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Keeping Your Enemies Closer: When Market Entry as an Alliance with Your Competitor Makes Sense

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We present an analytical framework of multimarket competition and supporting empirical analysis to explain why and when competing firms in an existing market may prefer an alliance entry over independent entry into a new market. Our findings suggest that an alliance entry is more profitable than an independent entry (i) when the new market is larger relative to the existing market, and (ii) when the competition in the existing market is stronger relative to the new market. We compare these key predictions with archival data from the regional shopping center industry in the United States and find that instances of alliance formation in this industry are consistent with our model-based predictions.

Data, as supplemental material, are available at http://dx.doi.org/10.1287/mksc.2016.0988.

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1. Introduction

More than 2,000 new alliances are formed each year, with this number increasing by 15% annually (Steinhilber 2013). Many of these receive fleeting attention, but an alliance between two fierce competitors stoked the curiosity of pundits. When Airbus recently launched the world's largest commercial aircraft, the A380, the three market leaders of the aircraft engine industry, GE Aviation, Pratt & Whitney, and Rolls-Royce, all wanted a share of this new market. Interestingly, instead of competing independently, GE Aviation and Pratt & Whitney, the larger and fiercer duo among the three firms, formed an alliance to take on the *smaller* Rolls-Royce, an early entrant to the new market. This alliance between two traditional loggerheads in the aircraft engine industry against a smaller firm raised many eyebrows. Why would two dominant and fierce competitors cooperate to take on a weaker competitor when entering a new market? To make things more puzzling, both firms had the technological capabilities and economies of scale to enter the new market alone. When asked why it did so, Pratt & Whitney alluded, surprisingly, to "bruising" competition in its *existing* market with GE Aviation.[1]

Alliances between large and fierce competitors amidst multimarket competition are not unique to the aircraft engine industry. BP and Mobil, heavyweights in the oil and gas industry, formed an alliance to compete in a new market for fuels and lubricants (Robson and Dunk 1999)—industry analysts speculated that low returns and intensifying competition in refining and retail, existing markets for BP and Mobil, were reasons for this surprise move. Similar examples can be found in the telecommunications industry (e.g., Nokia and Siemens formed an alliance to manufacture telecommunications equipment) and the shopping center industry (e.g., Simon Property Group and Triple Five Group formed an alliance to develop the Mall of America, the largest shopping center in the United States).

To answer our focal research question as to why and when is it optimal for two competitors in an existing market to form an alliance to enter a new market, we look to the literature on alliance formation (e.g., Gomes-Casseres 2005, Harrigan 1986). The answer is not immediately apparent from two prevalent themes in previous work. The first is to capture *complementarities* across firms through research and development spillovers (e.g., d'Aspremont and Jacquemin 1988) or through vertical integration across supply chains that allow firms to access technology and markets (e.g., Hamel 1991). The second is to gather critical mass to achieve *economies of scale* (e.g., Gomes-Casseres 1997), as in the case of horizontal integration, or to fend off competition (e.g., Van den Bulte and Wuyts 2007).

[1] articles.courant.com/1996-11-08/business/9611080237_1_rolls-royce-engine-ge-pratt.

Neither seems to explain the alliance between GE Aviation and Pratt & Whitney; yet, both firms deemed it a "logical solution."[2]

We introduce a third reason—multimarket competition—to explain alliance formation in new market entry. In today's competitive environment, industry and market boundaries are increasingly blurred, and firms may meet the same competitors in multiple markets. Extant literature tells us that multimarket competition tends to breed mutual interdependence (Stephan and Boeker 2001) or mutual forbearance through increased familiarity and deterrence (Jayachandran et al. 1999) among competitors; it also informs us about the collusive behavior of firms (Bernheim and Whinston 1990) and how collusive behavior affects economic performance (Scott 1982). Yet the role of multimarket competition in alliance formation is unclear: when is an alliance preferred over independent entry in the presence of multimarket competition? We focus on two key factors: (i) the size of the market in determining the firms' profits; and (ii) the extent of competition that firms face across different markets. We develop a game-theoretic model consisting of two focal firms and other nonstrategic fringe firms competing in an existing market: the two focal firms have an opportunity to enter a new market—new only to these two focal firms—which is currently dominated by other firms. Each firm can do so either independently or as an alliance, and decides its mode of entry before the level of investment in each market. Solving for a pure-strategy Nash equilibrium under each mode of entry in this noncooperative game, we obtain optimal investments and profits as a function of (i) the relative size of the two markets; and (ii) the relative competition in the two markets. We then assess gains from an alliance mode of entry over an independent mode of entry, and characterize conditions where an alliance mode of entry does better.

Casual inspection suggests that firms enter a new market independently when the size of the new market is relatively large, to better capture the attractive reward individually, and that they enter a new market as an alliance when competition in the new market is relatively strong, to jointly deter competition. On the *contrary*, we find that an alliance mode of entry into the new market is more profitable than independent entry when (i) the new market is *larger* relative to the existing market; and when (ii) competition in the existing market is *stronger* relative to the new market. The intuition is that an alliance introduces mutual free riding on the other firm's investment in the new market, and this leads to a coordinated reduction in each firm's investment into the new market relative to that of independent entry. This frees up investment resources for the existing market, so that both firms in the alliance can compete more effectively in the existing market. Such a strategy is more profitable if relative competition in the existing market is relatively strong, and that the coordinated increase of investment into the existing market allows both firms in the alliance to better deal with it; at the same time, the coordinated reduction of investment into the new market is sufficient to manage the relatively weaker competition in the new market. In addition, the new market needs to be relatively large in an alliance entry to overcome the effects of free riding by both firms.

The remainder of the paper is as follows. In Section 2, we describe the game-theoretic setup of our model, and in Section 3 we derive its key results. Proofs are in the appendix and model details are in Technical Appendix A (available as supplemental material at http://dx.doi.org/10.1287/mksc.2016.0988). Several extensions of our model considering product market price competition, asymmetry of focal firms, endogeneity in sharing rules, and multiple existing markets, are presented in Technical Appendix B. In Section 4, using archival data from the formation of alliances between major owners of regional shopping centers in the United States, we find supporting empirical evidence for the key predictions of our model. Finally, we conclude in Section 5 with a summary of our findings, the limitations of our research, and the implications of multimarket competition for alliance formation.

2. Model

Consider two markets, indexed as $m = 1, 2$: let $m = 1$ denote the existing market and $m = 2$ the new market. Also, let $i = A, B$ index the two focal firms. Both firms compete in the existing market and are interested in entering the new market. Besides A and B, there are other firms in the existing and the new market. Let $j = X, Y$ index the aggregation of other independent fringe firms: X, which reside in the existing market and Y, which reside in the new market.[3] Also, we assume that X is only interested in the existing market, and Y is only interested in the new market, i.e., neither is considering entry into the other market. Figure 1 shows the status quo arrangement of firms in the two markets.

