COMPETITIVE TENSION:
THE AWARENESS-MOTIVATION-CAPABILITY PERSPECTIVE

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Abstract

This paper investigates competitive tension, or the strain between a focal firm and a given rival that is likely to result in the firm taking action against the rival. Drawing on the awareness-motivation-capability perspective, we show how perceived competitive tension, as constructed from managers’ and industry stakeholders’ competitor assessments, is influenced by the independent and interactive effects of three factors: relative scale, rival’s attack volume, and rival’s capability to contest. Our results provide a new avenue for studying competitors and the relationship between competitor analysis and interfirm rivalry.
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In science, there is a steady state in which opposing forces hold each other in check until the build-up of tension turns the static relationship into dynamic interplay—the point when the steel cable snaps, the steam chamber’s pressure valve opens, or one psychological force overwhelms the other. In business practice, a similar phenomenon exists: when tension that one opponent imposes on another triggers rivalrous actions.

Competitor analysis is central to strategy and organization research (Porter, 1980; Hitt, Ireland, & Hoskisson, 2005). The literature has explored a number of important issues, including conjecture variation (Amit, Domowitz, & Fershtman, 1988), competitor identification (Porac & Thomas, 1990), and blind spots (Zajac & Bazerman, 1991), and has made advances in such areas as theoretical integration of competitor analysis and interfirm rivalry (Chen, 1996). Fundamental questions—such as who a focal firm’s competitors are, and how much competition the firm faces from each rival—have been implicitly or explicitly addressed by a variety of studies (e.g., Reger & Huff, 1993; Smith, Ferrier, & Ndofor, 2001). These studies, while sharing common research threads, differ in their conceptual development and analytic focus.

Competitive dynamics research, which analyzes competition in terms of individual market actions, has examined predictors and effects of interfirm rivalry through the lens of the firm-dyad (Chen & MacMillan, 1992; Ferrier, 2001). These studies have produced a diverse set of organizational and strategic variables centered on awareness, motivation, and capability—three key drivers of interfirm rivalry (Smith, et al., 2001). However, researchers have relied almost exclusively on observable market factors or structural variables, ignoring the perceptual aspect of interfirm rivalry. Research taking a perceptual (or in some cases, cognitive) approach has contributed to the conceptualization (Porac, Thomas, Wilson, Paton, & Kanfer, 1995), identification (Clark & Montgomery, 1999), and categorization (Hodgkinson & Johnson, 1994) of competitors, as well as of strategic (Reger & Huff, 1993) and competitive (Porac et al., 1995)
groups. Nonetheless, it tends to treat a firm’s competitors as a homogeneous group and has
made almost no effort to examine the varying degrees of “pressure” (Porter, 1980) that a firm
experiences from its rivals, let alone the implications for critical aspects of interfirm rivalry,
including attack (Ferrier, 2001) and retaliation (Chen & MacMillan, 1992). Most fundamentally,
competitive tension and related ideas, such as intensity (Barnett, 1997), threat (Michell, 1989),
and pressure (Sinha & Noble, 1997) have been used interchangeably in the literature without
systematic conceptualizations or operationalizations. This gap is problematic because scholars
use and apply these ideas widely in their research.

To address these concerns, this paper formalizes the construct of competitive tension,
defined as the strain between a focal firm and a given rival that is likely to result in the firm
taking action against the rival. Although our conceptualization incorporates both objective and
perceptual considerations, the empirical focus of this paper is on perceived competitive tension.
Specifically, we first investigate the extent to which firm-dyad variables (such as relative scale,
rival’s attack volume, and rival’s capability to contest) derived from the awareness-motivation-
capability (AMC) perspective can predict perceived tension. To demonstrate the significance of
the proposed construct and its behavioral implications, we then examine the effects of perceived
tension on the firm’s consequent competitive actions against the rival.

By introducing the notion of competitive tension, this research re-conceptualizes the
relationship between competitor analysis and interfirm rivalry, theorized by Chen (1996).
Through the empirical application of the AMC perspective to this study, and by exploring the
interactions among the three AMC variables, we enrich, extend, and formalize this theoretical
perspective. Equally important, by analyzing the objective sources of perceived competitive
tension, this paper bridges two contrasting approaches to competitor analysis and responds to the call by Reger and Huff (1993), and Jayachandran, Gimeno, and Varadarajan (1999).

THEORETICAL BACKGROUND

The strategy literature has long highlighted the importance of competitor analysis. Early work drew mainly from industrial organization (IO) economics (Bain, 1956; Porter, 1980) to study competition at the industry level, assuming that firms within the same industry are de facto competitors. Later research refined competitors to take into account intra-industry heterogeneity by studying the formation of various groups within the same industry (Cool & Schendel, 1987) and to analyze competitors at the brand-/product-level, an effort initiated by marketing researchers (Clark & Montgomery, 1999). Scholars taking a strategic-group approach consider firms within the same “primary competitive group” (Porac et al., 1989: 414) to be homogeneous, or they classify them broadly as direct (Peteraf & Bergen, 2003) or core competitors (Porac, et al., 1995). This approach assumes that firms belonging to the same strategic (or competitive) group will face a comparable degree of competition and hence compete similarly. While IO economics and strategic group research provide an essential foundation for competitor analysis, they ignore the intricacy of differential relationships and the possible asymmetry of competitive perceptions and behaviors for each pair of firms (Chen, 1996). Accordingly, recent competitive dynamics research has proceeded by differentiating the intensity of competition a firm encounters with various rivals and offering implications for actions toward specific opponents.

Competitive Dynamics

Conceptualizing interfirm rivalry as the exchange of actions and responses, research in competitive dynamics has found that the characteristics of an action (Ferrier, 2001) and of the attacker (Chen & MacMillan, 1992) and defender (Smith, et al., 1991) are related to the
likelihood and speed of a response, which in turn relate positively to performance (Young, Smith, & Grimm, 1996). There have been some important conceptual advances. To capture the relational nature of competition, researchers have carried out competitor analysis in pairs, taking the perspective of a focal firm (Chen, 1996). This dyadic approach recognizes the varying degrees of competition inherent in each relationship and constitutes a fine-grained analysis that complements the structural (Porter, 1980) or group approach (Cool & Schendel, 1987).

Research has also shown that the analysis of competitors is especially meaningful if it can be used to predict interfirm rivalry—the engagement of firms through competitive actions (Chen, 1996). This recognition is essential for differentiating competitor analysis (a static consideration of the relationship between firms) from interfirm rivalry (interplay between firms and the behavioral aspects of competition); more importantly, it is crucial for establishing a conceptual linkage between the two.

To this end, research has identified three underlying drivers of rival behavior: awareness of the competitive relationship and/or competitors’ initiatives; motivation to act (or respond); and the capability to do so (Smith et al., 2001). Recent studies have focused, variously, on a stream of actions (Ferrier, 2001), a particular type of market action such as entry/exit (in contrast to previous investigation of all types of actions) (Baum & Korn, 1996), and interfirm rivalry in a multimarket context (Gimeno 1999). Researchers have found, among other results, that a simultaneous attack of multiple actions carried out over a significant duration of time may overwhelm rivals into a period of inaction (Ferrier, 2001).

