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GLUE OR GASOLINE? THE ROLE OF INTERORGANIZATIONAL LINKAGES IN THE OCCURRENCE AND SPILLOVER OF COMPETITIVE WARS

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Despite their prevalence and significance, competitive wars have received limited attention in the strategy literature. Our knowledge of how interorganizational linkages influence competitive wars is particularly lacking. Drawing on the social embeddedness perspective, we argue that both direct linkages (i.e., strategic alliances) and indirect linkages (i.e., common ownership ties and common analyst ties) reduce the likelihood of war, thereby functioning as the glue that binds firms together. Yet once competitive wars are launched in related markets, indirect linkages through common third-parties may continuously function as glue, reducing the likelihood of war spillover, whereas direct linkages, such as strategic alliances, may facilitate the spillover of competitive wars, akin to adding gasoline to a fire. Using data from the U.S. domestic airline industry between 1991 and 2010, our empirical evidence offers strong support for our predictions.

As one of the most severe forms of competitive interaction in the marketplace, competitive wars often result in negative performance consequences for associated firms and industries (Rindova, Becerra, & Contardo, 2004). For example, when major U.S. airlines went head-to-head in matching one another's price reductions in 1992, some estimates suggested that the total losses experienced by the industry that year exceeded the combined profits for the entire industry since its inception (Rao, Bergen, & Davis, 2000). Similarly, in 2019, the rapid-fire price cuts among major online brokerage firms—Charles Schwab, E*TRADE Financial, and Interactive Brokers Group—slashed equity-trading commissions to zero, leading to a sharp decline in their revenue and stock prices (Fonda, 2019). Despite their significance for performance, thus far competitive wars have received limited attention from management scholars.

Competitive wars are distinct from day-to-day competitive activities. First, competitive wars are often waged to disrupt the status quo and challenge the entrenched status hierarchy in a market[1] (Levenstein, 1997; Slade, 1987). In contrast, day-to-day competitive activities represent actions continuously taken by firms to seize market opportunities or respond to rivals' maneuvers within the existing status hierarchy in a given market. Second, competitive wars are severe in magnitude. They are destructive and are therefore unsustainable, creating significant threats to the survival of participants and the overall

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[1] Unless specified, our use of "market" refers to both geographic and product markets.

stability of the industry (Heil & Helsen, 2001; Henderson, 1997).[2] In contrast, day-to-day competitive activities are often part of "an incessant race to get or to keep ahead of one another" (Kirzner, 1973: 20). Such common activities typically do not have devastating effects on the performance of the firms or markets involved.

Compared with the relative neglect of the management field, economics studies have devoted considerable attention to one form of competitive wars: price wars. These studies have identified a number of price war triggers, such as demand fluctuations (Green & Porter, 1984; Rotemberg & Saloner, 1986), industry concentration, and firm financial condition (Busse, 2002; Levenstein & Suslow, 2006; Morrison & Winston, 1996; Ross, 1997). While this line of work offers rich insights regarding the economic determinants of competitive wars, to date it has not considered how social embeddedness may trigger or escalate competitive wars.

According to the social embeddedness perspective, organizations are embedded in a network of social and economic relationships that shape their behavior (e.g., Baum & Oliver, 1992; Granovetter, 1985). As a result, the competitive actions of firms are influenced not only by their individual interests but also by the interests of other organizations with whom the firms are directly or indirectly connected (Gimeno, 2004; Gnyawali & Madhavan, 2001).

Recently, a small group of scholars has begun to examine how the social embeddedness of rivals affects how they compete (Connelly, Lee, Tihanyi, Certo, & Johnson, 2019; Cui, Yang, & Vertinsky, 2018; Downing, Kang, & Markman, 2019; Klein, Semrau, Albers, & Zajac, 2019; Skilton & Bernardes, 2017). Joining this line of work, the current study explores how the two most common conceptualizations of embeddedness—relational and structural embeddedness (Granovetter, 1985; Gulati, 1998)—influence competitive wars. The notion of embeddedness emphasizes the idea that "economic behaviors are constrained by ongoing social relations" (Granovetter, 1985: 482). Social relations between firms can take different forms. Relational embeddedness refers to the extent to which firms are connected through direct ties, as well as the nature of those ties (Gulati, 1998; Rowley, Behrens, & Krackhardt, 2000). Structural embeddedness, on the other hand, shifts "the frame of reference from the dyad to the triad" (Gulati & Gargiulo, 1999: 1446), focusing on the extent to which actors are indirectly tied via common third-parties[3] (e.g., Polidoro, Ahuja, & Mitchell, 2011). We use three types of interorganizational linkages to examine relational and structural embeddedness. To capture relational embeddedness, we focus on strategic alliances, which are voluntary arrangements between competing firms involving exchange, sharing, or the codevelopment of products, technologies, and services (Gulati, 1998). Alliances vary in nature, with some involving significant resources and strategic commitment and others involving less significant commitments (e.g., Nohria & Garcia-Pont, 1991; Oxley & Sampson, 2004). To capture structural embeddedness, we examine indirect linkages that are created when competing firms are connected to the same third-party. In particular, we focus on common ownership ties through shared institutional investors (Connelly et al., 2019) and common analyst ties through shared financial analysts (Israelsen, 2016).

Borrowing the glue-versus-gasoline metaphor from Pierce, Kilduff, Galinsky, and Sivanathan (2013), the basic premise of our study is that some interorganizational linkages among competitors that restrain the initiation of competitive wars (serving as glue) may also serve to fuel the spread of competitive wars to other markets (like adding gasoline to a fire) once the war has commenced. Elaborating the glue metaphor, we argue that when firms are directly connected through alliances they are less likely to go to war, because alliances increase trust and create resource interdependence among partners. In addition, when firms are indirectly connected via institutional investors and analysts, they are less likely to go to war because such common third-parties are able to mediate the conflicts of interest between these firms and may sanction actions that deviate from mutually beneficial objectives. Despite the "glue" effect of interorganizational linkages, competitive wars still occur in many industries. Due to the complex origins of these wars and the multimarket, multiunit nature of today's competition, once competitors enter into wars in other markets, the wars are likely to spill over to the focal market, where

[2] As we will discuss later, some competitive wars may enhance the performance of some war participants; these wars are outside the scope of our study.

[3] We study structural embeddedness by focusing on indirect interorganizational linkages via common third-parties. It is important to note that structural embeddedness can be defined much more broadly. Beyond triads, prior research has also examined the configuration of interorganizational networks (e.g., Moran, 2005; Provan, Fish, & Sydow, 2007; Tsai, , Su, & Chen, 2011).

these competitors are also present (e.g., Gimeno, 1999). We argue that while common ownership ties and common analyst ties may function as stronger glue, reducing the likelihood that competitors will spread the wars from other markets to the focal market, alliances may amplify such a spillover effect—much like adding gasoline to a fire.

We tested our propositions in the U.S. domestic airline industry, using a data set of 4,086 competitive wars that occurred in 2,066 geographic markets over 20 years. We found strong support for our propositions. This paper makes three major contributions. First, it contributes to the competitive dynamics literature, which has focused predominantly on day-to-day competitive activities. Given the fundamental differences between competitive wars and day-to-day competitive activities, studying competitive wars advances our knowledge of a unique form of competition that has substantial performance implications for firms and related industries.

Second, we contribute to the research on social embeddedness in two ways. We extend our understanding of how direct interorganizational linkages can fuel, rather than mitigate, competition. While prior research has generally put greater emphasis on the constraining effect of direct linkages on firm competitive behavior (e.g., Cui et al., 2018; Han, Shipilov, & Greve, 2017; Klein et al., 2019), we identify the onset of a competitive war as a critical and yet unstudied situational trigger that may transform a direct linkage, which usually reduces competition into a catalyst for competitive escalation.

Additionally, our study highlights the importance of understanding different mechanisms through which direct and indirect linkages affect competition. According to Gulati and Gargiulo (1999: 1447), an essential debate in the social embeddedness literature is "whether the mechanisms behind the impact of indirect ties on behavior are substantially different from those behind the effect of direct ties." Although many scholars have articulated the fundamental differences between direct and indirect linkages (e.g., Gulati, 1998; Gulati & Gargiulo, 1999), limited efforts have been made to explore how and why they work similarly or dissimilarly in shaping competition. Taking a deep dive into their effects in the context of competitive wars, we argue that both direct and indirect linkages can function as glue, preventing the occurrence of wars. However, they do so through different mechanisms, with direct linkages relying largely on trust and resource interdependence, and indirect linkages relying largely on the mediating and sanctioning role of powerful third-parties. Our study signifies the importance of understanding such differences, because direct and indirect linkages can have opposite effects on the spillover of competitive wars once a war has commenced.

Finally, our paper introduces new ways of conceptualizing and empirically identifying competitive wars. More specifically, we draw on the multimarket competition research to identify the spillover effects of competitive wars across markets. This is in contrast with the traditional approach, which has studied wars largely as independent, single-market events and ignored the process through which they may escalate from a single market event into an industry-level disaster affecting many markets. We hope our new approaches can advance the current understanding of competitive wars and pave the way for additional empirical research in the future.

THEORY AND HYPOTHESES

Competitive Dynamics and Competitive Wars

Competitive dynamics research has emphasized that interfirm rivalry can be analyzed by studying the actions and responses of individual firms (Chen, 1996). Focusing on competitor dyads as the fundamental level of analysis, this research stream has yielded a set of attributes (e.g., visibility, magnitude, complexity, and speed) to characterize a wide range of competitive activities, such as pricing actions, marketing actions, capacity actions, and new product introductions (for a review, see Chen & Miller, 2012). Competitive dynamics research has devoted extensive attention to day-to-day competitive activities. Yet, it has made a limited effort to understand competitive wars (Rindova et al., 2004). As a distinct form of competition, competitive wars are often waged to redefine the status quo or renegotiate the rent distribution in a market (Cabral, 2018). Through extreme aggression and destruction, war participants hope to shape the future behavior of their rivals, pushing them to accommodate the new market divide or the new status hierarchy. This is in contrast to the day-to-day activities, which are largely responses to rivals' actions (Chen, 1996) within the existing status structure. Through such responses, firms adjust price levels, marketing strategies, capacity investment, and product development to match or exceed their competitors' offerings along these dimensions.

Competitive wars often involve multiple markets. The multimarket nature of today's competition means that a competitive war initiated in one market

may quickly spread to other interconnected markets, where the same competitors are also present. It is important to note that prior research in economics has largely viewed competitive wars as a single-market phenomenon (e.g., Busse, 2002; Morrison & Winston, 1996). We believe that to develop a comprehensive understanding of how competitive wars begin and unfold, it is critical to consider the process through which competitive wars may spread across multiple markets.

