	−0.06	−0.24	0.09	0.01	−0.21	−0.07		
[33] Reciprocal Avg MMC$_{\text{Leader}}$(MS)/100	Market Share Leaders	13,297	1.11	0.75	−0.02	−0.03	0.01	0.28	0.21	−0.29	0.03	−0.26	−0.18	0.56	0.00	0.37	0.01	−0.02	−0.24	0.11	0.02	−0.18	0.13	0.93	
[34] Non-Reciprocal Avg MMC$_{\text{Leader}}$(MS)/100	Market Share Leaders	13,297	2.92	1.70	−0.07	−0.09	0.00	0.35	0.15	−0.29	0.01	−0.33	−0.17	0.74	0.06	0.38	0.07	−0.08	−0.23	0.07	0.00	−0.22	−0.15	0.99	0.86
																							[35]	[36]	[37]
[35] Average market share outside market$_{\text{Challengers}}$(MD)	Market Dependence Leaders	13,297	0.29	0.04	0.05	0.16	0.00	−0.10	0.06	−0.03	0.04	0.20	−0.06	−0.09	−0.09	0.01	−0.11	0.10	−0.04	0.07	0.02	0.11			
[36] Total MMC$_{\text{Leader}}$(MD)/100	Market Dependence Leaders	13,297	3.52	2.47	0.28	0.01	0.09	0.37	0.20	−0.24	−0.04	−0.25	−0.22	0.82	0.16	0.35	0.06	0.11	−0.24	0.15	0.20	−0.05	−0.04		
[37] Reciprocal Avg MMC$_{\text{Leader}}$(MD)/100	Market Dependence Leaders	13,297	0.70	0.60	0.34	0.10	0.14	0.34	0.24	−0.19	−0.02	−0.16	−0.18	0.82	0.18	0.30	0.03	0.16	−0.20	0.15	0.26	0.01	0.10	0.90	
[38] Non-Reciprocal Avg MMC$_{\text{Leader}}$(MD)/100	Market Dependence Leaders	13,297	2.83	1.94	0.25	−0.02	0.07	0.36	0.18	−0.24	−0.05	−0.27	−0.22	0.78	0.15	0.35	0.06	0.09	−0.25	0.14	0.17	−0.07	−0.08	0.99	0.83
																							[39]	[40]	[41]
[39] Average market share outside market$_{\text{Challengers}}$(RC)	Resource Centrality Leaders	13,297	0.29	0.04	0.01	0.16	0.04	−0.12	0.04	0.03	0.03	0.25	0.00	−0.09	−0.03	−0.04	−0.10	0.15	−0.02	0.09	0.04	0.11			
[40] Total MMC$_{\text{Leader}}$(RC)/100	Resource Centrality Leaders	13,297	3.64	2.43	0.13	−0.02	0.06	0.35	0.13	−0.24	−0.01	−0.25	−0.21	0.77	0.15	0.35	0.08	0.06	−0.24	0.15	0.17	−0.05	−0.07		
[41] Reciprocal Avg MMC$_{\text{Leader}}$(RC)/100	Resource Centrality Leaders	13,297	0.78	0.60	0.17	0.04	0.09	0.31	0.17	−0.22	0.01	−0.20	−0.19	0.77	0.15	0.31	0.03	0.09	−0.24	0.16	0.21	0.00	0.01	0.92	
[42] Non-Reciprocal Avg MMC$_{\text{Leader}}$(RC)/100	Resource Centrality Leaders	13,297	2.86	1.90	0.11	−0.04	0.05	0.35	0.11	−0.24	−0.01	−0.26	−0.21	0.75	0.14	0.35	0.09	0.05	−0.24	0.15	0.15	−0.06	−0.09	0.99	0.87

Table 3. Test of Hypothesis 1: fixed-effects panel data regression with heteroscedastic and autocorrelated errors (fixed effect intercepts for airline, market and time period effects are not presented)