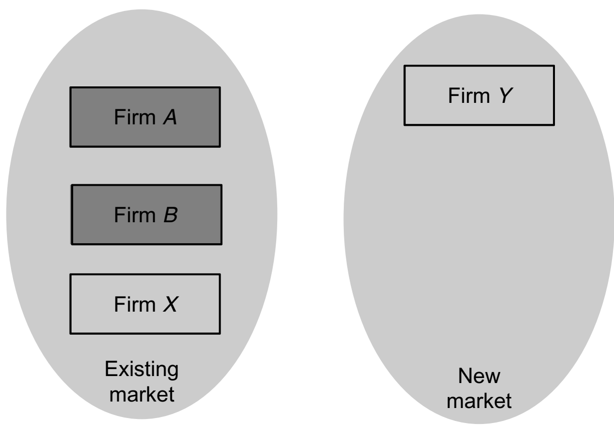
2.1. Mode of Entry into New Market (Stage 1)

A focal firm has two possible modes of entry, E_i, into the new market. Each can enter the new market either independently ($E_i = indep$) or as an alliance

[2] www.enginealliance.com.

[3] By "new market," we specifically mean a market that is new only to the two focal competitors, i.e., other firms can already be present in this new market. A new market here does not connote any notion of novelty.

Figure 1 Status Quo of Firms in the Existing and New Markets



($E_i = alliance$). These two alternatives are represented in Figure 2. In either mode of entry, we assume that firms have already entered the existing market independently, and that this is the status quo.

2.2. Investment Decision (Stage 2)

After deciding its mode of entry, E_i, each focal firm then considers how much investment to channel toward each of the markets. These investments can represent upfront expenditure pertaining to R&D or product development. In either mode of entry, we assume that firms A and B each have a normalized endowment of unit 1, a measure of the internal resources that firms set aside from their capital budgeting processes for investment.[4] Each firm then simultaneously invests its entire unit of endowment into both markets, assuming that both markets are sufficiently attractive in terms of return. Let a and b represent A and B's respective investment into the existing market. Correspondingly, $1-a$ and $1-b$ represent A and B's respective investment into the new market. In other words, we assume that both markets are sufficiently attractive in terms of return, such that firms invest its entire endowment across the existing and new market (see Technical Appendix A for boundary conditions). Instances where firms can scale back and save on investment cost are not considered and are a limitation of our model.

2.3. Relative Size of Markets

Let the relative size of the existing market be represented by $M \in (0, 1)$, as a proportion of total market size across both markets. Thus, $1-M$ represents the relative size of the new market. In our setup, if $M > \frac{1}{2}$, the size of the existing market is larger than that of the new market. We also assume that there are no interdependencies in demand across both markets.

2.4. Relative Investment Competition in Markets

Fringe firms X and Y, like focal firms A and B, are also investing in both markets. Let $w \in (0, 1)$ represent the relative investment competition from X into the existing market, as a proportion of total investment competition across both markets. Thus, $1-w$ represents the relative investment competition from Y into the new market.[5] In our setup, if $w > \frac{1}{2}$, competition in the existing market is stronger than that in the new market. We believe this way of modeling relative investment competition is reasonable only in settings in which a small number of firms in an industry like A and B have significant market power, and segments of an industry are markets where a small number of firms compete against one another regularly.[6]

2.5. Timing of Game

Assume A and B engage in a two-stage noncooperative game with complete information. In Stage 1, both firms simultaneously decide whether to enter the new market independently or as an alliance. Both firms enter the new market as an alliance only if they simultaneously choose to do so; in all other cases, both firms enter the new market independently. In Stage 2, both firms decide how much of its endowment to invest in each market, based on the mode of entry in Stage 1. We will describe the payoff to each firm under the two modes of entry, based on decision variables a and b. The sequence of events for alliance formation toward new market entry are shown in Figure 3.

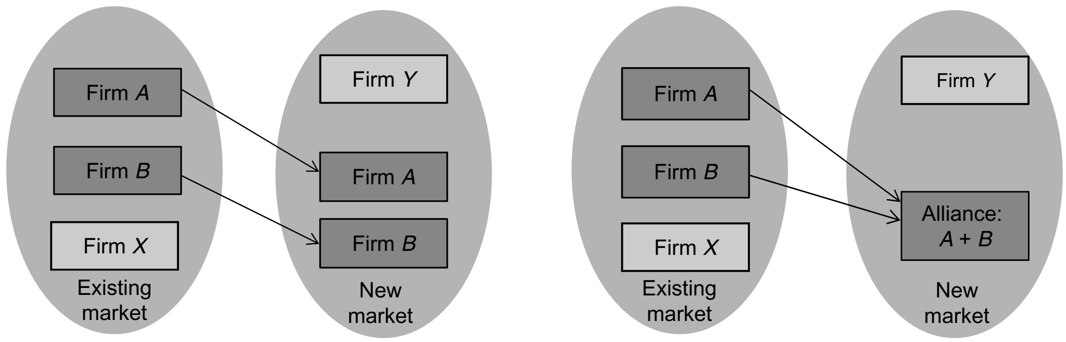
We solve the game using backward induction. In Stage 2, focal firms simultaneously solve for the optimal investment and profit under both modes of entry, before deciding in Stage 1 which mode of entry yields a higher profit. The subgame-perfect Nash equilibrium for the game will thus be the equilibrium derived from backward induction. Next, we

[4] We do not consider the case where firms can access financial markets and borrow capital from external sources, and acknowledge that this is a limitation of our model. Our assumption applies if the cost of external capital exceeds a firm's internal hurdle rate, often the case for a risky investment, such that the firm may not be willing to borrow external capital.

[5] This assumes that the sum of the investments from X and Y is equivalent in magnitude to the initial endowment of firms A and B. This is applicable if the sum of competing investments across both markets is comparable to initial endowments, and that it is neither overwhelming nor underwhelming for the focal firms to take on.

[6] For example, the aircraft engine industry is dominated by three major firms who often meet one another in different segments of the industry (i.e., engine types); the oil and gas industry is made up primarily of several major firms that participate across different types of petroleum products across the value chain; the entire spectrum of the telecommunications industry is dominated by a handful of large firms; and a significant portion of the shopping center industry in the United States is owned by large real estate investment trust firms who have interests in shopping centers across multiple geographies. In these examples, when firms decide to enter a new segment of the industry, they can choose to compete or collaborate.

Figure 2 Two Modes of Entry for A and B—Independent (Left) and Alliance (Right)



present each focal firm's investment decision (a and b) and π_{i,E_i}, the resulting profit function of focal firm i under each mode of entry E_i.