Competitive wars bring fundamental changes to competitive environments that may challenge some of the well-established recipes in the competitive dynamics literature. For instance, during competitive wars, the rapid exchange of actions and the magnitude of economic impact often challenge the calculative cost–benefit analysis implied in studies using game theoretical approaches (Chen & MacMillan, 1992). Additionally, abundant evidence has shown that in many cases, firms cannot pinpoint the exact cause of competitive wars (Genesove & Mullin, 2001; Kreps, 1989). As a result, the clear identification of actor and responder required by traditional competitor analysis in competitive dynamics research becomes challenging (e.g., Chen, Smith, & Grimm, 1992; Yu & Cannella, 2007). Finally, competitive signals are likely to be noisy during wartime, and the chances for bluffing and misinterpretation are high. Thus, it is hard for rivals to use signals to communicate intentions and plan actions, as suggested by the competitive signaling literature (e.g., Heil & Robertson, 1991). To conclude, the distinctive nature of competitive wars makes it a particularly important phenomenon to study theoretically.

Interorganizational Linkages and Competition

Interest has been growing in extending the social embeddedness perspective to the context of interfirm competition (Gimeno, 2004; Gnyawali & Madhavan, 2001; Tsai et al., 2011).[4] Interorganizational linkages are formed for both cooperative (e.g., to overcome resource constraints and jointly develop new products [Das & Teng, 2000; Rothaermel & Boeker, 2008]) and competitive (e.g., to offset competitive pressures or maximize a firm's private gains [Dussauge et al., 2000; Gimeno, 2004; Lavie, 2007; Yang et al., 2015]) reasons. Research has shown that these linkages can facilitate or constrain the resource flow, actions, and future relationships of the firms involved. Focusing on direct interorganizational linkages, for instance, some researchers have explored factors that may increase the competitive tension between partners, leading to instability of alliances (Berg & Friedman, 1977; Kogut, 1988; Park & Russo, 1996) and learning races (Hamel, 1991; Khanna et al., 1998). Others have investigated how coopetition and the type of alliance portfolio may shape rivals' competitive aggressiveness and their market entry decisions (Cui et al., 2018; Klein et al., 2019). Shifting the focus from direct linkages to indirect linkages, recently a small group of scholars began to explore how indirect linkages through a common third-party may affect the competitive relationship between rivals. For instance, Gimeno (2004) examined how a firm's selection of partners is affected by its competitors' choice of partners. Connelly and colleagues (2019) demonstrated that competitors with common ownership ties will engage in dissimilar competitive actions to avoid direct competition with one another.

Research has indicated that direct linkages between rivals may shape their competitive behavior in two important ways. First, through repeated interactions, direct linkages promote mutual trust that may align the interests of competitors and reduce their incentives to act opportunistically (Uzzi, 1997; Venkatraman & Zaheer, 1995). Second, through repeated interactions, direct linkages facilitate resource sharing and knowledge transfer, which may further reduce competitors' incentives to pursue private interests at the cost of common gains. Although competitors often form direct linkages to "manage their dependence on other organizations and mitigate the uncertainty generated by that dependence" (Gulati & Gargiulo, 1999: 1443), such

[4] Other literature that might be relevant here is that on coopetition. Having grown quickly in recent years, coopetition research encompasses a wide range of topics. For example, some scholars have examined how cooperative relationships affect interfirm rivalry (e.g., Cui et al., 2018; Hamel, 1991; Khanna, Gulati, & Nohria, 1998). Others have investigated how competitive relationships affect alliance formation and termination (e.g., Ang, 2008; Dussauge, Garrette, & Mitchell, 2000; Kogut, 1988). Some scholars have explored the dynamisms related to competitive networks and cooperative networks (Gnyawali, He, & Madhavan, 2006; Hsieh & Vermeulen, 2014). Others have studied the performance implications of simultaneously pursuing cooperative and competitive strategies (e.g., Chen, 2008; Lado, Boyd, & Hanlon, 1997). Considering the breadth of this literature, we decided to focus our literature review on a narrower body of work that is directly related to the competitive outcomes of embeddedness.

linkages may also "produce new patterns of dependence and interdependence" between competitors (Hillman, Withers, & Collins, 2009: 1405). As a firm becomes too embedded in direct linkages, and concentrated levels of exchange are tuned to specific partners, adaptation to innovations, new industry trends, and new potential partners becomes difficult (Uzzi, 1997).

Unlike direct linkages, which firms join purposefully, indirect ties form at the discretion of common third-parties (e.g., Connelly et al., 2019; Pahnke, McDonald, Wang, & Hallen, 2015). Prior research has suggested two mechanisms through which indirect linkages between rivals may shape their competitive behavior. First, common third-parties can act as mediators, transferring information between competitors that lack direct connection and trust, eliminating misunderstandings, and aligning their interests and perspectives (Gould & Fernandez, 1989; Heidl, Steensma, & Phelps, 2014; Simmel, 1950). As noted by Simmel (1950: 145), "the appearance of the third party indicates transition, conciliation, and abandonment of absolute contrasts." The third-parties' nonpartisanship and impartial position allow them to present to each competitor the claims and arguments of the other in more objective terms (Simmel, 1950). Second, third-parties have the ability to sanction actions deviating from mutually beneficial objectives in both active and passive ways (Coleman, 1990; Li & Piezunka, 2020). Bestowed with important resources and socioeconomic influence, third-parties can actively penalize unilateral behaviors that damage the common interests of the triad (Azar, Schmalz, & Tecu, 2018; Connelly et al., 2019; Rosenkopf & Padula, 2008). Even if the third-parties decide to take more passive roles, research has shown that managers of the firms they are connected with are still incentivized to consider their interests and demands (Pfeffer & Salancik, 1978). This is the "shadow of others" effect, which arises from concerns about sanctions that the third-parties may impose (Polidoro et al., 2011: 204).

Despite its merits, prior research on the competitive consequences of interorganizational linkages suffers from a number of limitations. First, it has thus far examined only the impact of interorganizational linkages on day-to-day competitive activities, paying no attention to competitive wars (e.g., Cui et al., 2018). Second, it has focused predominantly on the cooperation-enhancement or competition-suppression impact of direct linkages (e.g., Han et al., 2017; Klein et al., 2019). Finally, it has typically studied the effects of direct and indirect linkages on competition separately (Connelly et al., 2019; Han et al., 2017). In an attempt to address these gaps in the literature, we explore below the effects of direct and indirect linkages on both the occurrence and the spillover of competitive wars.

Interorganizational Linkages and the Occurrence of Competitive Wars

Strategic alliances. Direct interorganizational linkages come into existence when organizations actively seek one another out and make a deliberate choice to collaborate (Ang, 2008; Axelrod, 1984; Heide & Miner, 1992). A typical type of direct interorganizational linkage is the strategic alliance. We argue that strategic alliances among incumbents in a focal market will reduce the likelihood that a competitive war will occur in this market, due to two considerations.[5] First, through repeated interactions, strategic alliances increase trust between competitors (Hamel, 1991; Hitt, Worthington, & Li, 2005). As an "explicit and primary feature" of cooperative relationships (Uzzi, 1997: 43), trust reduces the chance that a partner will unilaterally pursue self-interest at the expense of mutual interest. Second, alliances facilitate resource sharing and knowledge transfer (Gulati, 1998; Harrigan, 1988; Mesquita, Anand, & Brush, 2008). Through repeated interactions, because cooperative relationships are increasingly tuned toward specific partners, the processes of increasing integration and efficiency may create resource dependencies that will further reduce rivals' motivation to break the peace with partners. Thus, we hypothesize:

Hypothesis 1. The number of strategic alliances among incumbents of a market is negatively related to the likelihood of a competitive war occurring in that market.

[5] It is important to note that our hypothesized effect depends on the topology of the alliance constellations in a market. If alliances are randomly distributed among incumbents (i.e., the market is not characterized by multiple cohesive subgroups or alliance cliques), high alliance intensity will represent a high level of cooperation between incumbents. However, if in a market there are multiple alliance cliques competing with one another (e.g., Gomes-Casseres, 2003; Lazzarini, 2007), high alliance density may not act to restrain the intensity of rivalry (it may even increase it), and our hypothesized effects might not be present. We thank one anonymous reviewer for bringing this important boundary condition to our attention.

Common ownership ties. Hypotheses 2a and 2b focus on the effects of two types of indirect interorganizational linkages—common ownership ties and common analyst ties—on the occurrence of competitive wars. Indirect linkages can take different forms, such as common supplier ties (Piezunka & Clough, 2016) or common partner ties (Bae & Gargiulo, 2004). We have decided to focus on common ownership ties and common analyst ties, largely because they best embody the two mechanisms through which indirect linkages exert influence over competition. First, institutional investors and financial analysts tend to hold impartial positions in competitive wars. To effectively play the mediating and sanctioning roles, nonpartisanship of the third-parties is critical (Li & Piezunka, 2020; Simmel, 1950). Thus, it is important to ensure that third-parties are not involved in the war, as would be the case for common partner ties, and are not playing one party against the other to capture value in negotiations, as would be the case for common supplier ties. Second, both institutional investors and financial analysts have the interest and power to affect the behavior of the firms they are connected with because of their resource holdings or socioeconomic influence. Common institutional investors can sanction undesirable competitive behavior of firms because they hold critical resources on which firms rely. The sanctioning power of common financial analysts, on the other hand, is derived from their socioeconomic influence over other key resource holders. Although analysts themselves do not control critical resources that directly affect firms, their opinions are highly influential in the investment decisions of firms' current shareholders and potential investors.

We expect that the extent of common ownership ties among incumbents in a market is negatively associated with the likelihood of a competitive war in that market, for three reasons. First, institutional investors are motivated to discourage firms they own from entering into a war. Such motivation is particularly strong for investors who have equity stakes in multiple competing firms. For these investors, maximizing the aggregated value of all firms in their portfolios is much more important than having one firm triumph over the others in a war (Connelly et al., 2019).[6] Thus, we expect that investors will work hard to mediate the conflicts of interest between competing firms with whom they are connected. Research in the finance literature arena has found that institutional investors offer specific suggestions in private settings to align the interests and perspectives of the firms they own, and their suggestions are often taken very seriously (e.g., Chowdhury & Wang, 2009; Goranova & Ryan, 2014; McCahery, Sautner, & Starks, 2016).

Second, when mediation fails, we argue that institutional investors have the ability to penalize behavior that may jeopardize their interests, as well as the interests of other firms they own. It has been well-established that institutional investors can utilize multiple means, including the threat of exit, employment of "voice," and use of media, to sanction firms that do not act in accordance with their interests and preferences (Bushee, Gerakos, & Lee, 2018; David, Hitt, & Gimeno, 2001; McCahery et al., 2016).