Subsample:	Market share challengers			Market dependence challengers			Resource centrality challengers		
Dependent variable: Yield	Model 1.1 Coefficient	Model 1.2 Coefficient	Model 1.3 Coefficient	Model 1.4 Coefficient	Model 1.5 Coefficient	Model 1.6 Coefficient	Model 1.7 Coefficient	Model 1.8 Coefficient	Model 1.9 Coefficient
Frequency	0.0020***	0.0019***	0.0019***	0.0020***	0.0019***	0.0019***	0.0020***	0.0019***	0.0019***
Round Tickets	–0.0369***	–0.0370***	–0.0362***	–0.0377***	–0.0378***	–0.0379***	–0.0343***	–0.0347***	–0.0347***
Class	0.1786***	0.1785***	0.1788***	0.1818***	0.1816***	0.1813***	0.1753***	0.1748***	0.1744***
Direct Flights	0.0253***	0.0251***	0.0250***	0.0310***	0.0308***	0.0306***	0.0268***	0.0260***	0.0265***
Circularity	–0.0017	–0.0016	–0.0020	–0.0033**	–0.0030*	–0.0030*	–0.0024†	–0.0023†	–0.0022†
Cost of Inputs	0.7028***	0.7043***	0.7039***	0.7222***	0.7253***	0.7302***	0.6935***	0.7051***	0.7142***
Market Size/100,000	–0.0363***	–0.0361***	–0.0360***	–0.0376***	–0.0371***	–0.0371***	–0.0371***	–0.0364***	–0.0365***
Firm Size/1,000,000	0.0010***	0.0009***	0.0009***	0.0012***	0.0010***	0.0014***	0.0010***	0.0006***	0.0007***
Hub Economies/100,000	0.0008***	0.0007***	0.0008***	0.0006***	0.0006***	0.0006***	0.0005***	0.0004***	0.0005***
Network Economies	0.0362***	0.0360***	0.0359***	0.0442***	0.0442***	0.0441***	0.0369***	0.0360***	0.0368***
Load Factor	–0.0266***	–0.0266***	–0.0268***	–0.0256***	–0.0258***	–0.0256***	–0.0271***	–0.0271***	–0.0268***
Market Concentration	0.0296***	0.0295***	0.0287***	0.0260***	0.0246***	0.0243***	0.0249***	0.0238***	0.0235***
Potential Entrants	–0.0019***	–0.0019***	–0.0019***	–0.0019***	–0.0019***	–0.0018***	–0.0019***	–0.0019***	–0.0019***
Hub Concentration	0.0408***	0.0401***	0.0413***	0.0370***	0.0358***	0.0340***	0.0395***	0.0363***	0.0358***
Hub Share	0.0229***	0.0233***	0.0235***	0.0233***	0.0239***	0.0235***	0.0417***	0.0444***	0.0427***
Market Share	0.0057***	0.0054***	0.0039*	–0.0013	–0.0010	–0.0005	–0.0003	–0.0008	–0.0002
Average market share outside market$_{imt}$	0.0158**	0.0165***	0.0037	0.0075	0.0092†	0.0048	0.0145**	0.0170***	0.0148**
Average market share outside market$_{Leader}$(MS)$_{imt}$	0.0123***	0.0116**	0.0127***						
Average market share outside market$_{Leader}$(MD)$_{imt}$				0.0158***	0.0130***	0.0123***			
Average market share outside market$_{Leader}$(RC)$_{imt}$							0.0184***	0.0135***	0.0117***
Total MMC$_{Challenger}$(MS)/100		0.0002**							
Reciprocal MMC$_{Challenger}$(MS)/100			0.0029***						
Non-Reciprocal MMC$_{Challenger}$(MS)/100			–0.0011***						
Total MMC$_{Challenger}$(MD)/100					0.0003***				
Reciprocal MMC$_{Challenger}$(MD)/100						0.0030***			
Non-Reciprocal MMC$_{Challenger}$(MD)/100						–0.0004**			
Total MMC$_{Challenger}$(RC)/100								0.0005***	
Reciprocal MMC$_{Challenger}$(RC)/100									0.0028***
Non-Reciprocal MMC$_{Challenger}$(RC)/100									–0.0002
N	30,823	30,823	30,823	30,823	30,823	30,823	30,823	30,823	30,823
F-value	117.90***	117.89***	118.19***	119.69***	119.79***	119.94***	109.43***	109.72***	109.85***
Tests of linear restrictions of coefficients:		**d.f.**							
F-test:- Reciprocal MMC = Non-Reciprocal MMC = 0		2	41.86***			36.79***			59.95***
(H1a) *F*-test: Reciprocal MMC = 0		**1**	**82.52******			**50.39******			**61.51******
F-test: Non-Reciprocal MMC = 0		1	44.61***			9.74**			1.53
(H1b) *F*-test: Reciprocal MMC = Non-Reciprocal MMC		**1**	**75.16******			**40.28******			**41.35******

Significance levels: †($p < 0.10$); *($p < 0.05$); **($p < 0.01$); ***($p < 0.001$)

multimarket contacts are statistically different from each other (associated with Hypothesis 1b).

Hypothesis 1a tests whether challengers display less intense competitive behavior (higher yields) when they have reciprocal multimarket contacts with the leader. Statistically, this implies that the coefficients of Reciprocal MMC(MS), Reciprocal MMC(MD) and Reciprocal MMC(RC) are significantly positive. From Table 3 it can be seen that the coefficients of these variables are all positive and statistically significant at the 0.001 level. Therefore, Hypothesis 1a is strongly supported for all three alternative operationalizations.