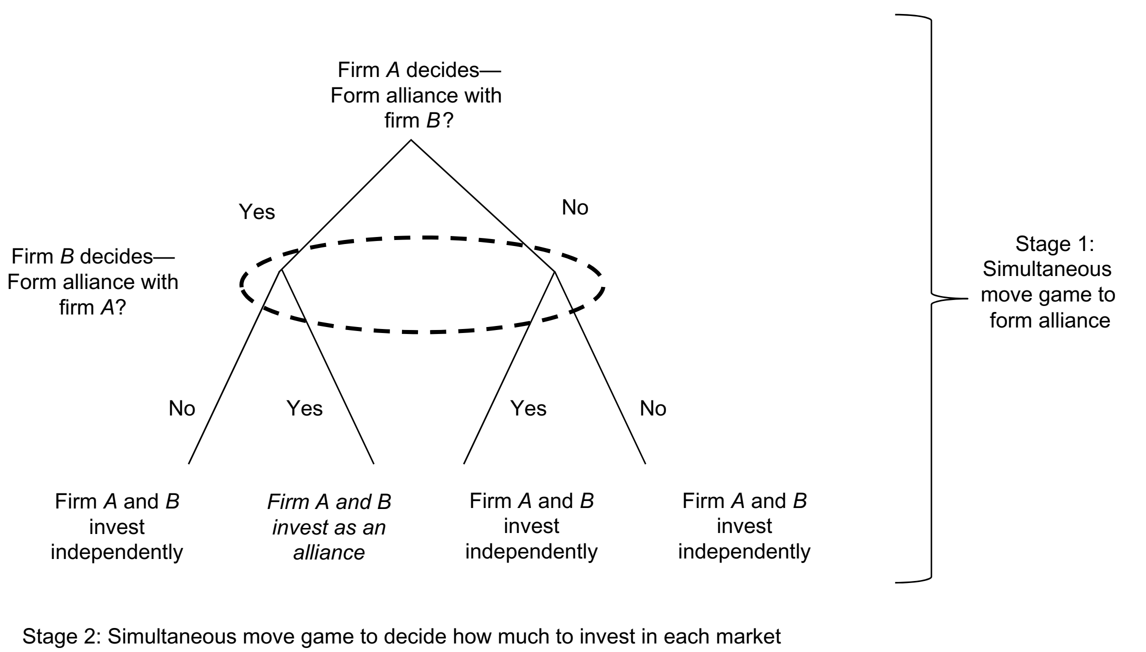
2.6. Decisions and Outcomes in Independent Entry ($E_i = indep$)

Focal and fringe firms compete for a share of each market. To link a firm's investment to market share, we assume that a firm's share of each market is determined by its share of the total investments into that particular market. This specification is similar to the class of models known as the steady-state market share model (e.g., Bell et al. 1975, Little 1979), or the Lanchester model (Erickson 1985): changes in market share are tied directly to inputs—in our case, investments—from itself and competing firms, the microfoundations of which stem from sales gained from competing firms due to the focal firms' own investment, versus sales lost from its lagged value due to investment from the competing firms (see Technical Appendix A for the derivation).

Under independent entry, $\pi_{A,indep}$ and $\pi_{B,indep}$ in Equations (1) and (2) represent the respective profits of A and B under an independent mode of entry. The first term in each equation represents the payoff from the existing market, and the second term represents the payoff from the new market. In each term, share of payoff for each firm moderates the relative size of the market. For example, $a/(a+b+w)$ is A's share of the payoff from investing a into the existing market of relative size M, amidst competing investment from B (who invests b) and fringe firm X (who invests w). The third term accounts for the normalized unit of endowment for investment.

$$\pi_{A,indep} = \frac{a}{a+b+w} \cdot M + \frac{1-a}{(1-a)+(1-b)+(1-w)} \cdot (1-M) - 1, \quad (1)$$

Figure 3 Sequence of Game: A Two-Stage Noncooperative Game



$$\pi_{B,\,indep} = \frac{b}{a+b+w}\cdot M + \frac{1-b}{(1-a)+(1-b)+(1-w)}\cdot(1-M)-1. \quad (2)$$

In the first and second terms, margins in each market are assumed to be fixed and identical. This is more applicable in industries where investments affect market share more than margins (e.g., aircraft engine manufacturers often maintain a tight pricing on their line of engines[7]), but not as applicable in industries where investments are targeted toward lowering cost and/or increasing prices (e.g., consumer electronics). For the latter, we attempt a model generalization in Technical Appendix B where margins are determined through price competition in a differentiated Bertrand setting.[8]

2.7. Decisions and Outcomes in Alliance Entry ($E_i = alliance$)

Alternatively, A and B can enter the new market as an alliance. If so, A and B pool their resources into a single entity for entry into the new market. In this case, $((1-a)+(1-b))/((1-a)+(1-b)+(1-w))$ represents the market share of the alliance in the new market. This payoff will then be split between A and B, according to a sharing parameter, s, which represents the share of A. Naturally, B receives the remaining share $1-s$. The net profits of A and B under an alliance mode of entry are denoted, respectively, by $\pi_{A,\,alliance}$ and $\pi_{B,\,alliance}$ in Equations (3) and (4).

$$\pi_{A,\,alliance} = \left[\frac{a}{a+b+w}\cdot M\right] + s\left[\frac{(1-a)+(1-b)}{(1-a)+(1-b)+(1-w)}\cdot(1-M)\right]-1, \quad (3)$$

$$\pi_{B,\,alliance} = \left[\frac{b}{a+b+w}\cdot M\right] + (1-s)\cdot\left[\frac{(1-a)+(1-b)}{(1-a)+(1-b)+(1-w)}\cdot(1-M)\right]-1. \quad (4)$$

To begin with, we assume s to be exogenous. The exogeneity of the sharing parameter may be the ex ante outcome of bargaining or negotiation between A and B, which we do not explicitly model, or it may reflect preexisting relationships between the firms (Bhaskaran and Krishnan 2009). In other words, we assume that firms commit and are then bound to fulfill these investment commitments according to the sharing parameter (e.g., pharmaceutical firms entering an R&D alliance agree to a shareholding structure before investing in the alliance; GE Aviation and Pratt & Whitney inking the shareholding structure before investments are made). This approach has its limitations if the sharing parameter incorporates ex post contributions, such that the shareholding structure is itself a function of investments (e.g., in emerging markets where bargaining or negotiation of the sharing is an ongoing process). We address this in Technical Appendix B with an extension of the model that allows s to also incorporate actual ex post investments of the firms, i.e., s is endogenous in investments.

We summarize our model notation in Table 1.

Table 1 Model Notation

Symbol	Definition
E_i	Focal firm's mode of entry into new market: independent or alliance
a	Focal firm A's investment allocation to the existing market
b	Focal firm B's investment allocation to the existing market
M	Relative size of existing market
w	Relative competition in the existing market
s	Focal firm A's share of the alliance payoff
$\pi_{A,\,indep}$	Focal firm A's profit under independent mode of entry
$\pi_{B,\,indep}$	Focal firm B's profit under independent mode of entry
$\pi_{A,\,alliance}$	Focal firm A's profit under alliance mode of entry
$\pi_{A,\,alliance}$	Focal firm B's profit under alliance mode of entry

3. Analysis of Model

Our analysis is in two parts: (i) when the two markets, existing and new, are equal in size; and (ii) when they differ in size.