Third, we argue that institutional investors can exert influence even if they take a more passive role. Due to the shadow of other effect (Polidoro et al., 2011), firms cannot afford to ignore the interests of institutional investors, even when they are constrained from actively suppressing competition (e.g., Gilo, 2000; O'Brien & Salop, 2000). Elhauge (2016) found that because the substantial institutional holdings of firms are public information, in the absence of any communication and coordination with institutional investors, firms voluntarily lessen competition to appease those investors who also hold shares in their competitors' businesses. Thus, we hypothesize:

> *Hypothesis 2a. The extent of common ownership ties among incumbents in a market is negatively related to the likelihood of a competitive war occurring in that market.*

Common analyst ties. We propose that the extent of common analyst ties among incumbents in a market is negatively associated with the likelihood of a competitive war in that market. Financial analysts tend to react negatively to competitive wars. It has been demonstrated that analysts who are less accurate in their earnings forecasts likely lose their positions and have lower status (e.g., Hong, Kubik, & Solomon, 2000; Mikhail, Walther, & Willis, 1999). The high degree of uncertainty created by

[6] It is important to note that not all common institutional investors will have symmetric holdings in the firms at war. When investors' holdings are asymmetric, they may espouse a logic of win–lose that often incites managers in competitive wars to protect the interests of high-priority relationships at the expense of other periphery relationships. We thank an anonymous reviewer for suggesting this boundary condition.

competitive wars may unavoidably increase analysts' forecasting errors. Additionally, research has found that analysts are incentivized to provide optimistic (sometimes overly optimistic) recommendations because their personal income is tied to the trading commissions and fees generated by the brokerage firms employing them (e.g., Brown, Call, Clement, & Sharp, 2015; Groysberg, Healy, & Maber, 2011). When one firm an analyst covers is at war, the war not only harms the financial performance of the firm but may also harm the compensation of the analyst. Since analysts typically specialize by industry or market sector, they tend to cover most of the major firms in that industry.[7] Competitive wars are particularly harmful to analysts when multiple firms they cover are at war—a situation that will severely damage their ability to make accurate and optimistic recommendations and sell shares.

Unlike institutional investors, who can take either an active or a passive role in mediating and sanctioning conflicts, analysts may achieve similar outcomes through indirect socioeconomic influence. Analysts are generally employed by brokerage houses or investment banks to offer recommendations to investors. The nature of their job establishes their nonpartisanship, dispelling concerns that they will side with one competitor over another. As a result, they can play a mediating role (i.e., extinguishing the flame of war) by presenting differing perspectives using means such as reports that explore the industrywide implications of competitive wars, conversations with management, questions during conference calls, media interviews, etc. In addition to their impartial position, analysts' superior knowledge about the industry and market sector may further enhance the credibility and persuasiveness of their recommendations.

Second, analysts can use their "opinion leader" status to penalize, or threaten to penalize, competitive behavior that destroys the stability of an industry and the accuracy of their forecasts. Prior research has shown that an analyst's decision to downgrade a stock or abandon coverage has a detrimental effect on a firm's stock price (Barber, Lehavy, & Trueman, 2010; Stickel, 1992; Womack, 1996). This is in part because a large number of uninformed investors (e.g., retail investors), as well as institutional investors, follow analysts' recommendations to identify investment opportunities (Blasco & Corredor, 2016; Zuckerman, 1999). It is important to recognize that analysts' individual influence may be weak. However, if the opinions of multiple analysts are aligned, they can act as a powerful force in penalizing firms through their influence over stock prices. In fact, a stream of research in the management and finance fields has demonstrated that because of career concerns, analysts tend to follow each other's opinions and recommendations, leading to a herd effect in their forecasts (Hong et al., 2000; Rao, Greve, & Davis, 2001; Trueman, 1994).

To conclude, from the perspective of focal firms, although analysts themselves do not hold the resources these firms rely on, analysts' opinions matter greatly to such firms, because analysts have a profound impact on the evaluations and decisions of other resource holders. Therefore, we hypothesize:

Hypothesis 2b. The extent of common analyst ties among incumbents in a market is negatively related to the likelihood of a competitive war occurring in that market.

The Spillover of Competitive Wars

Despite the glue effects of interorganizational linkages, competitive wars still occur. They can be triggered by the interaction of a number of factors, including demand fluctuation (Green & Porter, 1984), a firm's financial distress (Busse, 2002), a novice's inexperience, the misreading of competitors' signals (Kreps, 1989), or the intent to renegotiate rent (Genesove & Mullin, 2001). The exact cause of a war is often hard to identify. This is especially true when the war involves multiple players in multiple markets. In some industries, imperfect information about firms' competitive maneuvers creates ambiguity regarding the origin of a war. In other industries, it is difficult to attribute a war to the actions of specific firms (Green & Porter, 1984). Even for a closely monitored cartel, Genesove and Mullin (2001) found that its members still had to launch investigations to decide whether and how cheating had occurred. Similarly, according to McDowell (1992), during the 1992 price war in the U.S. airline industry, "the top executives of each company blame[d] the others for starting the fare war that they regard[ed] as ill advised." As Robert L. Crandall, the chairman of American Airlines, said in an interview, "The half-price sale was a monstrous stupidity, a monstrous stupidity started by Northwest." However, John H. Dasburg, the chief executive of Northwest, viewed it differently: "What American Airlines initiated was predatory and very

[7] In terms of market coverage, analysts typically follow all product and geographic markets of the firms they cover.

damaging," he said in a telephone interview. "It clearly cost the industry hundreds of millions of dollars, apparently on the basis of some long-term notion of how the customer is supposed to buy airline tickets."

No matter who starts the war, once it has commenced we expect that it will soon become a market-level phenomenon, particularly in industries with low differentiation, such as airlines. Any firm attempting to sustain a price that is substantially higher than those offered by rivals will risk losing all of its business. Thus, it cannot afford to do nothing. Additionally, based upon the multimarket competition literature, we expect that once competitors enter into wars in other markets, these wars may spill over to the focal market, where competitors are also present (Gimeno, 1999). This may seem to contradict the mutual forbearance hypothesis, but in fact it does not. Firms mutually forbear primarily due to their fear of cross-market retaliation. Once the equilibrium of deterrence (i.e., mutual forbearance) is upset, wars can easily spread from one market to other markets through multimarket contacts between rivals. For example, when a competitive battle broke out among three airlines—American, United, and Eastern—in Miami, San Francisco, and Chicago, their aggressive fare cuts produced a ripple effect that affected two bystanders: Continental and Western Airlines. In response, these two airlines expanded the battle from the original three cities to 79 additional markets (Burrough, 1984). Hence, we hypothesize:

Hypothesis 3. The proportion of incumbents in a focal market that were at war in other markets during the previous period is positively related to the likelihood of a competitive war starting in that focal market.

Interorganizational Linkages and the Spillover of Competitive Wars

Hypothesis 3 identifies a baseline condition under which a war in the focal market may be triggered by spillover from other markets. In Hypotheses 4 and 5, we use the onset of competitive wars as the situational trigger to examine the effects of different types of interorganizational linkages on the spillover of wars to other unaffected markets.

Strategic alliances. After a competitive war breaks out in other markets, we expect that the effect of strategic alliances will change from glue to gasoline, such that the positive relationship between the proportion of incumbents at war in other markets and the likelihood of competitive war occurring in the focal market will be amplified when the number of strategic alliances among incumbents in a market is higher.[8] First, before a war, when firms enter an alliance, they develop trust over time and place themselves at risk by allowing one another access to knowledge and resources. The onset of a war, however, will create distrust among partners. Whether a firm's response in a war is a defensive act designed to protect its market position or an offensive act designed to steal market share is subject to the interpretation of competitors. A spiral of suspicion may also lead firms to overreact to rivals' actions (Schilke & Lumineau, 2018). For example, in discussing what leads firms into self-defeating price wars, Michael Marn, a partner at McKinsey, explained, "Price wars are often caused by overreactions to threats that either aren't there at all or are not as big as they seem" (Henderson, 1997).

Relatedly, unlike indirect linkages—through which a credible and dispassionate intermediary will mediate or sanction conflicts between firms it owns or covers—alliances are formed on a voluntary basis, and partners may need to sort things out themselves when conflict arises. Although formal contracts may be used to stimulate coordination between and among alliances (e.g., Sytch & Tatarynowicz, 2014), they are often ineffective governance devices, because it is almost impossible to fully specify all contingencies in advance (Schilke & Lumineau, 2018). Research has shown that there are two common approaches to resolving interorganizational conflicts: the adversarial rights-based approach, which relies "on some independent standard with perceived legitimacy or fairness to determine who is right" (Ury, Brett, & Goldberg, 1988: 7); and the consensual interest-based approach, which emphasizes information sharing and mutually acceptable alternatives to escalation (Ury et al., 1988). Following the onset of a war, reaching agreement regarding "who gets what" becomes exceedingly difficult. When each party increasingly assesses its own rights-based actions as justified and the other's rights-based actions as hostile and deserving of retaliation, we expect that diverging attribution regarding "who is right and who is

[8] We would like to note that Hypothesis 4 also applies to markets with multiple competing alliance cliques; that is, high alliance density will facilitate the spillover of the war because firms tend to do more damage to members of other alliance cliques.

wrong" may escalate conflict between estranged partners (De Dreu, Nauta, & Van de Vliert, 1995).

Finally, firms tend to cause more damage to their own partners than to an unrelated competitor during a war. Because partners' operations are aligned and are more likely to operate in the same or complementary markets, when one firm acts aggressively in a war, the spillover effect on the firm's partners is likely more direct and prevalent than others.[9] In response, those partners may react aggressively to protect their own interests. Thus, we hypothesize:

Hypothesis 4. The number of strategic alliances among incumbents in a market positively moderates the relationship between the proportion of incumbents at war in other markets and the likelihood of competitive war occurring in the focal market.

Common ownership ties and common analyst ties. In the previous sections, we explained how the effect of strategic alliances will transform from preventing a war (glue) to amplifying the spillover of a war (gasoline). In the next two hypotheses, we propose that the competition-reducing (glue) effects of the two types of indirect linkages will become stronger after a war has commenced, such that the positive relationship between the proportion of incumbents at war in other markets and the likelihood of competitive war occurring in the focal market will be attenuated when the extent of common ownership ties and the extent of common analyst ties among incumbents are higher in a given market.