Hypothesis 1b tests whether the competitive intensity is lowered more by reciprocal contacts than by nonreciprocal contacts. This hypothesis attempts to differentiate between a general effect of multimarket contact (in which case, no difference would be expected) vs. a particular effect of reciprocal multimarket contacts, as suggested by the spheres of influence concept. This hypothesis is tested through an F-test that restricts the coefficients of reciprocal and nonreciprocal multimarket contacts to being equal. All three resulting F-statistics are significant at the 0.001 level, which indicates that the coefficients of reciprocal multimarket contacts are significantly higher than those of nonreciprocal contacts. Hypothesis 1b is thus strongly supported.

Hypotheses 2a and 2b focus on the effect of multimarket contacts on the intensity of competitive behavior exhibited by leaders. The three leader subsamples are used, and results are presented in Table 4. Hypothesis 2a tests whether leaders display less intense competitive behavior when they compete with challengers with which they have reciprocal multimarket contacts. Statistically, this implies that the coefficients of Reciprocal Avg MMC(MS), Reciprocal Avg MMC(MD), and Reciprocal Avg MMC(RC), are significantly positive. These coefficients are positive and statistically significant at the 0.001 level for all operationalizations, in strong support of Hypothesis 2a.

Hypothesis 2b tests whether the leader's competitive intensity is lowered more by reciprocal contacts than by nonreciprocal contacts. Similar to Hypothesis 1b, this is tested with an F-test that restricts their coefficients to be equal. The resulting F-statistics are all significant at the 0.001 level. Reciprocal multimarket contacts have significantly higher forbearance effects than nonreciprocal contacts in all three operationalizations. Hypothesis 2b is thus strongly supported.

Effects on sustainability of market position

Hypotheses 3a and 3b test the effects of multimarket contacts on the leader's market share, using the three leader subsamples. Table 5 presents the results. Hypothesis 3a tests whether leaders have a higher equilibrium market share when they compete with challengers with which they have reciprocal multimarket contacts. Statistically, this implies that the coefficients of Reciprocal Avg MMC(MS), Reciprocal Avg MMC(MD), and Reciprocal Avg MMC(RC) should be significantly positive. From Table 5 it can be seen that the coefficient of reciprocal multimarket contact is not significant for Market Share Leaders, is significant for Market Dependence Leaders ($p < 0.01$) and strongly significant for Resource Centrality Leaders ($p < 0.001$). Hypothesis 3a therefore is not supported for the market share operationalization of spheres of influence, supported for the market dependence operationalization, and strongly supported for the resource centrality operationalization.

Hypothesis 3b compares the effect on the leader's equilibrium market share of reciprocal and nonreciprocal contacts. Since the heteroscedasticity-robust estimates of the covariance matrix are used, the restrictions of coefficients are tested with Wald tests. As shown in Table 5, the resulting Wald statistic is not significant for Market Share Leaders, marginally significant for the Market Dependence Leaders ($p < 0.05$), and strongly significant for Resource Centrality Leaders ($p < 0.001$). Reciprocal multimarket contacts are associated with higher equilibrium market shares than nonreciprocal contacts for the resource centrality operationalization and, marginally, for the market dependence operationalization, but not for the market share operationalization. Hypothesis 3b therefore is not supported for the market share operationalization of spheres of influence, marginally supported for the market dependence operationalization, and strongly supported for the resource centrality operationalization.

Evaluation of results

Given the large sample size, it is also important to evaluate the magnitude of the effects in

Table 4. Test of Hypothesis 2: Fixed-effects panel data regression with heteroscedastic and autocorrelated errors (fixed effect intercepts for airline, market and time period effects are not presented)