3.1. Setting Size of Both Markets to be Equal

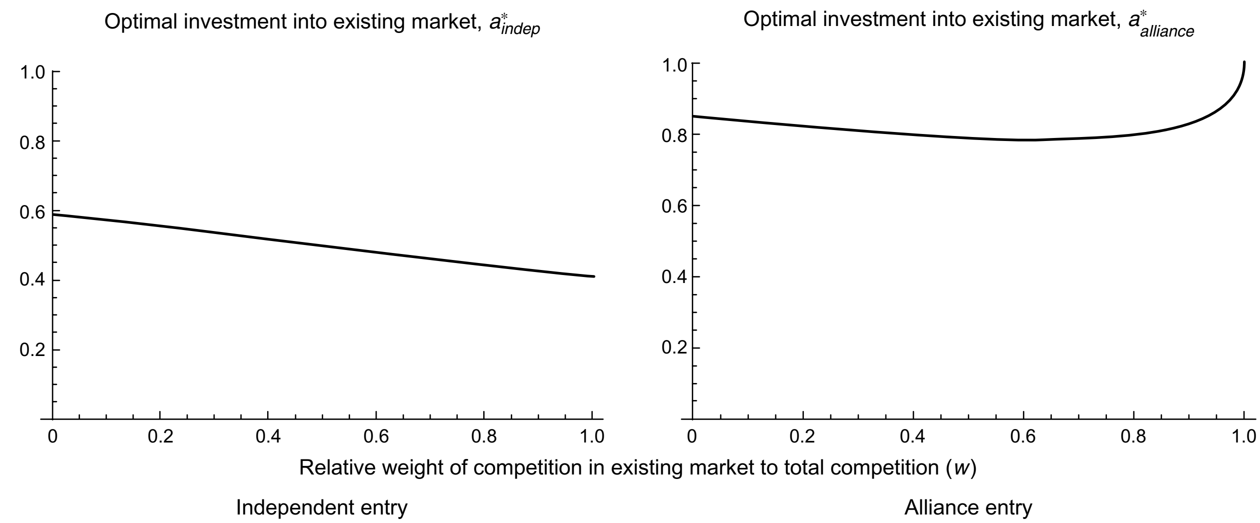
When $M=\frac{1}{2}$, the two markets are of equal size. Also, we will assume that focal firms A and B are symmetric for now, and therefore, sharing of the payoffs from the new market in an alliance mode of entry is assumed to be split equally ($s=\frac{1}{2}$). We relax this assumption in Technical Appendix B by allowing firms to have asymmetric endowments, and consequently, sharing rules that reflect this asymmetry.

3.1.1. Independent Entry for $M=\frac{1}{2}$. Solving Equations (1) and (2) for $M=\frac{1}{2}$, we obtain a unique pure-strategy Nash equilibrium solution that maximizes profit for both modes of entry given $a, b \in (0,1)$. The optimal investment for a firm under an independent mode of entry, $a^*_{indep,\,M=1/2} = b^*_{indep,\,M=1/2}$,

[7] Gathering evidence from multiple transactions that are available online, the engine developed for the A380 new market by the alliance between GE and Pratt & Whitney, the GP7000, goes for a unit price of between US$13–14 million. Compare this with an engine in the existing market that goes for a unit price of between US$10–11 million.

[8] We acknowledge that this is approach may still have its limitations because it may not capture many ways in which margins are determined.

Figure 4 Optimal Investments into Existing Market (Market Sizes Are Equal)



is given by the second root of the cubic implicit function in Equation (5). See the appendix for the proof, and Technical Appendix A for the closed-form expressions.

$$9w - 8w^2 + 2w^3 + (9 - 26w + 10w^2)a^*_{indep,\,M=1/2} + (-20 + 16w){a^*_{indep,\,M=1/2}}^2 + 8{a^*_{indep,\,M=1/2}}^3 = 0. \quad (5)$$

3.1.2. Alliance Entry for $M = \frac{1}{2}$. We follow the same procedure to solve Equations (3) and (4) for the symmetric pure-strategy Nash equilibrium solution in an alliance mode of entry into the new market. The optimal investment for a firm under an alliance mode of entry, $a^*_{alliance,\,M=1/2} = b^*_{alliance,\,M=1/2}$, is given by the second root of the cubic implicit function in Equation (6). See the appendix for the proof, and Technical Appendix A for the closed-form expressions.

$$18w - 13w^2 + 3w^3 + (18 - 40w + 14w^2)a^*_{alliance,\,M=1/2} + (-28 + 20w){a^*_{alliance,\,M=1/2}}^2 + 8{a^*_{alliance,\,M=1/2}}^3 = 0. \quad (6)$$

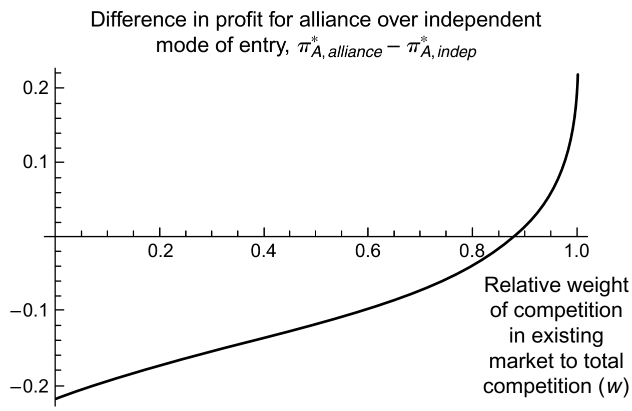
3.1.3. Comparing Optimal Investments in Independent versus Alliance Entry for $M = \frac{1}{2}$. Figure 4 shows how the optimal investments into the existing market under each mode of entry vary with respect to w. Observe that in the independent mode of entry, optimal investment $a^*_{indep,\,M=1/2}$ is monotonically decreasing as competition in the existing market relative to the competition in the new market (w) increases. In other words, when the two markets are equal in size, the optimal strategy, as intuition would predict, is to decrease one's investment in the existing market (and correspondingly increase one's investment in the new market) as competition in the existing market intensifies.

In the alliance mode of entry, two observations are worth highlighting. First, for all values of w, the optimal investment in the existing market under the alliance mode of entry is always higher than that of independent entry, i.e., $a^*_{alliance,\,M=1/2} > a^*_{indep,\,M=1/2}\ \forall\, w$. Second, $a^*_{alliance,\,M=1/2}$ is nonmonotonic, i.e., optimal investment in the existing market decreases in the lower range of w, but increases in the upper range of w.

The intuition for the first observation is that both firms in an alliance will always have an incentive to invest more in the existing market as compared to the new market, because each is the sole recipient of the payoff from the existing market, but has to share the payoff of the new market with the other firm in the alliance.