As previously discussed, both institutional investors and financial analysts react negatively to competitive wars. Competitive wars are particularly harmful to institutional investors who hold an equity stake in more than one war participant. Competitive wars may impair analysts' compensation, because their ability to accurately predict firm value and offer optimistic recommendations will be undermined. As the spillover of competitive wars across markets further exacerbates the negative impacts of wars on institutional investors and analysts, we expect that they will be more strongly incentivized to suppress the escalation of conflicts between firms they own or cover. More specifically, we propose that after a war breaks out, institutional investors will become more active in mediating conflicts between war participants they own and sanctioning their over-aggression when mediation fails. Similarly, we propose that financial analysts will also try harder to extinguish the flame of war through socioeconomic influence. Acting as mediators, they can help to reduce misunderstandings between war participants by offering their nonpartisan perspective of competitive wars, using means such as research reports and pubic interviews. They can also take advantage of their "opinion leader" status to penalize, or threaten to penalize, undesirable behavior by downgrading a firm's stock. For instance, as soon as tension surrounding a price war between Verizon and AT&T began to surface in 2017, analysts downgraded their earnings forecasts for both Verizon and AT&T, citing the "fiercely competitive" environment (Nicolaou, 2017). Finally, from the perspective of focal firms, the onset of a war will further enhance the influence of institutional investors and financial analysts, because their endorsement and support will become more critical to managers during a time of war and uncertainty. Hence, we hypothesize:

Hypothesis 5a. The extent of common ownership ties among incumbents in a market negatively moderates the relationship between the proportion of incumbents at war in other markets and the likelihood of competitive war occurring in the focal market.

Hypothesis 5b. The extent of common analyst ties among incumbents in a market negatively moderates the relationship between the proportion of incumbents at war in other markets and the likelihood of competitive war occurring in the focal market.

METHODS

Sample

We used data from the U.S. domestic airline industry to test our hypotheses. We chose this industry as our empirical setting for four reasons. First, anecdotal and empirical evidence has suggested that competitive wars are particularly prevalent in the U.S. airline industry (Busse, 2002; Morrison & Winston, 1996). Former American Airlines CEO Robert Crandall has said that the airline industry is "the closest thing there is to legalized warfare" (Dempsey & Goetz, 1992: 15). Second, in this industry, competitors are increasingly connected through direct and indirect interorganizational linkages (Azar et al., 2018; Ito & Lee, 2007). For example, the number of passengers traveling on routes in which strategic partnerships are present grew more than 13-fold between 1998 and 2003. Moreover, as a handful of institutional investors (e.g., Berkshire Hathaway,

[9] We assume that the market does not have multiple competing alliance cliques.

BlackRock, Vanguard, State Street, and PRIMECAP) continue to acquire stakes in competing airlines, overlap among large shareholders of major U.S. airlines has increased considerably in the last decade (Schmalz, 2016). Third, this industry has more than 4,000 distinct markets that can be readily identified, along with their incumbent firms, rendering it an ideal setting to study how competitive wars spread across geographic markets. Finally, because airlines are a public service industry, the U.S. Department of Transportation (DOT) collects extraordinarily rich information on both markets and firms in this industry.

To capture the occurrence and spillover of competitive wars, we used data on price wars. A price war is "a period in which the firms in a market set prices that are significantly below the usually prevailing prices" (Busse, 2002: 299). Price wars are undoubtedly the type of competitive war most frequently documented by the media and academic research (Cabral, 2018; Henderson, 1997; Rao et al., 2000).

Our panel data sample includes 2,066 markets, spanning the second quarter of 1991 to the fourth quarter of 2010 (79 periods in total). We imposed four criteria to construct our sample. We first restricted our sample to city-pair markets, where both end cities were at least small hubs according to their Federal Aviation Administration classification (i.e., traffic in each airport constituted at least 0.05% of the total traffic in all U.S. airports). We further restricted our sample to markets with average traffic of more than 10 passengers per day and markets between cities more than 100 miles apart to avoid the effect of substitution via ground transportation. We also eliminated monopoly market observations. Finally, we eliminated markets with less than four quarters of continuous data, because our analyses include firm fixed effects. Our final sample consists of 112,210[10] market-period observations.

We obtained data from five main sources. We used the Airline Origin & Destination Survey (also known as DB1A and DB1B) to identify markets and calculate prices for each market. We used *Aviation Daily* to identify announcements regarding strategic alliances among incumbent firms in a given market. Our data on common ownership ties were obtained from the Thomson-Reuters Institutional Holdings (13F) Database. We obtained data on analyst coverage from the IBES database. Finally, we used Air Carrier Financial Reports (also known as Form 41 reports) to obtain other financial and operating data on airlines.

Following prior research (e.g., Gimeno, 1999), we define a market (i.e., a city-pair route) as a set of customers demanding air travel between any given pair of cities using either direct or one-stop flights. We focus on both direct and one-stop services because these services are often considered substitutes. We define incumbent as a carrier that has more than a minimum market share (5%) or a minimum efficiency scale of capacity in a market, which equates to 900 travelers per quarter, or 10 travelers per day, in a given city-pair market (Borenstein, 1991; Gimeno, 1999). Defining incumbents in this way enables us to include both major players and niche players in a market.

In this study, our unit of analysis is market period. While previous research on competitive dynamics has often employed the firm period or the competitor-dyad period unit of analysis, we chose to use the market period for two main reasons. First, in the airline industry, markets vary significantly in terms of their characteristics (e.g., size, distance, and intensity of competition), and airlines make important strategic decisions (e.g., pricing and capacity) at the market rather than the firm level (Brueckner, Lee, & Singer, 2014). If we aggregated an airline's prices across different markets to the firm level, an airline could simultaneously be identified as both at war and not at war in a given period. Hence, identifying the occurrence of a price war at the firm level is problematic. Second, the DOT's O&D Survey offers price data aggregated at the quarterly level. Because competitive interactions within a given market occur rapidly, it is impossible to identify in our data the sequence of specific price changes that led to the war (i.e., who was first to cut prices and who followed), as well as who is fighting with whom. In fact, to disentangle the role each airline played in the occurrence and spillover of a war is a challenging task, even if we set aside our data restrictions. In reality, multiple airlines often cut prices around the same time, largely because of the high degree of price transparency and strategic interdependence.

Dependent Variable

War occurrence. We considered a market to be at war when actual prices in that market were more than 20% lower than expected prices (Fershtman &

[10] Our actual sample is smaller than the maximum number of observations possible, because it is an unbalanced panel sample. Only 819 markets in our sample have data for all 79 periods, and, on average, markets in our sample have data for 37 periods.

Pakes, 2000; Morrison & Winston, 1996; Ross, 1997). We considered a war in a market to have ended when actual prices were higher than expected prices. We used passenger yield (i.e., average price per revenue passenger mile) to capture changes in actual prices in a market. We used autoregressive models,[11] employing lagged pricing data from the previous eight quarters, to predict the expected price level for each market in each period. We calculated the difference between actual and expected price levels in a market. When the actual price is more than 20% lower than the expected price, this implies a substantive change in the pricing behavior of competitors in that market and indicates that a price war has begun.[12] We identified the end of a price war as the first period following the beginning of a war with a positive residual (i.e., when actual price exceeds expected price) in the autoregressive model.[13]

Accordingly, we operationalized our dependent variable as a dichotomous variable that takes the value of 1 if a market hits the 20% price drop threshold in a given period and 0 otherwise. Moreover, because we are interested in the occurrence of a price war in a market, only the first period of a war's commencement in a market is coded as 1; all subsequent observations that represent the continuation of a war in that market are coded as 0. However, this does not mean that a market enters into war only once during our sample period. If a market ceases to be at war (i.e., when the previous war has ended) and then prices once again drop significantly, we treat it as if a new war has begun in that market.

While our empirical approach is generally in line with previous studies of price wars (e.g., Fershtman & Pakes, 2000; Morrison & Winston, 1996; Ross, 1997), we made three improvements over earlier measures. First, in contrast to prior research that used the average fare in a market (e.g., Morrison & Winston, 1996), we used passenger yield to capture changes in actual prices in a market. Because airlines can change average fares in a market by changing the fares charged for different fare categories (i.e., economy class and first class), as well as the availability of seats in different fare categories, dividing the average fare by the travel distance enabled us to capture more accurately changes in the pricing behavior of airlines. Second, our measure better addresses the seasonality issue. Instead of directly comparing fares in a market with the previous quarter or year (e.g., Morrison & Winston, 1996; Ross, 1997), we used autoregressive models to predict the expected level of prices. Because seasonal patterns are a component of the predictors we used to detect price wars in our autoregressive models, changes in fares across seasons are not considered price wars.

Third, our approach of identifying the end of a price war is also robust to seasonal patterns and does not imply a return to pre-war price levels. Most previous studies have used one of two criteria to identify the end of price wars: (a) when there is an increase in fares by any amount, or (b) when fares return to pre-war levels (e.g., Fershtman & Pakes, 2000; Morrison & Winston, 1996; Ross, 1997). The problem with the first approach is that if any rise in fares is used to indicate the end of a price war, researchers risk erroneously categorizing seasonal increases in fares as the end of a price war. The second approach is also problematic, because it assumes that fares will return to pre-war levels once a price war ends. However, Morrison and Winston (1996) found that almost half of the price wars identified in their sample period never returned to the average fare prior to the beginning of the war. Thus, waiting until the average fare in a market returns to its pre-war level may artificially extend the duration of many price wars.

To validate our price war measures, we took three steps to compare the patterns of price wars identified using the DOT's O&D Survey with a count of press articles that mentioned price wars. First, using our DOT data, we summed up the total number of markets in which a price war began each year between 1991 and 2010. Second, we followed prior research (Busse, 2002) and identified price wars using press reports. Using the Factiva database, we identified 19,809 articles about the airline industry from major news and business sources that mentioned *price* or *fare*. We manually read the lead paragraph of each article to identify articles that mentioned *price* or *fare* with other key phrases related to warfare, such as *war, warfare, battle, slash, clash, skirmish, fight,* and *tug-of-war*, between 1991 and 2010. We

[11] The *R*-square of our autoregressive model is 95.9%, suggesting that the model has strong explanatory power.

[12] To check the sensitivity of our results based on this criterion, we identified the beginning of a price war using alternative cutoff thresholds, including 10%, 15%, and 25%. Our results remain largely unchanged under these alternative specifications.

[13] We also tried various other cutoff points to identify the end of a price war, including 5% (implying that the price has increased by 5% compared to what would be predicted by the information from the previous eight quarters) and 10%. Our results remained largely consistent with what we report in Table 2.

eliminated articles about foreign airlines and the pricing actions of domestic airlines in foreign markets. In total, we identified 1,327 price-war-related articles in the U.S. airline industry during our sample period. Third, we compared the number of markets in which price wars began each year with the percentage of press articles that discussed price-war-related issues in the industry each year. As can be seen in Figure 1, the price-war patterns identified using these two different approaches are well-aligned, demonstrating the validity of our price war measures.