Despite these advances, however, competitive dynamics research has mostly remained focused on the observable market variables or structural indicators of competition. It therefore leaves unexplored some critical issues concerning the relationship between competition and the
perceptions and opinions of corporate executives and industry stakeholders, including the notion, for example, that two firms facing exactly the same market conditions may evaluate competitors and interfirm relationships differently (Chen, 1996). A few scholars have begun to stress that it is necessary to complement the use of objective indicators with a perceptual evaluation of a firm’s competitive environment (Jayachandran, et al., 1999; Ferrier; 2001) by studying how each competitive relationship is perceived by managers (Reger & Huff, 1993; Porac, et al., 1995) as well as by other key industry stakeholders, such as financial analysts (Chen, Farh, & MacMillan, 1993). However, no study thus far has systematically examined the sources, meanings, and consequences of perceptions across different competitive relationships.

**Competitive Tension**

Although competitive tension could conceivably occur at an industry or group level, we take the position in this paper that competitive tension, consistent with the competitive dynamics perspective, is a firm-dyad-level construct. This is the level at which most competitive engagement occurs and which serves as the basis for inferring group-level phenomena (Chen, 1996). A critical but unexamined concept in competitor analysis, competitive tension provides a locus for the in-depth exploration of perceptual and objective considerations of competitors.

For several reasons, we use the term “tension” rather than threat, intensity, or other terms. Most importantly, tension, as it is conceptualized here, describes the state of latent strain that precipitates the “breaking point” when strain becomes manifest through competitive actions.

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1 Porter (1980), for example, raises the possibility that a group of rivals may join together to reprimand a “bad” competitor.

2 A few words to clarify the subtle differences among these related terms. Threat is a specific and substantial challenge one firm presents to another; intensity denotes the degree of pressure, threat, or tension that exists between firms. Compared with threat, pressure is of a lesser magnitude and more general in nature. Both threat and pressure can create and perpetuate a state of “tension” between rivals. In other words, by studying competitive tension, we are essentially evaluating the aggregate threats and pressures (both objective and perceived) that a firm experiences to predict future competitive actions.
Thus, tension defines the forces that build up and tend to pull a static interfirm relationship into dynamic behavioral interplay between rivals. It can be conceived of as a sort of energy storage agent: once there is enough “build-up” (due perhaps to history of prior battles or managerial and industry psychology), competitive tension is likely to “explode” into rivalrous actions.

Tension lends itself to both objective and perceptual considerations. As a term used widely in the natural and social sciences, tension has objective definitional meanings, as in physics, fluid mechanics, and electronics, as well as subjective or perceptual applications, as in psychology and psychiatry. Physics, for example, uses tension to delineate potential versus kinetic energy. In contrast, psychology employs the term to convey feelings of fear and anticipation or to express the build-up of opposing psychological forces.

In this study, perceived competitive tension denotes the extent to which firm managers and industry stakeholders consider a given rival to be the focal firm’s primary competitor, whereas objective structural tension relates to the ever-changing industry structure or market conditions in which rivals operate. Different manifestations of objective structural tension have been examined directly or indirectly, including market commonality (Chen, 1996), multimarket contacts (Baum & Korn, 1999), and reciprocal threat (Gimeno, 1999). While both objective and perceptual considerations are essential, the empirical focus of this paper is on perceived tension.

Perceived tension is consequential because it has implications for managerial actions (Dutton & Jackson, 1987; Reger & Huff, 1993), although the research has yet to explore the effects of such tension on interfirm rivalry. This paper takes the position that the perception of competitive tension by both informed managers and industry stakeholders (such as consultants and financial analysts) of a firm is a critical determinant for the likelihood that the firm will engage in interfirm rivalry with a given rival.
Indeed, the perceptions of decision makers and industry stakeholders alike—the level of competitive apprehension or anticipation they feel as they observe, filter, and act on competitive “information”—inform the way the firm acts (strategically or competitively) on those perceptions. Since industry stakeholders’ views of a firm’s competitive outlook are likely to be more differentiated than those of the firm’s managers (who may be influenced, for example, by managerial aspirations), their perceptions are equally critical.

**The Awareness-Motivation-Capability (AMC) Perspective**

Given the role of perceived tension in competitor analysis, it is essential to identify its key antecedents. The AMC perspective postulates that three behavioral drivers influence a firm’s decision to act or respond: awareness, motivation, and capability (Chen, 1996). In competitive dynamics research (Smith, et al., 2001), individual AMC components are manifested in a range of variables, including action visibility and firm size (Chen & Miller, 1994) for awareness; territorial interests in different markets (Gimeno, 1999) for motivation; and execution difficulty and information processing (Smith, Grimm, Gannon, & Chen, 1991) for capability. Some other variables, such as TMT characteristics (Ferrier, 2001), correspond to more than one component. Although the AMC perspective has been applied to the investigation of interfirm rivalry (Chen, 1996), it has yet to be used for the study of pre-battle competitor analysis, or, for our purpose, the perceived and objective relationship between rivals.

To extend the AMC perspective to competitor analysis (and the study of competitive tension) at the firm-dyad level, we focus on a pair-wise comparison between a focal firm and its rivals. We argue that each AMC component at the firm-dyad level influences both managers’ and industry stakeholders’ perceptions of competitive tension. In the context of this research, awareness is indicated by relative scale (defined, per Baum & Korn (1999), as a competitor’s
operating capacity compared with that of a focal firm’s), which captures visible size or scale disparities that affect managers’ and industry stakeholders’ cognizance of the relationship between the focal firm and a given rival. Motivation is reflected by rival’s attack volume (defined, per Ferrier (2001), as the extent to which a focal firm’s markets are under attack by a given rival’s actions), which highlights past competitive actions that provide the incentive for a firm’s managers and industry stakeholders to consider that the rival is in direct competition with the firm. Capability is signaled by rival’s capability to contest (defined as the operational ability of a given rival to potentially challenge a focal firm in the marketplace) and describes a rival’s relative resource-deployment ability (compared with a focal firm’s); this ability in turn influences assessments of the intensity of the competitive relationship by both the firm’s managers and industry stakeholders.

**HYPOTHESES**

This section first applies the AMC perspective to examine how relative scale, rival’s attack volume, and rival’s capability to contest influence—individually and interactively—perceived competitive tension. It then investigates the impact of this construct on the ensuing rivalry between firms. Figure 1 summarizes our research model. As illustrated in the figure, competitive tension sharply articulates the conceptual link between competitor analysis and interfirm rivalry (Chen 1996).

-Insert Figure 1 about here-

**AMC Antecedents of Competitive Tension**

**Relative scale.** Size, specifically the scale of an organization’s operation, has long been considered one of the most important contingent variables affecting a firm’s strategy and structure (Hambrick, MacMillan, & Day, 1982). Large scale is often associated with market
power (Hambrick et al., 1982), and visibility (Smith, et al., 1991). Competitive dynamics research has shown that large firms, or those with great scale or operating capacity, are more recognizable in the industry than smaller firms, and that they differ from their smaller rivals in terms of competitive behavior attributes (Chen & Hambrick, 1995). Larger-scale firms, for instance, are more likely to initiate massive attacks on their rivals and are committed to protecting their reputation when attacked.