Subsample: Dependent variable: Yield	Market share leaders			Market dependence leaders			Resource centrality leaders		
	Model 2.1 Coefficient	Model 2.2 Coefficient	Model 2.3 Coefficient	Model 2.4 Coefficient	Model 2.5 Coefficient	Model 2.6 Coefficient	Model 2.7 Coefficient	Model 2.8 Coefficient	Model 2.9 Coefficient
Frequency	0.0034***	0.0034***	0.0034***	0.0022***	0.0020***	0.0019***	0.0032***	0.0030***	0.0029***
Round Tickets	−0.0355***	−0.0352***	−0.0348***	−0.0295***	−0.0308***	−0.0302***	−0.0420***	−0.0436***	−0.0424***
Class	0.2477***	0.2484***	0.2462***	0.2208***	0.2199***	0.2172***	0.2021***	0.2026***	0.2037***
Direct Flights	0.0196***	0.0208***	0.0210***	0.0195***	0.0194***	0.0199***	0.0214***	0.0219***	0.0231***
Circularity	0.0155***	0.0143***	0.0155***	0.0230***	0.0227***	0.0240***	0.0024	0.0036	0.0037
Cost of Inputs	1.6205***	1.6039***	1.6099***	0.8123***	0.8234***	0.8667***	0.9589***	0.9600***	0.9868***
Market Size/100,000	−0.0646***	−0.0644***	−0.0643***	−0.0624***	−0.0621***	−0.0597***	−0.0641***	−0.0636***	−0.0635***
Firm Size/1,000,000	0.0014***	0.0005***	0.0008***	0.0024***	0.0016***	0.0007***	0.0020***	0.0012***	0.0008***
Hub Economies/100,000	0.0001	0.0000	0.0001	0.0004**	0.0004**	0.0006***	0.0003†	0.0002	0.0002
Network Economies	0.0349***	0.0350***	0.0351***	0.0354***	0.0350***	0.0361***	0.0360***	0.0359***	0.0377***
Load Factor	−0.0682***	−0.0674***	−0.0655***	−0.0548***	−0.0555***	−0.0548***	−0.0491***	−0.0494***	−0.0475***
Market Concentration	0.0157***	0.0132**	0.0104*	0.0200***	0.0192***	0.0195***	0.0142***	0.0131***	0.0138***
Potential Entrants	−0.0035***	−0.0035***	−0.0035***	−0.0033***	−0.0033***	−0.0031***	−0.0031***	−0.0032***	−0.0031***
Hub Concentration	0.0213***	0.0209***	0.0225***	0.0269***	0.0254***	0.0258***	0.0445***	0.0425***	0.0454***
Hub Share	0.0314***	0.0316***	0.0291***	0.0280***	0.0281***	0.0208***	−0.0018	−0.0007	−0.0005
Market Share	0.0024	0.0032	0.0051	−0.0087***	−0.0080***	−0.0073***	0.0084***	0.0087***	0.0075***
Average market share outside market$_{imt}$	−0.0224**	−0.0125†	−0.0137†	0.0213***	0.0241***	0.0235***	0.0108	−0.0137†	0.0009
Average market share outside market$_{\text{Challengers}}$(MS)$_{imt}$	0.0097*	0.0088†	−0.0049						
Average market share outside market$_{\text{Challengers}}$(MD)$_{imt}$				0.0130*	0.0075	−0.0067			
Average market share outside market$_{\text{Challengers}}$(RC)$_{imt}$							0.0089	0.0018	−0.0040
Total Avg MMC$_{\text{Leader}}$(MS)/100		0.0012***							
Reciprocal Avg MMC$_{\text{Leader}}$(MS)/100			0.0041***						
Non-Reciprocal Avg MMC$_{\text{Leader}}$(MS)/100			−0.0001						
Total Avg MMC$_{\text{Leader}}$(MD)/100					0.0011***				
Reciprocal Avg MMC$_{\text{Leader}}$(MD)/100						0.0116***			
Non-Reciprocal Avg MMC$_{\text{Leader}}$(MD)/100						−0.0008***			
Total Avg MMC$_{\text{Leader}}$(RC)/100								0.0012***	
Reciprocal Avg MMC$_{\text{Leader}}$(RC)/100									0.0113***
Non-Reciprocal Avg MMC$_{\text{Leader}}$(RC)/100									−0.0013***
N	13,132	13,132	13,132	13,132	13,132	13,132	13,132	13,132	13,132
F-value	2094.87***	2114.21***	2119.44***	209.70***	210.63***	215.97***	249.62***	251.06***	256.26***

Tests of linear restrictions of coefficients	d.f.	Model 2.3	Model 2.6	Model 2.9
F-test: Reciprocal Avg MMC = Non-Reciprocal Avg MMC = 0	2	64.69***	155.35***	138.91***
(H2a) *F*-test: Reciprocal Avg MMC = 0	**1**	**58.27*****	**299.44*****	**255.09*****
F-test: Non-Reciprocal Avg MMC = 0	1	0.09	17.67***	32.31***
(H2b) *F*-test: Reciprocal Avg MMC = Non-Reciprocal Avg MMC	**1**	**29.94*****	**260.32*****	**213.64*****

Significance levels: †($p < 0.10$); *($p < 0.05$); **($p < 0.01$); ***($p < 0.001$)

Table 5. Test of Hypothesis 3: Partial adjustment model with fixed-effects for airlines, markets and time (Heteroscedasticity-robust standard errors and tested presented; fixed effects not shown)