Independent Variables and Moderators

Strategic alliances. Using structured content analysis, we manually read 37,149 articles published by *Aviation Daily* from 1991 to 2010 to obtain information on strategic alliances.[14] In this study, we interpret the term *alliance* broadly to include different types of collaborative relationships, ranging from point-specific code sharing, to marketing alliances, to extensive equity-based strategic alliances involving joint operations, sharing of facilities, and revenue pooling across numerous markets.[15] Because airlines may choose to disclose their intention to collaborate in advance, we coded only those alliance arrangements that had been confirmed or would go into effect shortly after the announcement (i.e., when a future effective date is provided).[16] For each quarter, we summed up the total number of alliance relationships among all incumbent dyads in a market and scaled this number by the total number of rival pairs in a market to reflect the intensity of alliance relationships among incumbents in the market.

Common ownership ties. Following prior research (Connelly et al., 2019), we measured *common ownership ties* using the average overlap in institutional investors among incumbent airlines in a market. More specifically, as shown in Equation (1), we first calculated the percentage of common ownership between a given pair of rivals in a market. When a pair of rivals had more than one common investor, *percent common ownership* is the minimum level of ownership percentages among all common investors. We then summed the overlap in common investors across all rival dyads and divided this number by the total number of dyads in a market. This measure ranged between 0 and 1, where 0 means there are no common ownership ties between any pair of rivals in a market, and 1 means there is complete overlap between rivals' investors.

$$\textit{Common Ownership Ties}_{mt} = \frac{\sum_{i \in S_{mt}} \sum_{j \neq i,\ j \in S_{mt}} \textit{Percent Common Ownership}_{ijt}}{N_{mt} \cdot (N_{mt} - 1)} \quad (1)$$

where *Percent Common Ownership*$_{ijt}$ is the percentage of airline i's equity owned by institutional investors who also invested in airline j in market m at time t, S_{mt} is the set of airlines in market m at time t, and N_{mt} is the number of airlines in market m at time t.

Common analyst ties. We measured *common analyst ties* using the average number of financial analysts in common among incumbent airlines in a market. Following prior research (Bowers, Greve, Mitsuhashi, & Baum, 2014), we defined an analyst as following a firm if the analyst had issued at least one earnings forecast for the firm in the previous 12 months. We calculated this variable using four steps. First, we counted the number of unique analysts following each firm in a market. Second, for each quarter and each pair of rivals in a market, we calculated the number of analysts in common between them. Third, we scaled the number of common analysts by the mean number of analysts covering each pair of rivals.[17] Finally, we aggregated this measure of

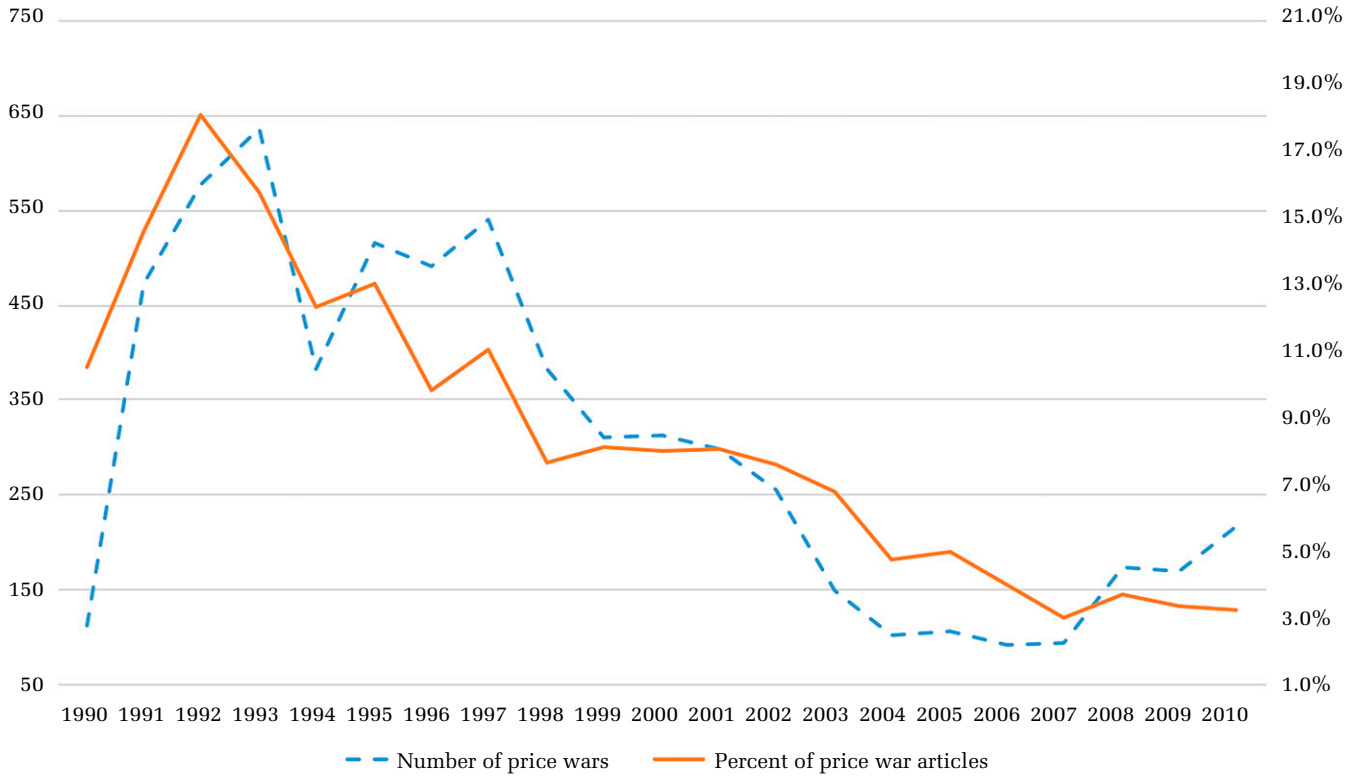
[14] Although some studies have used code-sharing agreements reported in the DOT's O&D Survey to study alliances in this industry (e.g., Ito & Lee, 2007), information about code-sharing alliances was not available from this database before 1998. To ensure the consistency of data sources throughout our sample period, we chose *Aviation Daily* and manually coded all of the alliance information from this publication.

[15] We do not consider multiparty alliances, such as global airline alliances (e.g., Star Alliance, OneWorld, or SkyTeam), because most domestic airlines belong to different alliance networks, and hence the impact of multiparty alliances in the domestic setting is very limited.

[16] For announcements of alliances coded as future intention, we manually checked a random sample of 30 instances. We found that the majority (93%) of these announcements were followed by a second announcement once specific details of the agreement were confirmed.

[17] We also used the minimum number of analysts following a pair of rivals and the square root of the product between the number of analysts following a pair of rivals as the denominators to explore the sensitivity of our results to this scaling decision. Our results remained largely unchanged, regardless of the scaling approach.

FIGURE 1
Comparison of Number of Price Wars and Percent of Price War Articles



common analysts at the dyadic level to the market level by taking the average among all pairs of rivals in a market.

Incumbents at war in other markets. This variable captures the percentage of incumbent dyads in a market that were at war in other markets in the previous period. We calculated this variable using two steps. First, for each pair of incumbents in the focal market, we created a dummy variable indicating whether these rivals were at war in other markets. Since large airlines, such as United Airlines and American Airlines, commonly compete with one another in hundreds of markets simultaneously, we considered a pair of incumbents to be at war in other markets only when price wars occurred in at least 5% of their shared markets.[18] Second, at the market level, we measured *incumbents at war in other markets* as the percentage of incumbent dyads in the focal market that were at war in other markets in the previous period.

Control Variables

Prior research has established that the likelihood of price wars may be influenced by changes in (a) industry demand and costs, (b) the competitive conditions of a market, and (c) market characteristics (e.g., Busse, 2002; Morrison & Winston, 1996). To account for these alternative explanations, we included a number of control variables in our models.

First, unstable demand conditions will increase the availability of excess capacity and hence increase the likelihood of a price war. To control for instability in industry demand, we included *demand instability*, which was measured as the percentage changes in predicted demand. Because changes in fare price also affect the level of demand in the airline industry, we did not use actual demand and instead ran regressions to predict demand based

[18] Although we added the 5% threshold to avoid overidentifying rivals that were at war, we checked the robustness of our results using alternative thresholds (e.g., 1% or 10%) to identify incumbent dyads at war. Our results remained consistent.

on five exogenous factors[19] (Evans, Froeb, & Werden, 1993). We then measured demand instability as the percentage changes in predicted demand. A higher value for this variable indicates a more unstable market. Our regression model with the five exogenous factors explained more than 70% of market demand variance in a quarter. Moreover, the correlation between the predicted and observed market demand value was approximately 0.84, leaving us reasonably confident that our use of a regression model to predict demand instability is appropriate.

Second, prior research has shown that decreases in operating cost may motivate firms to undercut competitors, triggering price wars (Morrison & Winston, 1996). Because aircraft fuel cost represents a major component of airlines' operating expenses and is largely beyond the control of individual airlines,[20] we added *fuel cost* to our model, which was measured as market incumbents' average cost of fuel per mile.[21]

Third, to control for important changes in the competitive conditions of a market, we added the *number of new entrants*, measured by the number of competitors that were new to a market and had achieved the minimum efficiency scale. Because new entrants often use low prices to capture market share from incumbent firms, they are one of the most important antecedents of price wars (Klemperer, 1989; Morrison & Winston, 1996). To control for changes in market structure, we added *market concentration*, measured as the Herfindahl index of concentration (Gimeno, 1999). We calculated this variable by taking the sum of the squared market shares of all incumbents in a market. Finally, to take into account important market characteristics that may influence the likelihood of price wars, we added *market size*, which was measured using the gravity model.[22]

Empirical Models

Because our dependent variable, $war\ occurrence_{mt}$, is a dichotomous variable that denotes whether a price war occurred in market m in period t, we used logistic regression in our estimation. Although probit regression offers similar fitted probability, we chose logistic regression because it is easy to interpret the results (Bowen & Wiersema, 2004), and because logistic regression produced a higher log-likelihood ratio than probit regression, suggesting that it offers a better fit to our sample. Moreover, to check for market and period effects, we conducted a Breusch–Pagan Lagrange multiplier test (Baltagi, 2005). This test rejected the null of zero market effect and the zero period effect. Because Hausman tests rejected random effects in favor of fixed effects in our models ($p < 0.01$), we tested our hypotheses using fixed-effects logistic regressions with market and period fixed effects. By including market fixed effects, we controlled for all period-invariant and market-specific factors, such as whether a market is a tourist route and the length of a route. By including period fixed effects, we controlled for all market-invariant and period-specific factors, such as macroeconomic conditions and seasonal fluctuations in industry demand.[23]

RESULTS

Table 1 reports sample descriptive statistics and bivariate correlations among the variables used in our analyses. In total, we identified 4,086 price wars

[19] The five exogenous factors are average personal income in the origin and destination cities connecting a route, distance of a route, a dummy for tourist route, total number of firms competing in a market (including both potential entrants and incumbents), and average fuel cost of airlines in the market.