Indeed, conventional strategy wisdom holds that scale (or size in general) is a major source of competitive concern (Baum & Korn, 1999), and, in a competitive situation, it is often the first organizational characteristic to attract a focal firm’s managers’ and stakeholders’ attention (Chen & Miller, 1994). As a result, relative scale is likely to associate positively with competitive tension perceived by a firm’s internal and external stakeholders.

**Hypothesis 1:** The greater the scale of a given rival relative to a focal firm, the greater the perceived competitive tension.

**Rival’s attack volume.** The relationship between firms in the marketplace, or market interdependence (Porter, 1980), is the most significant factor affecting conjectural variations and sphere of influence (Gimeno, 1999). Two firms are head-on opponents and will have strong incentive to act against each other if they compete directly in many markets (Baum & Korn, 1996; Gimeno, 1999); further, they engage each other with moves and countermoves that have direct implications for their market shares and success (Chen & Miller, 1994).

Any attacks initiated by a rival on a firm’s markets (such as entries into new ones or expansion in existing ones) would be considered by managers and industry participants to be a direct challenge to the firm (Ferrier, 2001). Tapping into the motivational component of competitive tension, a rival’s attack on a focal firm’s markets, especially those valued by the firm, moves the firm’s managers and outside stakeholders to view this rival as the one that
imposes the greatest tension, forcing the firm to act (or react) in defending its turf (Chen & MacMillan, 1992). Baum and Korn’s (1999) finding that rivals with high multimarket contacts are less likely to exit each other’s markets provides additional evidence.

Research has identified different characteristics of attack, such as volume and duration (Ferrier, 2001); our study focuses on attack volume, as indicated by the number of actions. A firm’s managers and outside stakeholders will be most motivated—and sensitive to the tension created by an opponent—if the opponent has recently launched a large number of attacks on its markets. The opponent’s high-volume of attacks leads to strong perceived tension.

**Hypothesis 2: The greater the volume of a given rival’s attacks on a focal firm’s markets, the greater the perceived competitive tension.**

**Rival’s capability to contest.** The extent to which a rival’s operational capability potentially challenges the focal firm in the marketplace (either with an attack or by responding to the focal firm’s action) is a critical factor influencing perceived tension between the two firms. Each of a focal firm’s rivals is endowed with various types and amounts of resources that are vital for its operation; consequently, each is equipped with different capabilities, in the eyes of the firm’s managers and industry stakeholders, in its engagements with the firm.3 Examples of resources that are essential for firm operation and competition include the ATM system in the banking industry and the logistics or operating hub structure in the discount retail industry.

Rival’s capability to contest derives mainly from two distinct but closely related sources. The first occurs when the rival and the focal firm have highly similar resource profiles—what we call the “similarity” consideration. The second occurs when the rival is a significant player in

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3 The basic ideas here have their theoretical roots in the resource-based view of the firm (Barney, 1991) and the dynamic capability perspective (Teece, Pisano, & Shuen, 1997), which focus on the firm level and stress ideas such as uniqueness and heterogeneity. Competitive dynamics, the perspective in which this paper is grounded, focuses on the firm-dyad level and emphasizes ideas such as similarity (Chen, 1996) and relativity (Chen & Hambrick, 1995). These perspectives are not incompatible—they differ simply in their theoretical focuses and levels of analysis.
the resource(s) the focal firm values most for its operation; this we call the “salience”
consideration. Simply put, the rival with the resource profile most similar to that of the focal
firm’s and/or who is most salient in the resources critical to the firm’s operations, will be
perceived by the firm’s managers and outside stakeholders as posing the greatest challenge to the
firm’s operational capability—and therefore as imposing the greatest competitive tension. Our
inclusion of similarity and salience considerations in the conceptualization of this construct is in
line with Porac and Thomas’ observation (1990: 225) that, “Two organizations are similar if they
share important attributes and hence tap the same resources in the task environment. Because
critical resources are usually scarce, similar organizations are usually competitively
interdependent.”

To elaborate, first, firms with similar resource profiles are likely to have comparable
capabilities and competitive stances (Miller & Shamsie, 1996), and competitors with similar
strategies and structures impose great pressure on each other (Heil & Robertson, 1991).
Consequently, a focal firm’s managers and industry stakeholders are likely to consider a rival
with a similar operations resource profile to be a direct competitor. These arguments are in line
with Gimeno and Woo’s (1996) finding of a positive relationship between the strategic similarity
of firms and the degree of their rivalry, and with Chen’s (1996) prediction that the greater the
resource similarity between a rival and a focal firm, the greater the likelihood that the rival will
attack (or retaliate against) the firm.

Second, resources that are essential for operational and competitive success are generally
limited and scarce within an industry (Barney, 1991). A rival’s capability to contest the focal
firm is determined by how salient the rival is in resources that a focal firm values for its
operation. Therefore, capability to contest is conditioned both by the strategic importance of a
given resource to the focal firm’s operation and by the rival’s strength in this resource. Two firms are head-on opponents and will experience, in the eyes of their internal and external stakeholders, great tension if they rely on similar resources for operation and, more fundamentally, if each is a salient player in the resources that are vital to the other (Chen, 1996).

**Hypothesis 3: The greater a given rival’s capability to contest the focal firm, the greater the perceived competitive tension.**

**Interaction effects.** In addition to the independent effect each AMC component has on perceived competitive tension, there are likely to be interaction effects. Drawing on Vroom’s (1964) expectancy-valence theory, Chen and Miller (1994) found positive interaction effects between various triggers of competitive response, which correspond to our individual AMC components, and called for thorough investigations of such effects in the future. To examine the interaction effects between pairs of the three AMC variables, we highlight the moderating role of the motivation component of the AMC perspective—rival’s attack volume. This premise is based on the observation that motivation is a prerequisite of behavior, and is a stronger and more direct predictor of competitive relationship than is capability or awareness (Chen, 1996).

Market rivalry is the most significant factor affecting conjectural variations and mutual dependence (Gimeno & Woo, 1996). In our research, capability to contest entails the rival’s potential to challenge the focal firm operationally, while relative scale constitutes a static consideration of their scale or size difference. In contrast, rival’s attack volume taps into the motivational component of the AMC perspective directly, as managers and industry stakeholders are more likely to perceive a given rival as imposing high competitive tension if the rival has recently unleashed a large volume of attacks on the firm’s markets. The effects of scale disparity and rival’s capability to contest on perceived tension depend on the motivation of a focal firm’s managers and industry stakeholders as triggered by rival’s attack volume. Indeed, they are more
sensitive to rival’s scale and capability when they have recently experienced rival’s attack in large volume. Hence, rival’s attack volume will strengthen the positive effect of relative scale, as well as of rival’s capability to contest, on perceived competitive tension.