	Market share leaders			Market dependence leaders			Resource centrality leaders		
Subsample: Dependent variable: Market share	Model 3.1 Coefficient	Model 3.2 Coefficient	Model 3.3 Coefficient	Model 3.4 Coefficient	Model 3.5 Coefficient	Model 3.6 Coefficient	Model 3.7 Coefficient	Model 3.8 Coefficient	Model 3.9 Coefficient
Lagged Frequency	0.0033**	0.0031**	0.0031**	0.0071***	0.0069***	0.0068***	0.0128***	0.0125***	0.0122***
Round Tickets	0.1817***	0.1837***	0.1838***	0.2613***	0.2601***	0.2598***	0.3498***	0.3465***	0.3522***
Class	–0.1202*	–0.1316*	–0.1315*	–0.2172***	–0.2216***	–0.2207***	–0.2123*	–0.2256**	–0.2280**
Direct Flights	0.1630***	0.1679***	0.1679***	0.1502***	0.1536***	0.1545***	0.2182***	0.2219***	0.2218***
Circularity	–0.1048***	–0.1127***	–0.1127***	–0.1856***	–0.1888***	–0.1910***	–0.5146***	–0.5146***	–0.5094***
Cost of Inputs	–1.6889**	–1.7518**	–1.7512**	–0.6832	–0.7719	–0.8860	–0.0507	–0.1148	–0.0538
Lagged Market Size/100,000	0.0230†	0.0222†	0.0222†	0.0057	0.0049	0.0044	–0.0211	–0.0228	–0.0234
Firm Size/1,000,000	0.0075***	0.0038**	0.0038**	0.0300***	0.0265***	0.0245***	0.0204***	0.0158***	0.0126***
Lagged Hub Economies/100,000	0.0010	0.0008	0.0008	0.0012	0.0011	0.0011	–0.0003	–0.0006	–0.0011
Lagged Network Economies	0.0001	0.0009	0.0009	–0.0036	–0.0042	–0.0053	–0.0604*	–0.0610*	–0.0623*
Lagged Load Factor	0.0098	0.0041	0.0041	0.0007	–0.0026	–0.0031	–0.0187	–0.0205	–0.0186
Lagged Market Concentration	–0.3113***	–0.3054***	–0.3054***	–0.2531***	–0.2520***	–0.2521***	–0.2293***	–0.2243***	–0.2246***
Potential Entrants	0.0113***	0.0108***	0.0108***	0.0109***	0.0101***	0.0102***	0.0092***	–0.0082***	0.0084***
Lagged Hub Concentration	0.0834*	0.0789†	0.0789†	0.0735	0.0686	0.0719	–0.0258	–0.0320	–0.0362
Lagged Hub Share	0.1296***	0.1240***	0.1240***	0.1877***	0.1880***	0.1819***	0.4051***	0.4069***	0.4074***
Average market share outside market$_{imt}$							0.1269	0.1316	
Average market share outside market$_{\text{Challengers}}$(MS)$_{imt}$	0.3360**	0.3370**	0.3370**	–0.0037	0.0048	0.0230			0.1073
Average market share outside market$_{\text{Challengers}}$(MD)$_{imt}$	0.3352***	0.2844***	0.2834***						
Average market share outside market$_{\text{Challengers}}$(RC)$_{imt}$				0.3001***	0.2564***	0.2382***	0.2681**	0.2067*	0.1751*
Total Avg MMC$_{\text{Leader}}$(MS)/100		0.0091***							
Reciprocal Avg MMC$_{\text{Leader}}$(MS)/100			0.0093						
Non-Reciprocal Avg MMC$_{\text{Leader}}$(MS)/100			0.0090**						
Total Avg MMC$_{\text{Leader}}$(MD)/100					0.0064***				
Reciprocal Avg MMC$_{\text{Leader}}$(MD)/100						0.0222**			
Non-Reciprocal Avg MMC$_{\text{Leader}}$(MD)/100						0.0037			
Total Avg MMC$_{\text{Leader}}$(RC)/100								0.0111***	
Reciprocal Avg MMC$_{\text{Leader}}$(RC)/100									0.0557***
Non-Reciprocal Avg MMC$_{\text{Leader}}$(RC)/100									0.0005
Lagged Market Share	0.2792***	0.2738***	0.2738***	0.2095***	0.2063***	0.2040***	0.3041***	0.2968***	0.2915***
N[a]	5717	5717	5717	4747	4747	4747	4604	4604	4604
F-value	33.64***	34.52***	33.83***	93.83***	92.48***	90.78***	54.58***	54.47***	53.94***
Wald tests of linear restrictions of coefficients		**d.f.**							
Wald test: Reciprocal Avg MMC = Non-Reciprocal Avg MMC = 0		2	47.25***			18.86***			38.28***
(H3a) Wald test: Reciprocal Avg MMC = 0		**1**	**2.42**			**9.62******			**19.15*******
Wald test: Non-Reciprocal Avg MMC = 0		1	7.51**			2.59			0.02
(H3b) Wald test: Reciprocal Avg MMC = Non-Reciprocal Avg MMC		**1**	**0.00**			**4.97***			**12.41*******