[20] Although some airlines try to manage their fuel costs through the use of fuel hedging programs, to a large extent the cost of fuel for all market incumbents is beyond the control of individual airlines and is more closely related to exogenous factors that may increase or decrease fuel costs.

[21] Since firm resource endowment might influence how firms respond to rivals' actions and the likelihood of a competitive war, in unreported analyses we added average firm size to all of our models in Table 2. The results of our hypotheses remained unchanged.

[22] As a widely used traffic forecasting model, the gravity model states that traffic between two cities is proportional to population size in the origin and destination cities and average personal income in the end cities, and is inversely proportional to the distance between them. Because these factors tend to be highly correlated, we followed prior research (e.g., Gimeno, 2004) and measured market size using the gravity model, which not only takes into account variations in route distance, population, and income levels of the two endpoint cities, but also bypasses any potential multicollinearity problem. Although both *market size* and *demand instability* are related to the level of travel demand in a market, *market size* captures the absolute level of demand expected in a market, while *demand instability* captures the extent of variation in a market's demand.

[23] We also checked the robustness of our findings using a linear probability model, and the results are largely consistent with what we reported in Table 2.

TABLE 1
Descriptive Statistics and Correlations

		Mean	*SD*	1	2	3	4	5	6	7	8	9
1	War occurrence	0.03	0.18									
2	Strategic alliances	0.12	0.36	−0.03								
3	Common ownership ties	0.11	0.10	−0.01	0.00							
4	Common analyst ties	0.52	0.33	−0.01	−0.08	0.16						
5	Incumbents at war in other markets	0.13	0.30	0.20	−0.05	−0.02	−0.17					
6	Demand instability	0.03	0.31	0.01	−0.01	−0.04	−0.02	0.06				
7	Fuel cost	0.07	0.12	−0.04	0.14	−0.10	0.11	−0.03	0.02			
8	Number of new entrants	0.16	0.42	0.00	0.12	0.05	−0.1	0.02	0.05	0.04		
9	Market concentration	0.52	0.24	0.02	−0.24	−0.21	0.23	0.02	0.04	−0.16	−0.17	
10	Market size	14.51	1.74	−0.02	0.03	−0.05	−0.08	0.05	−0.02	0.09	−0.01	0.14

in 2,066 markets. On average, each market in our final sample had approximately 1.97 price wars, and 82% of the markets had no more than three wars. On average, post-war prices were approximately 90.1% of pre-war levels. Further, approximately 77.2% of the price wars ended with prices lower than the pre-war level.

Table 2 reports the conditional fixed-effects logistic regression results for the likelihood of war. Model 1 contains only control variables. Model 2 adds the main effects of *strategic alliances*, *common ownership ties*, *common analyst ties*, and *incumbents at war in other markets*. Models 3 through 5 contain the results of interactions between interorganizational linkages (i.e., *strategic alliances*, *common ownership ties*, and *common analyst ties*) and *incumbents at war in other markets*. To assess potential multicollinearity in our data, we examined the variance inflation factors and found that none was greater than 2, which is well below the recommended threshold of 10 (Kleinbaum, Kupper, & Muller, 1988).

As shown in Table 2 (model 1), several control variables significantly affect the likelihood of war. Consistent with prior research (e.g., Heil & Helsen, 2001; Morrison & Winston, 1996), we found that: (a) both demand instability and the number of new entrants increase the likelihood of war, and (b) both fuel cost and market size decrease the likelihood of war. These findings seem to suggest that the likelihood of price wars will increase when firms' costs of operations are low and when markets are smaller, with volatile demand and threats from new entrants.

Hypothesis 1 states that the number of alliance relationships among incumbents in a market will have a negative impact on the likelihood of war in that market. In Table 2 (model 2), while controlling for other major antecedents of price wars, the coefficient of *strategic alliances* is negative and statistically significant ($p < .01$). Regarding economic significance, holding all other variables at their mean values, our results demonstrate that a market with a high level of *strategic alliances* (i.e., one standard deviation above the mean) is 14.3% less likely to experience a competitive war than a market with a low level of *strategic alliances* (i.e., one standard deviation below the mean). This difference increases to 46.8% when we compare a market with zero strategic alliances to a market with the highest number of strategic alliances in our sample. Thus, Hypothesis 1 is supported.

Hypothesis 2a predicts that common ownership ties among incumbents in a market will reduce the likelihood of war in that market. The results in Table 2 (model 2) show that the coefficient of *common ownership ties* is negative and statistically significant ($p < .001$). This result is economically significant as well. Holding all other variables at their mean values, we find that a market with a high level of *common ownership ties* (i.e., one standard deviation above the mean) is 27.3% less likely to experience a competitive war than a market with a low level of *common ownership ties* (i.e., one standard deviation below the mean). This difference increases to 56.1% when we compare a market with zero *common ownership ties* to a market with full *common ownership ties*. Hence, Hypothesis 2a is supported.

Hypothesis 2b states that common analyst ties among incumbents in a market will decrease the likelihood of war in that market. In Table 2 (model 2), the coefficient of *common analyst ties* is negative and statistically significant ($p < .01$). Regarding economic significance, holding all other variables at their mean values, our results demonstrate that a market with a high level of *common analyst ties* (i.e.,

TABLE 2
Conditional Fixed-effects Logistic Regressions Predicting the Likelihood of Competitive War

	(1)	(2)	(3)	(4)	(5)	(6)
Strategic alliances		−0.33**	−0.53***	−0.33**	−0.31**	−0.50***
		(0.11)	(0.13)	(0.11)	(0.11)	(0.13)
Common ownership ties		−1.83***	−1.79***	−0.89*	−1.71***	−1.23**
		(0.38)	(0.38)	(0.41)	(0.38)	(0.41)
Common analyst ties		−0.22**	−0.21**	−0.20**	0.17	0.11
		(0.08)	(0.08)	(0.08)	(0.09)	(0.10)
Incumbents at war in other markets		1.86***	1.95***	2.01***	1.92***	2.07***
		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Incumbents at war in other markets × strategic alliances			1.46***			1.30***
			(0.30)			(0.30)
Incumbents at war in other markets × common ownership ties				−3.38***		−1.79**
				(0.56)		(0.62)
Incumbents at war in other markets × common analyst ties					−1.06***	−0.84***
					(0.13)	(0.14)
Demand instability	0.19***	0.30***	0.30***	0.29***	0.29***	0.29***
	(0.04)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Fuel cost	−1.11***	−0.77*	−0.73*	−0.85*	−0.82*	−0.80*
	(0.22)	(0.33)	(0.33)	(0.33)	(0.33)	(0.34)
Number of new entrants	0.13***	0.14***	0.14***	0.14***	0.14***	0.14***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Market concentration	−0.18	−0.08	−0.08	−0.11	−0.12	−0.12
	(0.11)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
Market size	−0.90***	−0.58***	−0.58***	−0.58***	−0.59***	−0.59***
	(0.07)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Fixed-effects						
City-pair market	Included	Included	Included	Included	Included	Included
Period	Included	Included	Included	Included	Included	Included
Log-likelihood	−11744.72	−11340.29	−11328.67	−11321.73	−11305.71	−11292.92
Change in log-likelihood[a]		404.43	416.05	422.99	439.01	451.8

Notes: n = 112,210; robust standard errors in parentheses; two-tailed tests.
[a] Relative to Model 1 (baseline model with controls only).
* $p <$ 0.05
** $p <$ 0.01
*** $p <$ 0.001

one standard deviation above the mean) is 14.3% less likely to experience a competitive war than a market with a low level of *common analyst ties* (i.e., one standard deviation below the mean). This difference increases to 19.6% when we compare a market with zero *common analyst ties* to a market with full *common analyst ties*. Hence, Hypothesis 2b is supported.

Hypothesis 3 states that the likelihood of war in a market will increase when a higher proportion of incumbents (in the focal market) were at war in other markets in the previous period. In Table 2 (model 2), the coefficient of *incumbents at war in other markets* is positive and statistically significant ($p < .001$). In terms of economic significance, holding all other variables at their mean values, we find that a market with a high level of *incumbents at war in other markets* (i.e., one standard deviation above the mean) is 68.7% more likely to experience a competitive war than a market with a low level of *incumbents at war in other markets* (i.e., one standard deviation below the mean). Moreover, this difference increases to 95.5% when we compare a market with no incumbents at war in other markets to a market with all incumbents at war. Thus, Hypothesis 3 is strongly supported. The likelihood-ratio test also indicates that model 2 in Table 2 significantly improves the model fit compared to model 1 (the baseline model), suggesting that the addition of our theoretical variables (i.e., *strategic alliances*, *common ownership ties*, *common analyst ties,* and *incumbents at war in other markets*) substantially improves our ability to explain the likelihood of war ($p < .001$).

Hypothesis 4 predicts that strategic alliances among incumbents in a focal market will amplify the likelihood that wars involving the same incumbents

in other markets will spread to the focal market. In Table 2 (model 3), the coefficient of the interaction term between *incumbents at war* and *strategic alliances* is positive and significant ($p < .001$). To help interpret our interaction results, we estimate and graph the average marginal effects of *incumbents at war* on the likelihood of war at different levels of *strategic alliances*, *common ownership ties*, and *common analyst ties* (Hoetker, 2007). As illustrated in Figure 2, at low levels of *strategic alliances* (i.e., one standard deviation below the mean), a market with *incumbents at war* at one standard deviation above the mean is 43.4% more likely to experience a competitive war than a market with *incumbents at war* at one standard deviation below the mean. However, at high levels of *strategic alliances* (i.e., one standard deviation above the mean), this difference increases to 72.7%. These results demonstrate that at low levels of *incumbents at war*, *strategic alliances* tend to have a very strong effect in reducing the likelihood of competitive wars. However, as the level of *incumbents at war* increases, the effect of *strategic alliances* changes from deterring the war to amplifying the war, as indicated by the point of crossover. Thus, Hypothesis 4 is supported.

Hypothesis 5a states that common ownership ties among incumbents in a focal market will attenuate the likelihood that wars involving the same incumbents in other markets will spread to the focal market. In Table 2 (model 4), the coefficient of the interaction term between *incumbents at war* and *common ownership ties* is negative and significant ($p < .001$). As graphed in Figure 3, at low levels of *common ownership ties* (one standard deviation below the mean), a market with *incumbents at war in other markets* at one standard deviation above the mean is 83.2% more likely to experience a war than a market with *incumbents at war* at one standard deviation below the mean. However, at high levels of *common ownership ties* (one standard deviation above the mean), this difference decreases to 45.3%. Thus, as predicted, the extent of common ownership ties weakens the positive relationship between incumbents at war and the likelihood of war in the focal market. Thus, Hypothesis 5a is supported.