**Hypothesis 4-a:** The relationship between relative scale and perceived competitive tension is moderated by rival’s attack volume such that the greater the rival’s attack volume, the more positive the relationship between relative scale and perceived tension.

**Hypothesis 4-b:** The relationship between rival’s capability to contest and perceived competitive tension is moderated by rival’s attack volume such that the greater the rival’s attack volume, the more positive the relationship between rival’s capability to contest and perceived tension.

**Competitive Tension and the Implications for Action**

Competitive action has been a vital concern in competitive dynamics research. Scholars have found that a firm tends to act aggressively toward other firms that are visibly present or that threaten its vital markets (Smith, et al., 1991), and have examined the implications of multimarket rivalry for actions such as market entry (Baum & Korn, 1996) and pricing (Gimeno, 1999). Research has also found that managers and outside stakeholders make similar competitive assessments (Chen, Farh, & MacMillan, 1993) and that such assessments can predict rival actions taken in the industry (Chen & MacMillan, 1992).

The firm-dyad, perceptual consideration of competitive tension advanced here is consequential. If a firm is perceived by both managers and industry stakeholders to have high tension with a rival, it is likely that the firm will attack the rival’s markets to gain (or re-gain) its relative advantages and to reduce the tension imposed by the rival (Chen & MacMillan, 1992). Thus, perceived competitive tension can lead to ongoing competitive rivalry and should have long-term implications for industry stability (Porter, 1980).

Strong perceived tension increases the volume of the firm’s attacks on a rival’s markets. However, to gauge precisely the effects of perceived competitive tension on consequent
competitive actions, it is important to consider (and, from an empirical viewpoint, to control for) objective structural tension or the dynamics of market structure. Reger & Palmer (1996: 22, emphasis original) note aptly that “managers must be mindful to incorporate new information proactively from many sources and actively to disregard old, automatic maps in order to develop reliable maps for changing environment.”

**Hypothesis 5:** The greater the perceived competitive tension, the greater the volume of a focal firm’s attacks on the rival’s markets (controlling for objective structural tension).

**METHODS**

**Sample and Data Collection**

Our sample includes 13 major airlines competing against each other in the top 10,000 routes during the period 1989–1992. The airline industry is an ideal research context because of the rich sources of public information, well-defined markets, and the acknowledged intense competition among major players (Smith, et al., 1991; Gimeno, 1999). We chose this period because it is characterized by the rapid entry of new airlines and by the expansion of existing airlines into new routes, followed by an industry consolidation through mergers and acquisitions (Morrison & Winston, 1995). The turbulence of the period produced large variations for our investigation of competitive tension and interfirm rivalry.

We used both archival and survey data for our research. To identify specific markets each airline served, we obtained data from the Department of Transportation’s Origin-Destination (O&D) Survey of Airline Passenger Traffic. To assess the perceived competitive tension a given airline experienced from each of the other sample airlines, we used a questionnaire mailed in 1991 to informed airline executives and industry stakeholders, including 44 “insiders” (senior executives) and 72 “outsiders” (16 security analysts, 36 consultants, and 20
travel agents). These individuals had participated in a previous airline study that evaluated various competitive moves taken by airlines (Chen & MacMillan, 1992; Chen, et al., 1993). The list of potential informants for the original sample was compiled from several sources, mainly the Winter 1989 edition of the *World Aviation Directory*. The inside executives were all senior vice presidents or holders of higher titles (excluding chief executive officers) of the sample airlines. The sample outsiders were selected from various sources: 1) all security analysts who followed the industry and were listed in the 1989 edition of *Nelson Directory of Investment Research*; 2) all consultants listed in the *World Aviation Directory*; 3) the top 65 travel agencies (in terms of sales revenues) in the United States.

The questionnaire was pre-tested and professionally produced and distributed, and included two follow-up mailings. The response rates were 39% (n = 16, representing nine airlines) for insiders and 47% (n = 34) for outsiders. Whereas the number of insider respondents per firm ranged from 1 to 4, the number of outsider respondents per firm ranged from 26 to 33. A comparison of respondents and non-respondents suggested they did not differ in their observable characteristics, e.g., firm size and industry and company experience; about 70% of respondents had more than 20 years of industry experience.

**Dependent Variables**

**Perceived competitive tension.** To assess perceived competitive tension, we asked our inside and outside respondents to evaluate the extent to which a given airline can be considered a focal airline’s primary competitor. The informants were asked to identify and rank, from each airline’s viewpoint, its top five rivals from a list of all 12 other competitors. In the scoring

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4 Following an established network methodology, we used a “roster” format in our questionnaire design that provides a comprehensive list of all possible actors for respondents to rank (Wasserman & Faust, 1994). An alternative is a “free recall” format that asks respondents to generate their own list of actors first and then rank those actors. Although a free recall format tends to be less intrusive, it may reflect a recency effect because respondents
scheme, the airline rated as the top-ranked rival of a focal airline received a score of 5; second, a score of 4; etc. Those not included in the ranking received a score of 0. Scores were then averaged across all responses; thus, each score reflected the degree of competitive tension a focal airline experienced from a given competitor in the eyes of managers and industry stakeholders. We distinguished between insiders (airline executives assessed their own companies) and outsiders (analysts, consultants, and travel agencies) when analyzing the survey responses and constructing our perceived tension measures.

Because the perceptual measures were aggregated for each pair of firms, there was concern about the extent to which the average score for a given pair across all the raters represented a firm’s perception toward each of its competitors. To check for the internal consistency of the raters’ evaluations, we follow Shrout’s and Fleiss’s (1979) procedure to examine the intraclass correlation coefficients (ICCs) for each of the 13 airlines. The average ICC (1) value of .26 indicated that individual ratings of an airline, evaluated from each of its 12 sample airlines’ viewpoint, are reasonably consistent across all the raters (James, 1982); the average ICC (2) value of .77 suggested that the group means for the competitors’ ratings were stable (Bliese, 2000). Hence, aggregations for each pair of firms were supported.⁵

**Volume of a focal firm’s attack.** To extend the competitive dynamics research, which considers broadly all types of market actions, we focus on in-depth investigation of one key type of action, namely entry into a new market. The volume of a focal firm’s attack on a given rival’s markets is operationalized as the number of entries, among the 10,000 sample routes, by the firm.

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⁵ James (1982) reported that ICC (1) values generally ranged between 0 and 0.5, with a median of .12. Our ICC (2) score is comparable with those found in some of the well-cited psychometric research such as Kirkman, Rosen, Tesluk, & Gibson (2004) (with a range between .68 and .79). ICC (1) in their study ranged between .10 and .13.
into the rival’s routes from 1991 to 1992. We consider an airline an incumbent if it had at least a 1% share of a route (Baum & Korn, 1999).

**Independent Variables**

**Relative scale.** We operationalized relative scale as a rival airline’s scale divided by the focal airline’s scale during the same period, where scale is available seat miles, a common measure for airline capacity (Taneja, 1985).

**Rival’s attack volume.** The volume of a rival’s attack on a focal firm’s market is operationalized as the number of entries by the rival into the firm’s routes from 1989 to 1990. As above, we consider an airline an incumbent if it had at least a 1% share of a route.