The intuition for the second observation is less straightforward. In the presence of multimarket competition, the firm has to assess its private marginal return in the existing market versus the shared marginal return in the new market. In other words, both firms have to evaluate the size and the competitive intensity in the existing and new market, not only from each other but also from the other firms. As relative competition in the existing market (w) increases initially—and as relative competition in the new market ($1 - w$) decreases correspondingly—the resulting increase in the attractiveness of the new market is sufficiently large such that either firm is better off investing more in the new market through the alliance. In other words, the shared marginal return of the new market outweighs the private marginal return of the existing market. However, there comes a point when the private marginal return of the existing market starts to outweigh the shared marginal return of the new market. From this point on, either firm in an alliance mode of entry does better by allocating more investments to the existing market. As relative competition eases in the new market, less investment is

Figure 5 **Firms Do Better Under an Alliance Mode of Entry as Relative Competition in Existing Market Gets Stronger (Market Sizes Are Equal)**



needed by the alliance in the new market to overcome the weaker competition in the new market. Note that the abovementioned tension in an alliance mode of entry does not exist in the independent mode of entry since both firms are making a decision based on private marginal returns in the two markets. In other words, neither firm has to consider the tension of a private versus shared marginal return in the new market.

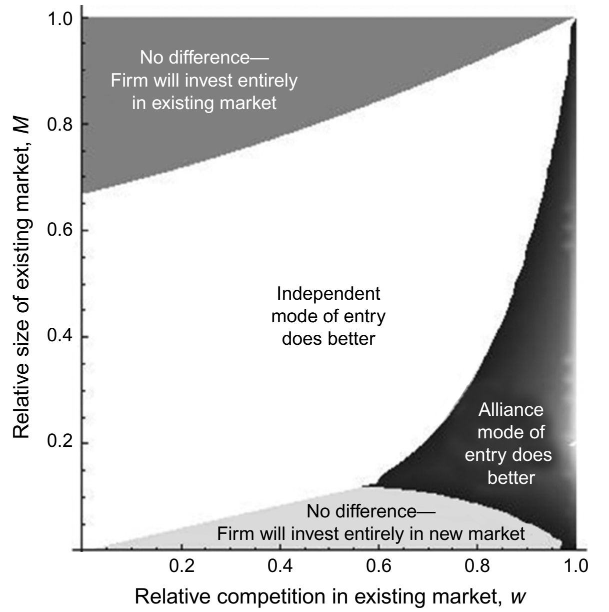
3.1.4. Comparing Optimal Profits in Independent versus Alliance Entry for $M = \frac{1}{2}$. Given the optimal investments in Equations (5) and (6), we can obtain the respective optimal profits of A and B under an independent mode of entry ($\pi^*_{i,\,indep,\,M=1/2}$) and alliance mode of entry ($\pi^*_{i,\,alliance,\,M=1/2}$). To determine when an alliance mode of entry into the new market is more profitable than an independent mode of entry, we solve for the conditions under which $\pi^*_{A,\,alliance,\,M=1/2} > \pi^*_{A,\,indep,\,M=1/2}$ and $\pi^*_{B,\,alliance,\,M=1/2} > \pi^*_{B,\,indep,\,M=1/2}$.

The plot in Figure 5 shows the difference in profits between an alliance and independent mode of entry for different values of w and helps us understand this result intuitively. We observe that holding the size of both markets equal, an alliance mode of entry does better as relative competition in the existing market increases. Profits in the alliance mode of entry exceed that of an independent mode of entry when $0.88 \lesssim w < 1$.

3.2. Solving for a General M

Next, we relax the assumption of $M = \frac{1}{2}$ and solve for the optimal investments and profits for a general M. We obtain a unique symmetric pure-strategy Nash equilibrium solution for both modes of entry, which is represented by the second root of the implicit functions in Equations (7) and (8), with additional boundary conditions on M. See the appendix for the proof and Technical Appendix A for the closed-form expressions of these optimal investments.

Figure 6 **Different Regions under which Either Mode of Entry Does Better**



Independent Entry for General M

$$9Mw - 2w^2 - 4Mw^2 + w^3 + (9M - 8w - 10Mw + 5w^2) \cdot a^*_{indep} + (-8 - 4M + 8w){a^*_{indep}}^2 + 4{a^*_{indep}}^3 = 0, \tag{7}$$

where $(w^2 - 2w)/(4w - 9) < M < (w^2 + 4w + 4)/(4w + 5)$.

Alliance Entry for General M

$$\begin{aligned} &18Mw - w^2 - 11Mw^2 + w^3 + Mw^3 \\ &\quad + (18M - 4w - 32Mw + 4w^2 + 6Mw^2)a^*_{alliance} \\ &\quad + (-4 - 20M + 4w + 12Mw){a^*_{alliance}}^2 \\ &\quad + 8M{a^*_{alliance,\,M=1/2}}^3 = 0, \end{aligned} \tag{8}$$

where $(w - w^2)/(w^2 - 11w + 18) < M < (w^2 + 4w + 4)/(6 + 4w - w^2)$.

3.2.1. Comparing Optimal Profits in Independent versus Alliance Entry for General M. Given the optimal investments in Equations (7) and (8), we can obtain the respective optimal profits of A and B under an independent mode of entry ($\pi^*_{i,\,indep}$) and alliance mode of entry ($\pi^*_{i,\,alliance}$). We then solve for the conditions under which $\pi^*_{A,\,alliance} > \pi^*_{A,\,indep}$ and $\pi^*_{B,\,alliance} > \pi^*_{B,\,indep}$. We show in Figure 6 the different regions under which a certain mode of entry into the new market does better, if there is a difference. Our main focus is on the darker gray region toward the right of Figure 6 where alliance mode of entry into the new market does better. Within this darker gray region, a lighter contrast denotes higher profits.

Figure 6 corroborates our result from the case of $M = \frac{1}{2}$—note that an alliance mode of entry does better when $w \gtrsim 0.88$. Second, we find that for $0 < M < 1$, there exists a minimum threshold of approximately 0.57 for w, below which an alliance cannot do better. The corresponding value of M is approximately 0.13.

Next, we find that as w increases from approximately 0.57 to 1, there is an increasing range of M in which an alliance mode of entry does better, which is asymmetrically larger for higher values of M. Thus, as w gets larger, there is greater admissibility for M toward the formation of an alliance, and this admissibility is skewed toward a higher M (i.e., a smaller relative size of the new market). Generally, as relative competition in the existing market gets stronger, an alliance can do better for a greater range of relative market sizes. Said differently, for larger values of M, there needs to be a higher w for an alliance mode of entry to do better. From Figure 6, we observe that the primary region in which an alliance mode of entry does better is when M is low and w is high. Our findings thus suggest that an alliance mode of entry into the new market yields a higher profit than independent entry (i) when the new market is larger relative to the existing market; and (ii) when the competition in the existing market is stronger relative to the new market. We summarize this as a key result below.

Result. An alliance mode of entry into the new market yields a higher profit than independent entry (i) when the new market is larger relative to the existing market; and (ii) when competition in the existing market is stronger relative to the new market.

4. Empirical Analysis Using Shopping Center Data

Our objective here is to examine whether our key result (i.e., whether two firms are more likely to enter a new market as an alliance when the new market is larger relative to the existing market, and when competition in the existing market is stronger relative to the new market) is consistent with market data, after applying the necessary econometric controls. Although we also account for some alternative explanations, the purpose of this empirical analyses is not to test the superiority of our model over all alternative models, but to examine whether the key prediction of our theoretical model is consistent with market data.