Hypothesis 5b states that common analyst ties among incumbents in a focal market will reduce the likelihood that wars involving the same incumbents in other markets will spread to the focal market. The results in Table 2 (model 5) reveal that the coefficient of the interaction term between *incumbents at war in other markets* and *common analyst ties* is negative and statistically significant ($p < .001$). As illustrated in Figure 4, at low levels of *common analyst ties* (one standard deviation below the mean), a market with *incumbents at war in other markets* at one standard deviation above the mean is 74.8% more likely to experience war than a market with *incumbents at war in other markets* at one standard deviation below the mean. However, at high levels of *common analyst ties* (one standard deviation above the mean), this difference decreases to 47.5%. Thus, as predicted, the extent of common analyst ties

FIGURE 2
Marginal Effect of Incumbents at War in Other Markets and Strategic Alliances on the Likelihood of Competitive War

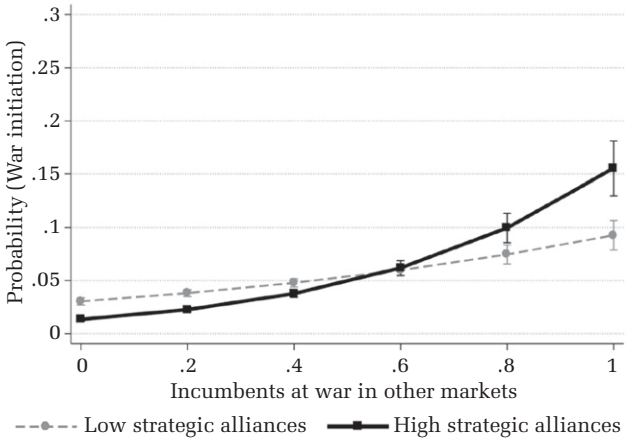


FIGURE 3
Marginal Effect of Incumbents at War in Other Markets and Common Ownership Ties on the Likelihood of Competitive War

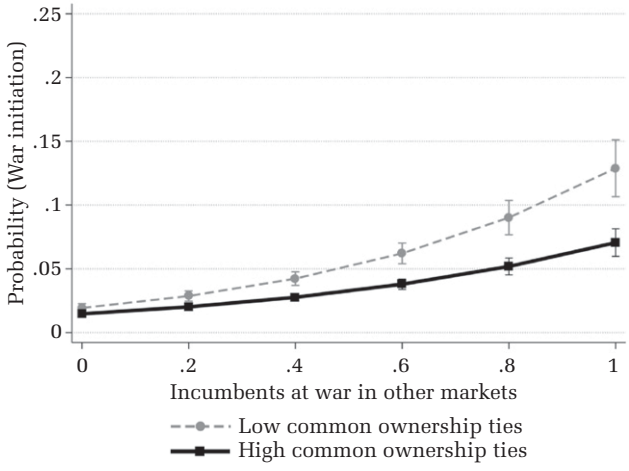
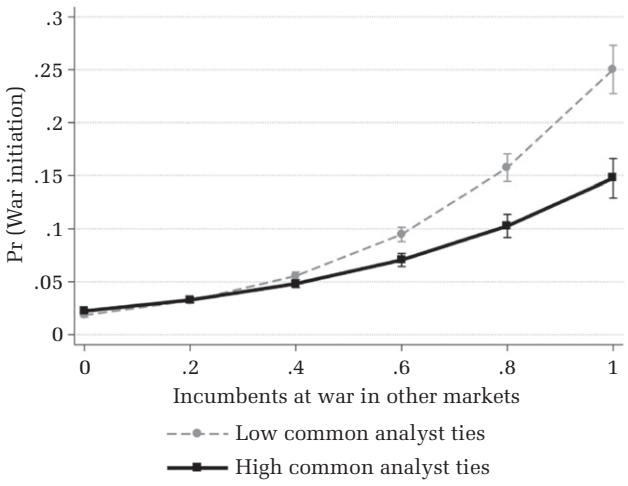


FIGURE 4
Marginal Effect of Incumbents at War in Other Markets and Common Analyst Ties on the Likelihood of Competitive War



weakens the positive relationship between incumbents at war in other markets and the likelihood of war in the focal market. Thus, Hypothesis 5b is supported.

Sensitivity Tests

We made several attempts to check the robustness of our findings.[24] First, to examine the temporal stability of our results, we strove to understand how the effect of common ownership ties varies over time. We found that as the average level of common ownership ties has increased over the past two decades, the magnitude of their impact on the likelihood of a competitive war has also increased substantially. When we tested the impact of common ownership ties exclusively using observations from 1991 to 2000, the coefficient of common ownership ties was –0.37 ($p < .10$), suggesting that a one standard deviation increase in common ownership ties will decrease the likelihood of a competitive war by 3.28%. However, when we conducted the same analysis exclusively using observations from 2000 to 2010, the coefficient of common ownership ties increased to –2.07 ($p < .001$), suggesting that a one standard deviation increase in common ownership ties will decrease the likelihood of a competitive war by 17%. These findings show that as common ownership ties become more prevalent in the airline industry, their impact on the likelihood of a competitive war also increases.[25]

Second, we explored the robustness of our results using a network-based measure of alliance clique. Prior research has revealed that airlines sometimes compete in multipartner alliances (e.g., Gimeno, 2004; Gomes-Casseres, 2003). Hence, a higher number of strategic alliances in a market does not always mean a higher level of cooperation among incumbents, because these incumbents may belong to competing groups of alliances. Thus, in addition to the density of alliances, it is important to control for the structure of alliances in a market. Using a network analysis approach suggested by Wasserman and Faust (1994: 249), we identified "cohesive subgroups" as a way to quantify the number of alliance cliques in each market.[26] Although alliance constellation is a prevalent phenomenon in the global airline industry, our data show that less than 1% of the markets in our sample have more than one alliance clique, suggesting that it is a less common phenomenon in domestic airline settings. We excluded 395 market-quarter observations with more than one alliance clique from our analyses and found that the results of our hypotheses remained unchanged. We also created a dummy variable indicating whether a market has more than one alliance clique (*multiple alliance clique*) and added this variable as a control in our main models. Again, our results remained consistent.[27]

Third, because our sample included periods in which industrywide price wars were more prevalent (e.g., 2001), a potential concern is that our findings regarding price wars in a particular market during a given quarter may be confounded by industrywide

[24] All of these analyses are available from the first author upon request.

[25] Some scholars have argued that in recent years, common ownership ties have been created primarily by passively managed index funds, and that managers of those funds tend to take a passive role to avoid interfering with corporate behavior. Therefore, the anticompetitive effect of common ownership ties should decrease over time. Unfortunately, we were unable to empirically test this idea because our sample stops in 2010, when this phenomenon had just begun to emerge.

[26] We defined alliance cliques as alliances that contain no overlapping partners within the same market. This measure captures situations in which two markets with an identical number of alliance ties may have different numbers of alliance cliques.

[27] These unreported robustness tests are available from the first author upon request.

(cross-market) wars. We tested the sensitivity of our findings by omitting observations from 1992, 1996, 2001, and 2009, which are known for industrywide price wars (Ben-Yosef, 2005), and found that all of our results remained robust. Moreover, because a number of major carriers filed for Chapter 11 bankruptcy protection during our sample period (e.g., United in 2002, U.S. Airways in 2002 and 2004, Delta and Northwest in 2005), we checked the robustness of our results by omitting observations from these periods.[28] We found that the results of our hypotheses remained robust.

Finally, since the same cities may appear in multiple city-pair markets, the issue of nonindependence across our market-period observations is a potential concern. We used two different approaches to address this issue. First, we adopted the approach developed by Cameron, Gelbach, and Miller (2011) and Kleinbaum, Stuart, and Tushman (2013) to estimate robust standard errors that are simultaneously clustered on both cities of a city-pair market. To render the two-way clustering of standard errors computationally feasible, we eliminated the city-pair market fixed effects in the paper. Second, we added dummy variables for both end cities of a city-pair market to control for the propensity of a particular city to enter into a war. Our results remained largely consistent using both approaches.

Auxiliary Analyses

To better understand the boundary conditions of our theory, we performed some auxiliary analyses to explore how heterogeneity within interorganizational linkages will impact the occurrence and spillover of competitive wars.

First, prior research has shown that not all alliances are equal in terms of the intensity of interorganizational trust and resource interdependence (Doz & Hamel, 1998). Compared to strong alliance ties, the levels of trust and resource interdependency involved in weak alliance ties are much lower (e.g., Nohria & Garcia-Pont, 1991; Oxley & Sampson, 2004). Thus, we expect weak alliance ties to act as weaker glue when incumbents are not at war elsewhere, and also as weaker gasoline when they are at war. To explore this, we followed prior research (e.g., Gimeno, 2004; Oxley & Sampson, 2004) to distinguish between strong alliance ties (i.e., alliance relationships involving a broad range of shared activities and many shared flight destinations) and weak alliance ties (i.e., alliance relationships involving a narrow range of shared activities and a limited number of shared flight destinations). We found that when predicting the likelihood of war, strong alliance ties have a negative and significant impact (coefficient = $-.16$, $p < .01$), while the coefficient of weak alliance ties was insignificant. Moreover, we found that when testing the interaction effects of strong and weak alliance ties, the interaction term between incumbents at war in other markets and strong alliance ties was positive and highly significant (coefficient = .83, $p < .001$), while the interaction term between incumbents at war in other markets and weak alliance ties was insignificant. These findings indicate that the effects of strategic alliances on both the occurrence and the spillover of competitive wars are more pronounced when alliance ties are strong. Since our theory assumes that strategic alliances increase trust and interdependence, strong alliances (which should involve greater levels of both) will serve as stronger glue when incumbents are not at war elsewhere, but also as stronger gasoline when they are at war. These findings are highly consistent with our theory.

In addition, prior research has suggested that institutional owners can be categorized as either dedicated or transient investors, depending on their preference for risk and the investment time horizon (Connelly, Tihanyi, Certo, & Hitt, 2010; Yan & Zhang, 2009). Because dedicated investors tend to hold large equity positions in a few firms for a long period, it is widely recognized that they are more capable of monitoring and influencing firm decisions compared to transient investors (Bushee, 2004). Therefore, our theoretical predictions should more soundly apply to dedicated investors than to transient investors. To explore how different types of institutional investors may impact the occurrence and spillover of competitive wars differently, we adopted Bushee's (2001) classification to distinguish between *dedicated common ownership ties* and *transient common ownership ties*. We found that both types of common ownership ties have a negative and significant relationship with the likelihood of war. Moreover, both have a negative and significant moderating effect on the relationship between incumbents at war in other markets and the likelihood that the war will spread to the focal market. The major difference is that the amount of changes in the log-likelihood ratio is much

[28] The major airlines under bankruptcy protection during our sample period are US Airways (from 2002Q3 to 2003Q1 and from 2004Q3 to 2005Q3), United Airlines (from 2002Q4 to 2003Q1), Northwest (from 2005Q3 to 2007Q2), and Delta Airlines (from 2005Q3 to 2007Q2).

higher for the model with *dedicated common ownership ties* than the model with *transient common ownership ties*. These findings seem to suggest that both types of common ownership ties can help firms reduce the likelihood of war and spillover; however, the explanatory power of *dedicated common ownership ties* is higher than that of *transient common ownership ties*.