**Rival’s capability to contest.** To measure rival’s capability to contest, we relied on airline fleet structure data (obtained from “TPFS” Turbine Airliner Fleet Survey 1990), given that acquisitions of various types of aircraft and development of fleet structure are vital for airline operation and competition (Taneja, 1989). We distinguished between two aspects of rival’s capability to contest and used two variables: similarity and salience.

Similarity captures the extent to which two airlines have the same profile in terms of fleet structure. To measure similarity we first calculated the Euclidean distance, $D_{ij}$, between two airlines (see the formula below). A zero distance indicates that two airlines have exactly the same distribution of aircrafts across different types, whereas a high value of $D_{ij}$ indicates that two airlines have very different fleet structures. We then reverse coded $D_{ij}$ to arrive a measure of similarity.

$$D_{ij} = \sqrt{\sum_{m=1}^{a} [\left(\frac{A_{im}}{A_i} - \frac{A_{jm}}{A_j}\right)]^2}$$

where $A_{im}$ = Total number of type m aircraft operated by airline i
$A_i$ = Total number of aircraft operated by airline i overall
$A_{jm}$ = Total number of type m aircraft operated by airline j
Salience captures the extent to which a rival is a dominant player flying the aircrafts that are vital to the focal firm’s operations. It can be calculated using the following index:

\[
S_{ij} = \sum_{m=1}^{n} \left[ \left( \frac{A_{im}}{A_i} \right) \times \left( \frac{A_{jm}}{A_m} \right) \right]
\]

where

- \( A_{im} \) = Total number of type m aircraft operated by airline i
- \( A_i \) = Total number of aircraft operated by airline i overall
- \( A_{jm} \) = Total number of type m aircraft operated by airline j
- \( A_m \) = Total number of type m aircraft operated by all airlines

In calculating the salience index, \( R_{ij} \), the first term \( A_{im}/A_i \) captures the strategic importance of a given type of aircraft to the focal firm (i). The second term \( A_{jm}/A_m \) reflects the share of a given rival (j) in this type of aircraft. We normalized the results so that the sum of the salience indices for all of a given firm’s competitors was equal to 1.

**Control variables.**

We included several control variables to rule out possible alternative explanations (cf. Baum & Korn, 1996, 1999). Age, past performance, slack resources, and objective structural tension served as controls when predicting perceived tension (Hypotheses 1 to 4). To measure age, we counted the number of years since the year of an airline’s founding; to measure past performance, we calculated an airline’s passenger load factor in the prior year. In addition to these firm level characteristics, we also controlled for slack resources given that more slack resources imply more potential for competitive activities (Ferrier, 2001) and may thus influence the perception of competitive tension. We used current ratio to measure slack resources.

Objective structural tension is a critical control variable in our analysis. It captures the extent to which a rival increases its presence in a focal firm’s markets, and it is likely to
influence both the perceived competitive tension and the volume of the focal firm’s attack on the rival. For objective structural tension, we adapted Chen’s (1996) market commonality measure and used the change scores (1989-90 and 1990-91) for analyses in Table 2 and Table 3.

We also controlled for several important firm-route level characteristics in our analysis predicting the volume of the focal firm’s attacks (Hypothesis 5). Because a firm’s route entry decision is likely to be affected by conditions of routes served in the prior year, we controlled for route density (average number of incumbents) in routes served by the focal airline in 1991. A firm’s market entry decision may also depend on the number of rivals’ routes not currently served by the focal airline and route density in these routes. In addition, following Baum and Korn (1996, 1999), we included a set of firm-level characteristics, including age, past performance, slack resources, and relative scale.

**Data Analyses**

To model our first dependent variable, perceived tension, at the dyadic level of analysis, we used Multiple Regression Quadratic Assignment Procedure (MRQAP), a regression analytical technique specifically designed for dealing with autocorrelation in dyadic data (see Krackhardt, 1988, for a detailed explanation of this technique and Tsai, 2002, for a recent application of this technique in examining the pattern of competition). For interaction effects, we first mean-centered our independent variables and then created multiplicative terms between the mean-centered variables. To check the robustness of our results, we performed additional analyses using GLS random-effects regression as well as fixed-effects regression (also known as the Least Squares Dummy Variable model). The pattern of results of these additional analyses is the same as those shown in our MRQAP analysis.
Because our second dependent variable, the volume of the firm’s attack on the rival’s markets, is a count variable, we considered two modeling strategies specially designed for count outcomes: Poisson regression and negative binomial regression models. Given that the Poisson model often underestimates the amount of dispersion in the outcome variable, the negative binomial regression model is adopted to correct for the overdispersion problems. We performed a test for the null hypothesis that the overdispersion parameter \( \theta \) equals zero for our model (Greene 2003; Long & Freese, 2003). The test statistics \( (G^2) \) are all very significant and provide strong evidence of overdispersion, suggesting that the negative binomial regression model is preferred to the Poisson regression model. Again following Baum and Korn (1999), we also controlled for important firm-level characteristics to overcome the problems of analyzing relational data (Lincoln, 1984). Since the error terms may be correlated across firms, we estimated all models using robust standard errors.

**RESULTS**

Table 1 reports means, standard deviations, and correlations for all the independent and dependent variables in this study. It should be noted that we have 13 sample airlines, which results in 156 (or 13x12) pairs of perceived competitive tension observations. The number of observations for insiders’ perception is 108 (or 9x12) because we have data from executives of nine airlines only, each evaluating 12 competitors. As shown in Table 1, the perceived competitive tension measure based on insiders’ responses is highly correlated with the same measure based on outsiders’ responses (correlation coefficient=0.88, p<0.01), providing evidence for the validity of our construct of perceived competitive tension. Also as shown in Table 1, the two aspects of rival’s capability to contest (similarity and salience) are significantly correlated, as expected.
We calculated variance inflation factor (VIF) to determine if there is multicollinearity in our analyses. For our analysis predicting perceived tension, the VIF value ranges from 1.22 to 2.16 with an average of 1.58, suggesting no serious problem of multicollinearity. In fact, our analytic technique, semi-partialing MRQAP, is robust against multicollinearity (see Dekker, Krackhardt, & Snijders (2003) for extensive simulation results showing how the semi-partialing method is analytically unbiased by multicollinearity). For our analysis predicting the volume of a focal firm's attack, the VIF value ranges from 1.05 to 3.93 with an average of 2.14. A close look at the VIF value suggests that slightly high inter-correlations do occur but only among some of our control variables. However, the significance levels of our results remain the same whether or not we entered the correlated control variables in our analysis. Indeed, multicollinearity does not affect our model fit and hypothesis testing.

Table 2 presents the regression results showing the effects of the antecedents of perceived competitive tension. Several models were estimated, with models 1 to 3 predicting insiders’ perception, models 4 to 6 predicting outsiders’ perception, and models 7 to 9 predicting the combined perception. These models test our Hypotheses 1 to 4.