4.1. Description of Industry and Data

The shopping center industry is a large and important industry in the United States, with revenues of more than $100 billion a year.[9] Archival data from the 2006 *Directory of Major Malls*[10] provide us a complete cross-sectional census of the regional shopping centers[11] operating in the United States and their ownership. We focus on five shopping center owners—prominent real estate investment trust firms based in the United States—whose revenues in 2007 averaged close to US$1 billion. These shopping center owners are present in multiple markets across the United States as opposed to a single localized market and thus are more likely to consider the effects of multimarket competition. These five focal shopping center owners are Simon Property Group, General Growth Properties, CBL & Associates, Developers Diversified Realty, and the Macerich Company.[12] Together, they own 797 shopping centers in aggregate, of which 660 shopping centers are owned independently and 137 are owned through an alliance. We consider alliances among these five shopping center owners, as well as with other smaller shopping center owners.[13] In our data, we observe if each shopping center is owned independently or by an alliance between two shopping center owners.

4.2. Definition of Market and New Market Entry

We define a market for a regional shopping center[14] as a three-digit zip code (covering around 1,000 square miles of overall area, with a 15–20 mile radius if it is circular). This is consistent with the guidelines of the International Council of Shopping Centers, which defines the service area of a regional shopping center to be around 15 miles[15] and also with past literature in marketing (Vitorino 2012).

We define a new market entry by an owner to be a shopping center in a new three-digit zip code where it does not have a presence. The existing market is defined to be the aggregate of the three-digit

[9] www.icsc.org/press/u.s.-shopping-center-industrys-second-quarter-net-income-matches-historic-h.

[10] We thank Professor Maria Ana Vitorino for the data, originally used in Vitorino (2012), which focuses on configuration of anchor stores (e.g., Macy's) within a regional shopping center, and how spillovers across these stores affect colocation within a shopping center. Our unit of analysis is different: we examine the mode of shopping center ownership (independent or joint venture) in a new market entry, accounting for ownership across the entire United States. Also, we do not assume complementarities arising from location spillovers.

[11] www.icsc.org/uploads/research/general/US_CENTER_CLASSIFICATION.pdf.

[12] Respective 2007 revenues are US$3.65 billion, US$3.26 billion, US$1.04 billion, US$0.95 billion, and US$0.90 billion.

[13] In our data, we have more competitors and more localized markets compared to the model. In Technical Appendix B, we allow for firms to come from multiple existing markets, i.e., both firms considering entry into a new market need not come from the same existing market. Our results are robust. We thank an anonymous reviewer for highlighting this issue.

[14] A regional shopping center covers 400,000 to 800,000 square feet in gross leasable area and has at least two anchor stores.

[15] www.icsc.org/srch/lib/USDefinitions.pdf.

zip codes for which the owner already had a presence prior to this particular new market entry. This assumes that when a shopping center owner considers market entry into a new three-digit zip code, she takes into account the size and competition of not only the new market but also the size and competition of the shopping centers in the existing markets. For the regional shopping centers in our data that opened between 1946 to 2009, we have a total of 610 new market entries by the five shopping center owners. Of these, 510 new market entries are independent and 100 new market entries are through an alliance mode of entry.[16] Going forward, we use the following notation. The subscript $i = 1, \ldots, 5$ refers to the five different owners, subscript $m = 1, \ldots, 712$ refers to the 712 three-digit zip code markets for which there is at least one shopping center in the United States and subscript $t = 1, \ldots, 64$ refers to each of the 64 years in our data.

4.3. Definition of Key Variables

Next, we define the two key variables used in our empirical analyses: (i) the relative weight of existing market size to total market size, which corresponds to the parameter M in our theoretical model, and (ii) the relative weight of competition in the existing market to total competition, which corresponds to the parameter w in our theoretical model.

4.3.1. Relative Weight of Existing Market Size to Total Market Size [$\underline{M}_{imt}$]. We observe average household income and the number of households in a 20-mile radius of the shopping center. We take their product to obtain total household income in a 20-mile radius of the shopping center. As a proxy for the size of a market (i.e., a three-digit zip code that has a similar area to that of a 20-mile radius), we take the average of all of the values of total household income for shopping centers that belong to the three-digit zip code. We then define the size of the existing market for a specific owner to be the *sum* of the market sizes for the three-digit zip codes that the owner already has a presence in, and the size of the new market to be the market size for the three-digit zip code which the owner is entering. We then construct the relative weight of existing market size to total market size by taking the ratio of the size of the existing market to the sum of the existing market and new market. The variable $\underline{M}_{imt}$ refers to the relative weight of existing market size to total market size for owner i entering market m in year t, and corresponds directly to the parameter M in our theoretical model. Using cross-sectional data for average household income and number of households in a 20-mile radius, variable $\underline{M}_{imt}$ varies on the time dimension as firms enter into different markets but not on the market dimension—this is reasonable if either growth in the market size is consistent across the markets, or if a shopping center owner is forward looking and accounts for future growth in market size in her market entry decision.

4.3.2. Relative Weight of Investment Competition in the Existing Market to Total Competition [$\underline{w}_{imt}$]. As a proxy for the level of investment competition in a local market, we use the gross leasable area of all shopping centers in the three-digit zip code that opened prior to the focal shopping center. We then define the level of investment competition in an existing market for a specific owner to be the *sum* of the level of investment competition for the three-digit zip codes that the owner already has a presence in, and the level of investment competition in a new market to be the level of investment competition for the three-digit zip code that the owner is entering. We then construct the relative weight of investment competition in existing market to total competition by taking the ratio of the level of investment competition in the existing market to the sum of the level of investment competition in the existing market and new market. The variable $\underline{w}_{imt}$ refers to the relative weight of competition in the existing market to total competition for owner i entering market m in year t, and corresponds directly to the parameter w in our theoretical model.

4.4. Empirical Results

Regression models based on 610 new market entry observations involving our five focal owners. Our binary dependent variable is an indicator of alliance entry into a new market, i.e., $\underline{E}_{imt} = 1$ if owner i entered new market m as an alliance in year t, and $\underline{E}_{imt} = 0$ if owner i entered new market m independently in year t. Our binary dependent variable $\underline{E}_{imt}$ corresponds to the focal firm's decision E_i in our theoretical model.

Table 2 shows the results of our logistic regressions. In Model I, the two covariates are (i) $\underline{M}_{imt}$, the relative weight of existing market size to total market size for owner i entering market m in year t and (ii) $\underline{w}_{imt}$, the relative weight of competition in the existing market to total competition based on gross leasable area for owner i entering market m in year t. In Model II, we also include the interaction of these two variables. In Models I and II, the main effects of $\underline{M}_{imt}$ and $\underline{w}_{imt}$ in the logistic regression are both directionally consistent and statistically significant, thus lending support to the result from our main model. Although our theoretical model predicts that relative market size and relative competition moderate each other in influencing the mode of entry into the new market, we do not

[16] The remaining 150 of the 660 independent ownerships and 37 of the 137 alliances are entries into existing markets.