Significance levels: †($p < 0.10$); *($p < 0.05$); **($p < 0.01$); ***($p < 0.001$)

[a] N for Hypothesis 3 is lower than for Hypothesis 2 due to missing observations for lagged dependent variable and to first-differencing to eliminate market-specific fixed-effects.

addition to their significance. To do this, I consider a representative case of a leader with 350 multimarket contacts with the challengers (about the average in the sample) and report the predicted change in prices and equilibrium market share associated with moving from a situation in which reciprocal multimarket contacts are one standard deviation below their mean to one in which they are one standard deviation above it. I assume that total multimarket contact stays fixed. Therefore, the predictions exclusively reflect changes in the composition of multimarket contact (reciprocal vs. nonreciprocal), and not in the level of multimarket contact. Depending on the operationalization, the change outlined above would increase prices of challengers between 2.21 percent and 4.28 percent of the average price, and prices of leaders between 3.68 percent and 8.86 percent of the average price. These changes would be of very substantial magnitude for an industry in which margins are often barely positive. In terms of equilibrium market share, the above change would make the equilibrium market share 9.32 points higher according to the resource centrality operationalization. The market dependence operationalization shows a more modest increase of 2.81 share points, while the increase is only 0.06 share points for the market share dominance operationalization.

Considering the significance and magnitude of the effects of the alternative operationalizations, the three operationalizations have similar predictive validity in the analysis of pricing behavior. In the analysis of sustainability of market share, however, the operationalization in terms of resource centrality appears clearly superior in terms of significance and magnitude of the effects. Therefore, the resource centrality operationalization has the highest predictive validity, especially for analyzing the sustainability of market positions within the firm's spheres of influence.

DISCUSSION AND CONCLUSION

This paper provides a test of the effects of multipoint competition when the units of multipoint competitors differ substantially in terms of their strategic importance and investigates the effect of spheres of influence on the sustainability of positions of those important units. The spheres of influence hypothesis is perhaps the most 'strategic' proposition of those emerging from theoretical models of multipoint competition (Karnani and Wernerfelt, 1985; Bernheim and Whinston, 1990; van Witteloostuijn and van Wegberg, 1992), since it poses that the effects of multipoint competition are contingent on firm-specific strategic interests in different markets.

Discussion of results and implications for multimarket competition research

The results provide systematic evidence that firms reduce their competitive behavior and improve their equilibrium market position by using strategic deterrence to influence the competitive motivation of their rivals. In particular, the study has focused on firms that have territorial interests in a focal market and that have the ability to engage in multimarket retaliation with their focal-market challengers in markets in which the challengers have territorial interests (reciprocal multimarket contacts). According to the results, these leaders are able to simultaneously: (a) enjoy lower intensity of price competition from their rivals, (b) display less intense competitive behavior of their own, and (c) maintain a higher equilibrium market share. The last two results are particularly interesting when contrasted with single-market competition models in which competitive de-escalation by a leader is incompatible with the sustainability of its market position. These two results, however, are not incompatible in a multipoint competition context, since the leader may reward the cooperation of focal-market challengers (or punish their competitive behavior) by a reciprocal treatment in their territories. This is an idiosyncratic feature of multimarket collusion based on spheres of influence (Bae, 1989; Bernheim and Whinston, 1990).

The results move beyond the study of general multimarket contact effects by considering the role of asymmetric territorial interests in the focal and contact markets. While prior work has either assumed that all multimarket contacts were equally important (Evans and Kessides, 1994; Baum and Korn, 1996; Gimeno and Woo, 1996) or assumed *a priori* weights for different contacts in relation to their importance (Feinberg, 1985; Chen, 1996), this study empirically determines that contacts in important markets of the rivals have a greater forbearance effect. These findings serve to shift research in multimarket contact towards more theoretically sound models of reciprocal deterrence.