Hypothesis 1 states that the greater the scale of a given rival relative to the focal firm, the greater the perceived tension. As shown in Table 2, the coefficient for relative scale is positive and statistically significant for insiders’ (p<0.05), outsiders’ (p<0.05), and combined (p<0.01) perceptions. Thus, Hypothesis 1 is confirmed. Hypothesis 2 states that the greater the volume of a given rival’s attack on the focal firm’s markets, the greater the perceived tension. The coefficient for rival’s attack volume is positive and statistically significant for insiders’ (p<0.05),
outsiders’ (p<0.05), and combined (p<0.05) perceptions. Hypothesis 2, then, is clearly confirmed as well. Hypothesis 3 suggests that the greater a rival’s capability to contest (salience and similarity), the greater the perceived tension. The coefficient for salience is positive and marginally significant for insiders’ perception (p<0.10), and is positive and statistically significant for outsiders’ (p<0.05), and combined (p<0.05) perceptions. However, the coefficient for similarity is not statistically significant in any of our models. Therefore, Hypothesis 3 is only supported for the salience aspect of capability to contest.

Hypothesis 4-a predicts that the relationship between relative scale and perceived competitive tension is moderated by rival’s attack volume. The coefficient for the interaction term between relative scale and rival’s attack is positive and statistically significant for insiders’ (p<0.05), outsiders’ (p<0.05), and combined (p<0.05) perceptions, suggesting that the greater the rival’s attack volume, the more positive the relationship between relative scale and perceived tension. Hence, Hypothesis 4-a is confirmed. Hypothesis 4-b predicts that the relationship between rival’s capability to contest (using either the salience or similarity variable) and perceived competitive tension is moderated by rival’s attack volume. The coefficient for the interaction term between the salience variable and rival's attack volume is positive and statistically significant for insiders’ (p<0.01), outsiders’ (p<0.05), and combined (p<0.05) perceptions, suggesting that the greater the rival’s attack volume, the more positive the relationship between salience and perceived tension. However, the coefficient for the interaction term between the similarity variable and rival’s attack volume is negative, contrary to our prediction for a positive interaction effect here. Overall, Hypothesis 4-b is only supported when we use the salience variable, but not the similarity variable, to measure rival’s capability to contest.
To show the patterns of the significant interaction effects that support our hypotheses in the above analysis, we plotted the interactions in Figure 2 using one standard deviation above and below the mean to capture high and low rival's attack volume.

-Insert Figure 2 about here-

Table 3 presents the results of negative binomial regression predicting the volume of a focal firm’s attack on a rival. Several models were estimated to test our Hypothesis 5. Model 1 is the baseline model with only the control variables. Model 2 estimates the effect of insiders’ perception of competitive tension. Model 3 estimates the effect of outsiders’ perception of competitive tension. Model 4 combines insiders’ and outsiders’ perceptions into one measure and estimates the effect of this combined measure.

-Insert Table 3 about here-

Hypothesis 5 states that perceived tension, controlling for the effect of objective structural tension, increases the volume of a focal firm’s attack on a rival’s markets. As shown in Table 3, the perceptions of insiders (p<0.05), outsiders (p<0.01), and the combined group (p<0.01), are all are statistically significant, supporting Hypothesis 5. Such support was found with the control of objective structural tension, which also yields its own independent positive effect on the firm’s attack volume (p<0.05).

DISCUSSION

Anchored in the competitive dynamics perspective, our research conceptualizes competitive tension, a construct intended to close a significant gap in the strategy and competitor analysis literature (Hodgkinson & Sparrow, 2002; Hitt, et al., 2005). The firm-dyad conceptualization of competitive tension contrasts with the prevailing consideration of direct (Peteraf & Bergen, 2003) and core (Porac, et al., 1995) competitors as mostly homogeneous. It
provides a refined framework of competitor analysis by differentiating the varying degrees of
tension each of a firm’s rivals imposes on the firm. The significance of the proposed construct is
clearly shown by its behavioral outcomes: perceived tension, even controlling for objective
structural tension, was found to affect a firm’s consequent actions against a given rival.

The promise of the AMC perspective lies in its integrative consideration of the three
antecedents and the demonstration of their influence on perceived competitive tension. The
AMC perspective is a natural outgrowth from findings in competitive dynamics research, and
each of its components has been shown to be empirically significant in explaining the behavioral
exchange of competitive moves (Chen, 1996). This paper extends this theoretical perspective
and tests it empirically within the context of competitor analysis. The focus on competitor
analysis, and particularly on insiders’ and outsiders’ perceptions of competitive tension, is in
direct contrast with previous applications of this perspective to the study of rivalrous behavior in
the marketplace. In addition to examining empirically the independent effects of each of the
AMC components on perceived tension, this paper takes an important first step in investigating
the interplay among them. The research advances this promising theoretical perspective by
demonstrating empirically the significance of the multiplicative relationships among the three
AMC components, as well as the central role of motivation in moderating the two other AMC
components in their effects on perceived tension. Not only does the perspective have the
potential to advance competitor analysis and interfim rivalry research, it may also illuminate our
understanding of interfim actions (competitive or cooperative) and relationships in general.
Further, it may be an important bridge between micro and macro organizational literature, as
attempted earlier by Dutton and Jackson (1987) and Chen and Miller (1994).
Finally, by treating competitive tension as a perceptual phenomenon anteceded by objective AMC factors, this study bridges competitive dynamics and the perceptual group approach to competitor mapping research (Reger & Huff, 1993; Porac & Thomas, 1990). Our findings suggest that in the absence of a perceptual assessment of competitors, three theoretically derived objective indicators can be used. Moreover, the paper shows the relevance and significance of industry stakeholders’ perception in the study of competitive tension. This, along with a high correspondence between insiders’ and outsiders’ ratings, suggests a “social construction view” of competition (White, 1980; Zuckerman, 1999, 2000)—a potentially promising topic in the extant literature.

Overall, the current research brings to the combined study of competitor analysis and interfirm rivalry a theoretical and empirical fusion of the AMC perspective and objective and perceptual considerations of a critical new construct, competitive tension. As such, it offers evidence that objective AMC indicators can predict perceived tension between rivals, a phenomenon that in turn influences future observable market behaviors.

**Implications**

The implications of this research are manifold. First, the firm-dyad conceptualization, in contrast to previous industry- or group-level considerations, is critical because significant differences exist even among direct rivals. Each firm experiences a different degree of tension with each rival, and from the firm’s point of view each rival is unique. Our findings show that high perceived tension between a focal firm and a rival plants the seed for the firm’s encroachment into the rival’s markets. The issues may help advance research in strategic group (Reger & Huff, 1993), multipoint competition (Baum & Korn, 1996; Gimeno, 1999), competitive aggressiveness (Ferrier, 2001), and interorganizational relationship (Oliver, 1990).
Among the AMC components, rival’s capability to contest offers particular promise. The conceptualization of this construct to include both similarity and salience concerns points to the underexplored research domain that spans the resource-based view of the firm (Barney, 1991), dynamic capabilities (Teece, et al., 1997), and product-market based competition (Porter 1980). Although we do not find support for our hypothesis concerning a positive interaction between similarity and rival's attack volume, the result of a negative interaction seems to suggest that the idea of "mutual forbearance" (Gimeno, 1999) may be an important consideration when forming the perception of competitive tension. Future research may further investigate this issue.