Table 2 Logistic Regression of Alliance Entry on Relative Size of Existing Market and Relative Competition in Existing Market

	Model I	Model II	Model III	Model IV
Constant	−1.89* (0.77)	−1.22 (0.84)	−1.29 (0.86)	−18.57 (6,523)
[$\underline{M}_{imt}$] Relative weight of existing market to total market size	−7.20*** (2.09)	−9.67** (3.00)	−9.18** (2.99)	−15.74** (4.92)
[$\underline{w}_{imt}$] Relative weight of competition in existing market to total competition	7.46*** (2.26)	6.64** (2.37)	6.38** (2.38)	13.56** (4.81)
[$\underline{M}_{imt} \times \underline{w}_{imt}$] Interaction term	—	2.76 (2.25)	2.70 (2.34)	−0.05 (4.54)
[Ω_i] Owner fixed effects	—	—	(None are significant)	$\Omega_2 = -0.88^*$ (0.38)
[γ_t] Time fixed effects	—	—	—	(None are significant)
AIC	537.55	538.05	535.18	571.28

Notes. Number of observations of new market entry = 610. Standard errors are in parentheses. Only statistically significant fixed effects are listed.

*Statistical significance at 0.05; **statistical significance at 0.01; ***statistical significance at 0.001.

find a negative interaction between the two independent variables in Model II.

In Model III, we also add in owner fixed effects to ensure that our error terms ε_{imt} are independent and identically distributed, and that our inferences on relative market size and relative competition are not being driven by any one particular owner. Only one of the owner fixed effects, $\Omega_{i=2}$, is statistically significant, although the effect size is relatively small. In Model IV, we also add in time (i.e., yearly) fixed effects, γ_t, to control for any potential socioeconomic changes over this long period[17]—none of the yearly fixed effects were significant, although the increased magnitudes for coefficients of $\underline{M}_{imt}$ and $\underline{w}_{imt}$ provide stronger support to the predictions from our model.

4.5. Interpretation and Elaboration of Significant Coefficients

Next, we provide some intuition based on Model III, which is the preferred model given that it has the lowest Akaike information criterion (AIC).

[$\underline{M}_{imt}$]. We obtain a negative coefficient of −9.18 for the relative weight of existing market size to total market size ($p = 0.0021$). Thus, an alliance entry is more likely when the new market is relatively larger. Holding everything else constant, a 10% increase in $\underline{M}_{imt}$ translates to a 150% increase in the odds of an alliance entry into a new market.[18]

[$\underline{w}_{imt}$]. We obtain a positive coefficient of 6.38 for the relative weight of competition in the existing market to total competition ($p = 0.0072$). Thus, an alliance entry is more likely when competition in the existing market is relatively stronger. Holding everything else constant, a 10% increase in $\underline{w}_{imt}$ translates to a 89% increase in the odds of an alliance entry into a new market.[19]

[17] We thank one of the reviewers for this suggestion.

[18] $e^{0.1\times 9.18} = 2.50$, which translates to a 150% increase in odds.

[19] $e^{0.1\times 6.38} = 1.89$, which translates to an 89% increase in odds.

4.6. Exploring Alternative Explanations

We now explore alternative explanations presented in the previous literature that may also influence the formation of an alliance, namely, factors relating to (i) knowledge complementarity, and (ii) economies of scale.

4.6.1. Knowledge Complementarity. Competitors may enter into an alliance because of knowledge complementarity. We attempt to control for one such form of knowledge complementarity arising from knowledge of local conditions—for example, partnering with another owner who is familiar with geographical market trends or jurisdiction may favor an owner's decision to enter a new market as an alliance. At the same time, we acknowledge that this does not rule out other sources of knowledge complementarity such as project management, marketing, ability to raise capital from financial markets, etc.[20] To control for knowledge complementarity arising from geography, we checked for instances in which either one of two alliance partners already had a presence in the market, and we benchmarked this against instances in which a single owner already had a presence in the market when entering independently. Table 3 shows our results. Although there is a higher percentage of alliance-owned shopping centers in which either owner had a presence in as compared to the independently-owned shopping centers, this is driven in part by an alliance-owned shopping center having twice as many owners and therefore simply having a higher chance of being in the market already. The difference between proportions is small and not statistically significant ($p = 0.26$ for three-digit zip codes and $p = 0.40$ for two-digit zip codes), thus suggesting that knowledge complementarity arising from geography does not appear to be a key reason for alliance formation in the data.

[20] We thank the associate editor for highlighting this.

Table 3 Proportion of Shopping Centers That Owner(s) Had Presence in Three- and Two-Digit Zip Code

	Three-digit zip code	Two-digit zip code
Alliance entry	0.255	0.620
Independent entry	0.208	0.577

4.6.2. Economies of Scale. Competitors may enter into an alliance because of economies of scale, of which there are many sources. Here, we examine one potential source that may explain why an alliance mode of entry is more likely when the size of the new market is relatively larger and when competition in the new market is relatively weaker. Because of a combination of real estate and population patterns in recent years, there may have been greater population growth in the suburbs, and therefore, more space for shopping center owners to develop larger shopping centers to cater to this suburban population. Since larger shopping centers require more resources to achieve economies of scale, this in itself may favor an alliance mode of entry. At the same time, because these new markets are greenfield markets, there is little competition. Together, these might offer an alternative explanation to our results based on multimarket competition.[21] Even though our results are robust to time trends, let us explore this alternative explanation. First, we find that (i) newer shopping centers are not necessarily larger shopping centers, and thus, economies of scale is an unlikely reason. Using only shopping centers that opened in the last 10 years of our data (2000 to 2009), a sizable number of newer shopping centers are smaller shopping centers located in built-up metropolitan areas: the average size of all new shopping centers from 2000 to 2009 is 498,000 square feet, compared to the average shopping center size of 526,000 square feet across the entire time period. Furthermore, we find that 46% of new shopping centers owned via an alliance mode of entry were below the average size of 498,000 square feet for all new shopping centers during that period. Second, we find that (ii) newer shopping centers are not necessarily in greenfield markets with less competition. For example, total competition faced by new shopping centers that opened from 2000 to 2009 (348 million square feet of gross leasable area) was comparable to total competition faced by new shopping centers that opened from 1990 to 1999 (358 million square feet of gross leasable area). Together, given that the size of new shopping centers and the scale of competition in recent years are similar to previous years, this suggests that economies of scale in greenfield markets is an unlikely alternative explanation for an alliance mode of entry.

[21] We thank one of the reviewers for raising this as a possible explanation.