The study also obtains relevant findings about the operationalization of territorial interests. Extant empirical research has focused on product–market position and revenue patterns (either in terms of market share dominance or market dependence) as proxies for unit importance. However, Bernheim and Whinston's (1990) model suggests that spheres of influence have their origin in the asymmetric cost advantages of firms in different markets. While all three operationalizations of territorial interests are roughly equivalent in predicting competitive de-escalation, they differ markedly in their predictive validity of equilibrium market shares. The operationalization of spheres of influence in terms of resource centrality has strong predictive validity, while that in terms of market share dominance does not. Airlines with high resource centrality in a market are able to maintain higher equilibrium market shares if they have multimarket contacts in markets in which their rivals have high resource centrality. Therefore, while market share dominance may result from the delineation of spheres of influence, these spheres of influence are not originated by market share dominance, but by an underlying resource advantage.

The support for the resource centrality operationalization of spheres of influence is particularly interesting since it agrees with anecdotal evidence in the airline industry. Nomani (1990a, 1990b) reports how retaliation in an attacker's hub is a common and powerful reply to an attack on one's own hub (airline executives talk of 'trashing' or 'bombing' their rivals' hubs). In two separate incidents, America West faced retaliation in its Phoenix hub after attempting competitive moves of its own into Houston (Continental's hub) and Minneapolis (Northwest's hub). America West quickly retreated. This behavior is part of a tacit competitive norm in the industry known as the 'golden rule' (Nomani, 1990a, 1990b; Evans and Kessides, 1994), by which firms attempt to gain pricing control in their own hubs by retaliating to attacks with responses in the rival's hubs. Under such a practice, a firm becomes the price leader in its own hub and challengers are expected to acquiesce without undercutting. Since airlines often have cost and differentiation advantages in their own hubs (Borenstein, 1989), this price leadership strategy should result in an increase in both the market share and profitability of the airline in its hub.

Since the findings may reflect some idiosyncratic characteristics of the airline industry, their generalizability must be considered. Two characteristics of the airline industry that may influence the results are the geographic nature of competition and the visibility and sunk character of hub commitments. When firms compete across multiple geographical markets, the value chain activities in each market are similar, and operations are more likely to be coordinated across markets. For instance, airlines typically centralize competitive strategy decisions in their yield management offices, and top managers are often involved in major competitive moves. This facilitates the internal coordination of strategic actions across multiple markets and the balance of expansion in multiple markets. This coordination would be less likely in companies in which different managers make competitive decisions for different products, segments or industries. The nature of the resource commitments in the airline industry also facilitates the recognition of territories, since hub positions are sunk and stable in the long term, clearly visible to rivals, and their economic advantages are well understood. Territories might be less likely to be maintained through deterrence if their identification depended on tacit or subjective dimensions (e.g., distinctive competences or capabilities) or dimensions that may not have a recognized causal effect on competitive advantage (e.g., prior history in the market). These conditions are not totally idiosyncratic to the airline industry, however. They easily extend to situations of competition in multiple geographic markets (e.g., banking, supermarkets, telecommunications, and cable TV) and global competition, and to some contexts of multiproduct or multibusiness competition, provided that appropriate internal cross-unit coordination exists and that territorial interests are identified by visible resource commitments.

Broader implications of study

This study presents a new opportunity to bridge industrial organization theory to strategic management. The logic of multipoint competition and spheres of influence is in fundamental agreement with the tenets of IO. The actions of competitors are interdependent (Porter, 1980; Tirole, 1990), with firms having an incentive to influence the decisions of their rivals. This is done by making one's behavior contingent on the actions of the competitor, in a tit-for-tat strategy (Axelrod, 1984). The real value of these strategies is not just that the firm responds to its rival when under attack, thus minimizing the period of competitive disadvantage (Chen and MacMillan, 1992), but more importantly that the rival learns to recognize the contingent nature of retaliation and thus avoids engaging in competitive attack. The deterrence effects of competitive response must be considered more centrally in research on competitive dynamics.

The theory of spheres of influence contributes to the current efforts to integrate resource-based and market-power explanations (Peteraf, 1993; Henderson and Mitchell, 1997). Recent research on sustainability has predominantly emphasized the lack of *ability* by rivals to erode one's position. Lack of ability would clearly be a necessary condition of sustainability if the defending firm could not influence the motivation of rivals to attack its position. This paper provides evidence that firms sustain important market positions by being able to influence, through strategic deterrence, the *motivation* of their rivals to attack. Airlines are able to maintain higher equilibrium market shares in their important hubs if they have opportunities for retaliation in their rivals' own hubs.

The finding that spheres of influence are outlined in terms of resource centrality suggests a closer integration between resource-based and deterrence arguments. Firms may have important resource-based advantages in some markets from differential efficiency, which would provide them with a *rent stream* (defined as the difference between the firm's average costs and the competitive market-clearing price) even under unrestrained competition by rivals. However, if rivals cannot be restrained from attacking those markets, the leader would need to exert intense competitive behavior in order to maintain its market position, with a substantial loss of revenue. On the other hand, if initial differences in rent-generating resource commitments also serve as *signals* for spheres of influence that are mutually recognized and respected by rivals, firms may be able to induce deescalation in their territories and obtain a *profit stream* (indicated by supracompetitive prices) in their territories in addition to a rent stream.