Second, the perceptual construction of competitive tension and the treatment of the three AMC predictors as objective phenomena point to a basic concern in strategy research: the extent to which these contrasting perspectives may correspond. Indeed, the two perspectives have been used to examine key strategy constructs such as environment (Boyd, Dess, & Rasheed, 1993), strategic group (Reger & Huff, 1993), and market structure (Baum & Korn, 1996). This study provides empirical evidence of their correspondence in competitor analysis, while extending recent efforts in cognitive classification (Reger & Palmer, 1996) and competitive dynamics (Jayachandran, et al., 1999; Ferrier, 2001).

Third, due to the sensitivity of insider perceptual information it is often difficult for researchers to determine how strategists prioritize their rivals and gauge the tension each imposes. Our findings suggest that, absent perceptual competitor information provided by airline managers, outsiders’ perceptions reliably indicate how a firm differentiates among a set of direct rivals. To go a step further, whereas insiders’ perceptions capture a focal firm’s managerial aspirations, outsiders’ perceptions reflect influential industry stakeholders’ views of the firm’s competitive (Chen, et al., 1993) and strategic (Zuckerman, 1999, 2000) reality. How these two
perceptions converge or diverge in different settings may provoke a debate on the relative importance between managers and external stakeholders in perceptual construction. Our findings echo some anecdotal evidence on the importance of stakeholders’ perceptions for competitive actions in some mature industries (Chen & MacMillan, 1992); however, we interpret our findings on insiders’ perceptions with caution, given that a relatively small number of insiders responded to our survey. Moreover, the research raises some unexplored, provocative questions in competitor analysis: for example, might perceived competitive tension be considered a collectively negotiated reality involving both managerial and market expectations, and if so, to what extent can such a reality explain market outcomes (Zuckerman, 1999, 2000) and patterns of rivalry among firms (Porac et al., 1995)?

Though the empirical focus of this paper is on perceived tension, our conceptualization of competitive tension includes objective structural tension. The use of objective structural tension as a control variable in the analyses and the finding of its independent impact on consequent competitive actions support previous research, which has shown, directly or indirectly, its empirical significance (Baum & Korn, 1999; Gimeno, 1999). It should be noted, however, that our conceptualization of objective structural tension considers the dynamics in market structure (specifically, the change in market commonality (Chen, 1996) between a rival and a focal firm), in contrast to its previous treatment as a static structural variable. Both the static and dynamic aspects of market structure are important in the conceptualization of objective structural tension.

The current study has practical implications as well. First, the AMC perspective is intuitively appealing and easily understood by strategists, who can rely on objective indicators to assess the level of competitive tension imposed by each rival and to allocate firm resources accordingly. For instance, managers can prioritize their attention and intelligence-gathering
effort according to the level of perceived competitive tension. Also, competitive tension, which has been shown to affect future competitive behaviors, may have implications for organizational performance, and research along this line will help advance the promise of this construct.

Limitations and Future Directions

This research takes a significant first step toward the perceptual differentiation of competitors, but may be limited by its focus on existing industry rivals. Future research should consider potential or “unseen” rivals or those outside of the industry (Porter, 1980)—the “peripheral” competitors (Porac, et al., 1995). Along this line, competition occurs at multiple levels. This study focuses only on competitive tension experienced at the firm-dyad level, though future research may examine tension at the industry or group level to develop a comprehensive understanding of this important construct. In addition, to demonstrate further the significance of perceived tension for consequent interfirm rivalry, it is necessary to examine broadly other types of competitive actions besides market entry.

Because information is relatively public in the airline industry, the correspondence between perceptions and objective reality, as well as between insiders’ and outsiders’ opinions, tends to be high—which may not be the case in other industries—and some of our measures can be improved. The use of a ranking scheme to measure perceived competitive tension, though useful for offering respondents a clear frame within which to compare and prioritize a focal firm’s competitors, does not represent the exact distance between the focal firm and each competitor. Similarly, this study asks respondents to rank a firm’s top five competitors. The selection of the number of competitors may be consequential and deserves further consideration; it is likely that the greater the number of competitors to be ranked, the smaller the chance for agreement among survey respondents. Also, the use of fleet structure to measure rival’s
capability to contest, while appropriate in the airline context, may not get to the heart of the “sticky” or process aspects of firm resources and capabilities (Barney, 1991), an area awaiting further investigation. Future research should explore the nuance and complexity of the interrelationships between AMC variables in a longitudinal design and under various industry conditions, and extend this promising perspective to develop a predictive theory not only of competitive action, but of organizational action in general.

Finally, one of the implicit premises of this research is that the competitive relationship between a pair of firms can be asymmetric: the tension that a rival imposes on a focal firm may not be equal to the tension the firm imposes on the rival (c.f., Chen, 1996). In the future, it would be useful to examine the extent to which perceived tension between a pair of firms differs, and what the behavioral implications are for perceptual asymmetry.

In conclusion, this paper examines an important missing element in competitor research: the idea of competitive tension. Understanding how firm managers and outside stakeholders perceive competitive tension, from the angles of scale or capacity, market action, and resource profile, can help reveal their awareness, motivation, and capability for interfirm rivalry.
REFERENCES


Figure 1. A Model of Competitive Tension

Awareness-Motivation-Capability \((t_{1})\)  

**Competitive Analysis**

- Relative Scale
- Rival’s Attack Volume
- Rival’s Capability to Contest

**Interfirm Rivalry**

- Perceived Competitive Tension
  - Managerial (Insider) Perception
  - Industry Stakeholder (Outsider) Perception
- Objective Structural Tension (Control)
- Volume of Attack on Rival
Figure 2. Interaction Results

a. Interaction between Relative Scale and Rival’s Attack Volume

b. Interaction between Salience and Rival’s Attack Volume
<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Perceived competitive tension-insiders</td>
<td>1.24</td>
<td>1.65</td>
</tr>
<tr>
<td>2 Perceived competitive tension-outsiders</td>
<td>1.19</td>
<td>1.33</td>
</tr>
<tr>
<td>3 Attack on rival's markets</td>
<td>81.98</td>
<td>95.96</td>
</tr>
<tr>
<td>4 Relative scale 90</td>
<td>2.89</td>
<td>4.90</td>
</tr>
<tr>
<td>5 Relative scale 91</td>
<td>3.75</td>
<td>7.06</td>
</tr>
<tr>
<td>6 Rival's attack volume</td>
<td>82.69</td>
<td>113.50</td>
</tr>
<tr>
<td>7 Salience</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td>8 Similarity</td>
<td>0.60</td>
<td>0.15</td>
</tr>
<tr>
<td>9 Structural tension 1989-90*</td>
<td>0.22</td>
<td>1.15</td>
</tr>
<tr>
<td>10 Structural tension 1990-91</td>
<td>0.26</td>
<td>1.60</td>
</tr>
<tr>
<td>11 Average route density of j’s routes not served by i</td>
<td>4.18</td>
<td>1.02</td>
</tr>
<tr>
<td>12 Number of j’s routes not served by i</td>
<td>2126.8</td>
<td>2106.1</td>
</tr>
</tbody>
</table>