5. Summary, Limitations, and Implications

We motivated our research with a potentially counterintuitive phenomenon—two fierce competitors in an existing market forming an alliance to enter a new market to take on a weaker competitor—and asked when and why an alliance mode of entry might be optimal for these two competitors. We find that multimarket competition can create interdependencies across markets, leading to firms having incentives to enter the new market as an alliance (i) when the size of the new market is larger relative to the existing market; and (ii) when the competition in the existing market is stronger relative to the new market. The intuition is that an alliance entry introduces mutual free riding on the other firm's investment in the new market, leading to a coordinated reduction of investment into the new market, relative to that of independent entry. This frees up resources for the existing market, so that both firms in the alliance can compete more effectively in the existing market—this is more profitable if relative competition in the existing market is strong, and if the coordinated reduction of investment into the new market is sufficient to manage the relatively weak competition in the new market. At the same time, the new market needs to be relatively large to overcome the effects of free riding in an alliance entry. Empirical analysis using archival data of regional shopping centers across the United States suggests our model-based predictions are consistent with market data.

That said, our study has a number of limitations. First, we define a new market to be one in which the focal firms do not have a presence in. Another way to define a new market—perhaps to better reflect the realities of new market entry—is to draw a different distinction in our definition of the two markets. For example, one might assume that an existing market is more likely to be a mature market whose size is independent of the investments of the firms in the existing market, whereas the size of the new market may depend on the investments of the firms into the new market. Alternatively, focal firms may have better information about the existing market as compared to the new market, therefore introducing uncertainty into the size of the new market—if firms are risk averse, our results can apply for the certainty equivalent of the new market size. Second, we can allow for more flexibility in the model to incorporate complementarity between the two firms and apply it to a wider variety of alliances, and not only to alliances between direct competitors. Allowing for complementarity between firms will certainly allow for more possibilities for an alliance mode of entry to do better, though our analyses suggest that in a multimarket context, complementarity is not necessary for an alliance mode of entry to be superior. Last, we can also expand the scope of our work by considering the role of antitrust law in influencing the ability of firms to form alliances, and understanding how consumer welfare varies under these situations.[22]

Altogether, we hope that our work provides researchers and practitioners with a richer understanding of how multimarket competition affects alliance formation, and explains why we observe alliances between fierce competitors under certain situations—and equally important, why we do not observe alliances between fierce competitors under other situations. Accounting for multimarket competition thus yields a potential explanation for the puzzle we present, and augments current findings in the literature. Although we believe that complementarities across firms and economies of scale will remain two important considerations in determining the formation of an alliance, we also believe our findings bring an additional vantage point: an alliance with a direct competitor can make sense in the presence of multimarket competition and potentially even in the absence of complementarities and economies of scale.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/mksc.2016.0988.

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Appendix

Proof for Independent Mode of Entry. The first order condition (F.O.C.) of Equation (1) with respect to (w.r.t.) a, and the F.O.C. of Equation (2) w.r.t. b, are given by

$$\frac{\partial \pi_{A,\,indep}}{\partial a} = \frac{1-M}{3-a-b-w}\left(\frac{1-a}{3-a-b-w}-1\right) + \frac{M}{a+b+w}\left(1-\frac{a}{a+b+w}\right), \tag{9}$$

$$\frac{\partial \pi_{B,\,indep}}{\partial b} = \frac{1-M}{3-a-b-w}\left(\frac{1-b}{3-a-b-w}-1\right) + \frac{M}{a+b+w}\left(1-\frac{b}{a+b+w}\right). \tag{10}$$

[22] We thank one of the reviewers for this suggestion.

The respective second order conditions (S.O.C.'s) are

$$\frac{\partial^2 \pi_{A,\,indep}}{\partial a^2} = \frac{2(1-M)}{(3-a-b-w)^2}\left(\frac{1-a}{3-a-b-w}-1\right) + \frac{2M}{(a+b+w)^2}\left(1-\frac{a}{a+b+w}\right), \tag{11}$$

$$\frac{\partial^2 \pi_{B,\,indep}}{\partial b^2} = \frac{2(1-M)}{(3-a-b-w)^2}\left(\frac{1-b}{3-a-b-w}-1\right) + \frac{2M}{(a+b+w)^2}\left(1-\frac{b}{a+b+w}\right). \tag{12}$$

Solving Equations (9) and (10) for a symmetric equilibrium, we obtain a cubic expression in a, shown in Equation (7). It is well established that a cubic equation with real coefficients has at least one real root, a consequence of the intermediate value theorem. To determine the number of real roots for this cubic equation, we check the discriminant. If the discriminant is greater than zero, it has three distinct real roots. If the discriminant is equal to zero, then it has a multiple root and all of them are real. If the discriminant is less than zero, then it has one real root and two complex roots.

We check the discriminant of our cubic equation and find that it is always positive for $w \in (0,1)$ and $M \in (0,1)$. Thus, all three roots of our cubic equation are real—however, because these are roots of an irreducible cubic polynomial that are *casus irreducibilis*, as explained in Sections 1.3 and 8.6 of Cox (2012), the second and third roots require complex numbers to express. Next, we check the roots to see if they satisfy the negative S.O.C. conditions for a maximizer. Doing so together with the constraints of w and M to always lie in $(0,1)$ rules out the first and third root, leaving us with only the second root of the following cubic equation that is the unique maximizer to profit. □

Proof for Alliance Mode of Entry. The same applies for an alliance mode of entry. The F.O.C. of Equation (3) w.r.t. a, and the F.O.C. of Equation (4) w.r.t. b, are given by

$$\frac{\partial \pi_{A,\,alliance}}{\partial a} = \frac{1-M}{2(3-a-b-w)}\left(\frac{2-a-b}{3-a-b-w}-1\right) + \frac{M}{a+b+w}\left(1-\frac{a}{a+b+w}\right), \tag{13}$$

$$\frac{\partial \pi_{B,\,alliance}}{\partial b} = \frac{1-M}{2(3-a-b-w)}\left(\frac{2-a-b}{3-a-b-w}-1\right) + \frac{M}{a+b+w}\left(1-\frac{b}{a+b+w}\right). \tag{14}$$

The respective S.O.C.'s are

$$\frac{\partial^2 \pi_{A,\,alliance}}{\partial a^2} = \frac{(1-M)}{(3-a-b-w)^2}\left(\frac{2-a-b}{3-a-b-w}-1\right) + \frac{2M}{(a+b+w)^2}\left(1-\frac{a}{a+b+w}\right), \tag{15}$$

$$\frac{\partial^2 \pi_{B,\,alliance}}{\partial b^2} = \frac{(1-M)}{(3-a-b-w)^2}\left(\frac{2-a-b}{3-a-b-w}-1\right) + \frac{2M}{(a+b+w)^2}\left(1-\frac{b}{a+b+w}\right). \tag{16}$$

Solving Equations (13) and (14) for a symmetric equilibrium, we again obtain a cubic expression in a, shown in

Equation (8). The discriminant for our cubic expression is always positive for $w \in (0,1)$ and $M \in (0,1)$. Again, all three roots are real, and *casus irreducibilis* requires complex numbers to express the second and third roots. Next, we check if the roots satisfy the negative S.O.C. conditions for a maximizer. Together with the constraints of w and M to always lie in $(0,1)$, this rules out the first and third root, leaving us with only the second root as the unique maximizer to profit. □

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