While it may be difficult to distinguish empirically between the rent and profit streams associated with resource commitments, the distinction hinges on whether firms, despite high market attractiveness, restrain themselves from attacking markets in which a rival has made an important resource commitment. This restraint would be more likely if these firms expected a disproportionate response from the rival. Evidence of such responses exists in the competitive dynamics literature. Attacks on a firm's important markets are more likely to cause response (Chen and MacMillan, 1992), are associated with more intense retaliation (Chen and Miller, 1994), and are more likely to lead to counterattacks in other markets rather than defense of the market (smith and Wilson, 1995). If firms foresee these responses, it could be hypothesized that competitive attacks would be less likely in a target market if a rival claims territorial interests in that market, other things constant. If this happens, competition may develop a dual nature. Regular competitive activity would shift to 'periphery' markets with no mutually recognized territorial claims by competitors. Competitive moves in those markets, while frequent, would have limited intensity, due to the limited interests in those markets and the risk of all-out war. At the same time, 'core' markets, in which rivals have strong territorial claims supported by substantial resource commitments, would generally enjoy lower competitive intensity (and therefore generate profits for the leaders as well as rents), although they could experience temporary shocks of very intense rivalry.

The spheres of influence model also complements evolutionary perspectives, since it suggests that firms reinforce their initial advantages, a form of path-dependent behavior. Evolutionary theorists have stressed that firms' directions of market expansion are molded by their past experiences, since they have the incentive to exploit existing organizational routines (Nelson and Winter, 1982) and leverage internal spillovers of tacit knowledge from their activities (Helfat, 1994). According to the spheres of influence hypothesis, mutual recognition of territories among competitors also serves to reinforce particular directions of market extension. Under spheres of influence, firms gain market share in those markets where they already have important resource commitments, and voluntarily avoid expanding into the territories of their rivals. This tendency towards market specialization, however, is determined by external processes—the competitive interaction among multipoint rivals—rather than internal ones. Thus, spheres of influence become 'self-reproducing' competitive structures (Leifer and White, 1990) as the competitive behavior of firms reinforces initial differences in territorial interests. A particularly interesting application of this path-dependence argument of spheres of influence could lead to the study of firms' specialization in different innovation trajectories in innovation-intensive industries. Innovation races often have 'winner-takes-all' outcomes; resources invested by the loser not only offer no return for the loser, but also force greater investment and lower return for the winner. Firms in these settings would gain from coordination to avoid 'head-to-head' innovation races by tacitly staking out their own 'innovation territories'.

The spheres of influence model has some important managerial and public policy implications. For managers, it emphasizes the value of gaining footholds in their rivals' important territories and the risks of having one's own important territories open to competitors (Watson, 1982). Rivals' footholds in a firm's important territories become a weakness that can limit the firm's expansion into other markets. As the anecdotes of America West and People Express show, firms whose important territories are open to rivals may face retaliation in those markets as they attempt to expand beyond their niche, forcing them to retreat or weakening their positions in their niche. For antitrust officials and regulators, the model stresses that collusion may be influenced not only by market structure dimensions in a market, but also by conditions in other markets in which the same rivals meet. For trade negotiators, the model forecasts the consequences of opening foreign markets to local firms. By opening those markets, negotiators provide domestic firms an opportunity to retaliate to foreign firms invading their market. While this unambiguously benefits domestic firms, domestic customers may be negatively influenced if it facilitates collusion in the domestic market. The welfare implications of spheres of influence are ambiguous (Bernheim and Whinston, 1990: 14). Collusion through spheres of influence improves welfare over single-market collusion, since spheres of influence agreements give greater market share to the most efficient firm in each market. However, spheres of influence reduce welfare when they facilitate collusion in contexts where single-market collusion could not be sustained.

In conclusion, this paper investigated the theoretical implications of multipoint competition when competing firms have asymmetric territorial interests in their mutually contested markets. In agreement with the spheres of influence hypothesis, I found that firms with important interests in a focal market experience a mutual de-escalation of rivalry and improve their market position when they have an opportunity to retaliate in markets where their focal-market rivals have important interests. This facilitates collusion in the short term and shapes the future structure of the industry by leading to a tacit division of markets into spheres of influence. The findings indicate that future research on the sustainability of market positions should pay more heed to the *motivation* of firms to imitate or erode each other's positions, and how firms can effectively influence the motivation of rivals through strategic deterrence.

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