+ p< 0.10; * p< 0.05; ** p<0.01

N=156, except for volume of attack on rival (132) and perceived competitive tension-insiders (108)

*For better display, the scale of structural tension reported here is 100 times the original.
### TABLE 2
**Effect of AMC on Perceived Competitive Tension**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Insiders (1)</th>
<th>Insiders (2)</th>
<th>Insiders (3)</th>
<th>Outsiders (4)</th>
<th>Outsiders (5)</th>
<th>Outsiders (6)</th>
<th>All Combined (7)</th>
<th>All Combined (8)</th>
<th>All Combined (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airline i’s age</td>
<td>0.003 *</td>
<td>-0.004</td>
<td>-0.001</td>
<td>0.005 *</td>
<td>0.003</td>
<td>0.007</td>
<td>0.005 *</td>
<td>0.003</td>
<td>0.007</td>
</tr>
<tr>
<td>Airline i’s past performance</td>
<td>-1.424 +</td>
<td>-3.443 *</td>
<td>-3.499 *</td>
<td>-1.344</td>
<td>-1.423 +</td>
<td>-1.520</td>
<td>-1.329</td>
<td>-1.435 +</td>
<td>-1.537</td>
</tr>
<tr>
<td>Airline i’s slack resources</td>
<td>0.384 **</td>
<td>1.102 **</td>
<td>1.008 *</td>
<td>0.495 **</td>
<td>0.960 *</td>
<td>1.255 *</td>
<td>0.499 **</td>
<td>0.965 *</td>
<td>1.265 *</td>
</tr>
<tr>
<td>Airline j’s age</td>
<td>0.026 *</td>
<td>0.014</td>
<td>0.007</td>
<td>0.031 +</td>
<td>0.019</td>
<td>0.014</td>
<td>0.031 +</td>
<td>0.019</td>
<td>0.014</td>
</tr>
<tr>
<td>Airline j’s past performance</td>
<td>1.607</td>
<td>2.397</td>
<td>3.616</td>
<td>0.353</td>
<td>0.652</td>
<td>0.939</td>
<td>0.374</td>
<td>0.654</td>
<td>0.950</td>
</tr>
<tr>
<td>Airline j’s slack resources</td>
<td>2.891 *</td>
<td>1.298</td>
<td>1.612</td>
<td>2.621 +</td>
<td>1.008</td>
<td>1.033</td>
<td>2.634</td>
<td>1.017</td>
<td>1.044</td>
</tr>
<tr>
<td>Structural tension 1989-90</td>
<td>0.449 *</td>
<td>0.193</td>
<td>0.089</td>
<td>0.310 *</td>
<td>0.125</td>
<td>0.003</td>
<td>0.309 *</td>
<td>0.125</td>
<td>0.002</td>
</tr>
<tr>
<td>Relative scale</td>
<td>0.086 *</td>
<td>0.484 **</td>
<td>0.073 **</td>
<td>0.284 **</td>
<td>0.073 *</td>
<td>0.285 **</td>
<td>0.073 *</td>
<td>0.285 **</td>
<td></td>
</tr>
<tr>
<td>Rival's attack volume</td>
<td>0.004 *</td>
<td>0.014</td>
<td>0.004 *</td>
<td>0.009 **</td>
<td>0.004 *</td>
<td>0.009 **</td>
<td>0.004 *</td>
<td>0.009 **</td>
<td></td>
</tr>
<tr>
<td>Salience</td>
<td>4.163 +</td>
<td>5.037 *</td>
<td>5.813 *</td>
<td>6.871 *</td>
<td>5.772 *</td>
<td>6.848 *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td>0.208</td>
<td>-0.800</td>
<td>-0.834</td>
<td>-1.590</td>
<td>-0.822</td>
<td>-1.580</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Relative scale)×(Rival's attack)</td>
<td>0.005 +</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003 +</td>
<td></td>
<td>0.003 +</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Salience)×(Rival's attack)</td>
<td>0.072 **</td>
<td>0.048 *</td>
<td>0.049 *</td>
<td></td>
<td></td>
<td>0.049 *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Similarity)×(Rival's attack)</td>
<td>-0.030 +</td>
<td>-0.022 +</td>
<td>-0.023 +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-2.236</td>
<td>-1.215</td>
<td>0.016</td>
<td>-1.694</td>
<td>-0.992</td>
<td>-0.357</td>
<td>-1.723</td>
<td>-0.998</td>
<td>-0.361</td>
</tr>
<tr>
<td>N</td>
<td>108</td>
<td>108</td>
<td>108</td>
<td>156</td>
<td>156</td>
<td>156</td>
<td>156</td>
<td>156</td>
<td>156</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.183</td>
<td>0.317</td>
<td>0.417</td>
<td>0.278</td>
<td>0.483</td>
<td>0.571</td>
<td>0.277</td>
<td>0.481</td>
<td>0.569</td>
</tr>
</tbody>
</table>

+ p< 0.10; * p< 0.05; ** p<0.01
### TABLE 3

**Effect of Perceived Competitive Tension on Attack Volume**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Airline i’s age</td>
<td>0.034</td>
</tr>
<tr>
<td>Airline i’s past performance</td>
<td>-23.45</td>
</tr>
<tr>
<td>Airline i’s slack resources</td>
<td>1.067</td>
</tr>
<tr>
<td>Airline i’s average route density</td>
<td>2.241**</td>
</tr>
<tr>
<td>Airline j’s age</td>
<td>-0.01+</td>
</tr>
<tr>
<td>Airline j’s past performance</td>
<td>14.466*</td>
</tr>
<tr>
<td>Airline j’s slack resources</td>
<td>1.568**</td>
</tr>
<tr>
<td>Average route density of j’s routes not served by i</td>
<td>0.653+</td>
</tr>
<tr>
<td>Number of j’s routes not served by i</td>
<td>0.001**</td>
</tr>
<tr>
<td>Structural tension 1990 – 1991</td>
<td>0.143*</td>
</tr>
<tr>
<td>Relative scale</td>
<td>-0.088</td>
</tr>
<tr>
<td>Perceived competitive tension</td>
<td>0.300*</td>
</tr>
<tr>
<td>Insiders</td>
<td>0.492**</td>
</tr>
<tr>
<td>Outsiders</td>
<td></td>
</tr>
<tr>
<td>All combined</td>
<td>0.487**</td>
</tr>
<tr>
<td>Constant</td>
<td>-7.507</td>
</tr>
<tr>
<td>N</td>
<td>132*</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-594.03</td>
</tr>
<tr>
<td>Likelihood ratio test</td>
<td>121.85**</td>
</tr>
</tbody>
</table>

+ p< 0.10; * p< 0.05; ** p<0.01

* The sample size was reduced from 156 (in Table 2) to 132 due to the loss of 24 observations associated with Pan Am and Midway Airlines which declared bankruptcy in 1991.