DISCUSSION

Combining insights from the social embeddedness perspective, this research investigates how different types of interorganizational linkages may shape the occurrence and spillover of competitive wars. Our results revealed that both direct and indirect linkages will act as glue, reducing the likelihood of war. However, once competitive wars break out in some markets, the anticompetitive effect of strategic alliances will be weakened, switching from glue to gasoline and boosting the chances that these wars will spread to the focal market. In contrast, common ownership ties and common analyst ties will function as stronger glue, diminishing the chance of war spillover. Our results elucidate how the occurrence of a competitive war is a critical situational trigger that transforms the way in which interorganizational linkages affect competition (i.e., it intensifies the glue effect of indirect linkages, and it transforms the glue effect of strategic alliances to gasoline).

Our findings extend prior research on competitive dynamics, social embeddedness, and multimarket competition in multiple ways. To the best of our knowledge, this is the first study in the competitive dynamics research that systematically examines the occurrence and the spillover of competitive wars. As one of the most severe forms of competitive interplay that has significant economic consequences, competitive wars have received scant attention from management scholars. This is unfortunate for two reasons. First, today, the battleground for competitive wars extends far beyond the airline industry to affect a variety of industries—including music, streaming TV, e-book readers, and online brokerage (Brueel & Vranica, 2019; Murphy, 2010; Shah, 2018). Thus, a strong understanding of these wars is more important than ever. Second, while some may view competitive wars merely as day-to-day competitive activities at a higher level of intensity, the purpose and the magnitude of competitive wars are dramatically different from the purpose and magnitude of day-to-day activities. As a result, many well-established approaches used by the competitive dynamics research may become less relevant in analyzing wars, calling for more systematic investigations of this unique phenomenon.

Second, our findings make two important contributions to the social embeddedness research. Previous studies on social embeddedness have tended to assume that cooperative relationships in the past will breed more cooperation in the future (Barden & Mitchell, 2007; Gulati & Gargiulo, 1999; Li & Rowley, 2002). We identify the onset of competitive wars as a critical situational trigger that may transform prior collaboration into a catalyst for aggression among organizations. Moreover, while previous studies have recognized the fundamental differences between direct and indirect linkages, limited efforts have been made to explain why and when they affect competitive behavior differently. Focusing on the underlying mechanisms through which interorganizational linkages take effect, we argue that strategic alliances enhance mutual trust and resource interdependence, and powerful common third-parties can mediate and sanction conflicts between competing firms with whom they are affiliated. As a result, both types of linkages could serve as glue and prevent a war from occurring. However, once war has commenced, trust may turn into mistrust among partners, and consequently the effect of alliances may be transformed from glue into gasoline, amplifying the spillover of the war. In contrast, common third-parties are not involved in the war, and their interests will be impaired even more when the war spreads across markets. As a result, they could be more active in mediating and sanctioning conflicts between firms they own or cover, thus serving as stronger glue.

Third, our study also examines an important and yet implicit belief in the multimarket competition literature. The central premise of multimarket competition is the mutual forbearance hypothesis (Edwards, 1955), which posits that multimarket rivals are less likely to initiate aggressive actions due to the fear of cross-market retaliation (Gimeno, 1999; Karnani & Wernerfelt, 1985). Thus, underlying the expectation of mutual forbearance is the assumption that competitive interactions will spread across markets when forbearance breaks down. However, no research to date has examined the validity of this assumption. To address this gap, the results for Hypothesis 3 provide initial evidence in support of this implicit belief: multimarket rivals that are at war in one market are likely to spread the war to other markets where they are also present.

Finally, this research adds to our understanding of how third-party ties may shape firms' competitive

behavior. Common ownership ties among direct competitors are increasingly prevalent in a large number of industries. For instance, in the U.S. airline industry, a few large institutional investors—such as Vanguard, BlackRock, and Berkshire Hathaway—have acquired a significant proportion of voting shares in all four major airlines since 2010. By 2016, the seven shareholders that controlled approximately 60% of United Airlines also controlled significant stakes in United's main competitors, including 33.1% of American Airlines, 27.5% of Delta Airlines, 27.3% of JetBlue Airlines, and 23.3% of Southwest Airlines (Elhauge, 2016). During our sample period, we also observed a similar trend. The average level of common ownership ties across markets almost tripled, from 7% in 1991 to more than 18% in 2010. The phenomenon of common ownership ties is of interest to scholars across disciplines (Azar et al., 2018; Connelly et al., 2019; O'Brien & Salop, 2000). Our study contributes to this nascent but growing body of literature by highlighting the role of common ownership ties in competitive wars. Our findings suggest that when competition escalates into catastrophic warfare, common ownership ties can help to prevent the situation from worsening, which is beneficial for the industry as a whole. Additionally, to the best of our knowledge, this research is the first to explore the impact of common analyst ties on competitive interactions among firms. While Bowers, Greve, Mitsuhashi, and Baum (2014) pioneered the study of multimarket competition among security analysts, we extend their work by investigating the role of common analyst ties in competitive wars. Finally, our choice of common third-parties distinguishes this work from prior research in which brokers have been extensively studied (Burt, 2005; Kleinbaum, 2012). Common institutional investors and analysts are not the *tertius gaudens*, which plays two alters against one another because of self-interest (Simmel, 1950). They are also not the *tertius iungens*, which connects two alters to promote common gains (Burt, 1992). Rather, they are powerful mediators who can sanction the behaviors of the competing firms they are connected to for the mutual benefits of the triad—two groups of market intermediaries that have been rarely examined in previous studies.

Limitations and Future Research

Our research offers fruitful avenues for future research. First, there are important boundary conditions of our arguments. As noted previously, industries with low differentiation are more likely to observe competitive wars and their spillover effects. Conversely, in industries with high differentiation, the chance of competitive wars will be lower, and it is relatively easy for competitors to segregate themselves from wars, even after they start. Additionally, our story more aptly applies to industries without competing alliance cliques. When a market is characterized by competing alliance cliques, members of one clique may react aggressively to the actions of members from another clique. As a result, high levels of alliance density at the market level may not always lead to lower competitive intensity. When this is the case, what forces can bring back peace to a market and how will a war between alliance cliques shape the cooperative relationship within and across those cliques? Finding answers to these questions offers important avenues for future research. Finally, our glue–gasoline story more aptly applies to alliances aimed at resource sharing (such as the code-sharing agreements in the airline industry). Such alliances are often associated with trust and resource interdependence between partners, which may plant the seeds of conflict escalation once the competitive war has commenced. However, strategic alliances can be driven by different purposes (e.g., information sharing or new-product marketing), and it would be interesting for future research to explore how different types of alliances may affect the occurrence and spillover of competitive wars differently.

Second, we only focus on competitive wars that are detrimental to the performance of firms and the industry involved, such as price wars, capacity wars, rewards wars, and bidding wars (e.g., Heil & Helsen, 2001; Surane, 2019; Webber, 2012). However, in some situations, competitive wars, such as marketing wars and product development wars, can have positive effects on the performance of war participants, because they can increase demand and grow the size of the pie for the industry as a whole. This is especially true when a new market category is emerging (Navis & Glynn, 2010). Because both the motivation and the dynamism of these wars are fundamentally different from lose–lose wars, one important extension of our study would be to explore how interorganizational linkages may shape the occurrence and development of these wars differently.

Third, this study emphasized the role of common third-parties in reducing the likelihood of competitive wars. In fact, research has shown that common third-parties can also assume other roles. For instance, Pahnke and colleagues (2015)

demonstrated that venture capital firms that are simultaneously connected with two competing entrepreneurial firms may leak critical information of one firm (e.g., technological core) to the other. Hence, in contexts in which the protection of innovation and trade secrets is critical to a firm's competitive advantage, we expect that the effects of common third-parties may differ (e.g., Pahnke et al., 2015; Piezunka & Clough, 2016).

Additionally, our research uses a social embeddedness lens to study competitive wars. Future research could extend our work by borrowing insights from behavioral perspectives, such as prospect theory, the behavioral theory of the firm, and the psychology of rivalry, to explore other complementary mechanisms that would spark and spread competitive wars. For example, building on the psychology of rivalry (e.g., Kilduff, Elfenbein, & Staw, 2010), we suspect that wars can sometimes be triggered by strong emotional and psychological antagonism between individual CEOs. Moreover, from a strategic communication perspective (e.g., Guo, Yu, & Gimeno, 2017; Nadkarni, Pan, & Chen, 2019), we suspect that the type of language that executives use to refer to their competitors (e.g., metaphors for friends or for enemies), the way executives frame their price-cut decisions, and the way analysts and the media discuss competitive wars all influence the occurrence and spillover of competitive wars.

Furthermore, we examine the spillover effects of competitive wars only across geographic markets. Theoretically, such spillovers tend to be more prevalent across geographic markets because in many industries with localized competition, different geographic markets are often managed using a centralized organizational structure. It is arguably easier to coordinate the actions of different business units across geographic markets than across product markets (e.g., Sengul & Gimeno, 2013). Nevertheless, the spillover of competitive wars can occur across both geographic and product markets. Thus, a promising direction for future research would be to examine how interorganizational linkages may influence competitive wars that have taken place in multiple product markets. Relatedly, the chance of having a competitive war is also not uniform across markets. We suspect that a competitive war is more likely to begin in markets peripheral to the initiator of the war because the firm may want to test the water and observe its rivals' reactions. However, when the conflict escalates, the war is more likely to spread to markets that are strategically important to the initiator (e.g., Gimeno, 1999; Livengood & Reger, 2010), due to its rivals' desire to signal their commitment to defend their territories. Aided by the right data, a thorough investigation of the process through which a competitive war evolves will improve our understanding of how rivals actually interact with one another during the war.

Lastly, constrained by the scope of our study, we were unable to examine how competitive wars may affect subsequent cooperative relationships between competitors. As we noted above, alliances between rivals are fragile and need to be managed with care. The breakout of a war may lead to the deterioration, or even dissolution, of the alliance (Kogut, 1989; Park & Ungson, 2001). For instance, when America West slashed its unrestricted fares by more than 50%, Continental cancelled its long-term codesharing agreement with America West on the day that America West unveiled its fare-reduction plan (Trottman, 2002). Hence, we encourage future scholars to explore how competitive wars may shape sequential alliances between rivals.

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