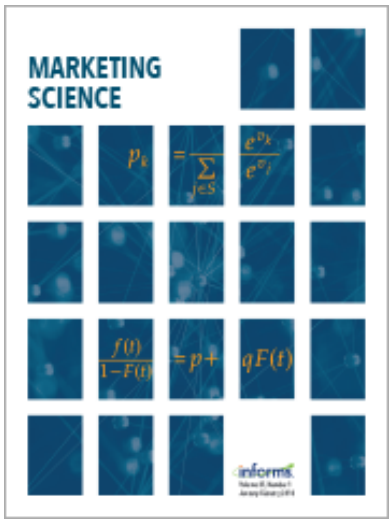

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Market Entry Strategy Under Firm Heterogeneity and Asymmetric Payoffs

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Abstract

How should a firm decide whether or not to enter an untested market when a competing firm is vying for the same market? Should a firm always speed to the market in an effort to capitalize on pioneering advantages? We address those questions by developing a simple game-theoretical model that captures the most essential factors in a firm's market entry decision, such as market uncertainty, firm heterogeneity, competition, cannibalization, and order-of-entry effects.

Our analysis shows that in a competitive context, both pioneering advantages and laggard's disadvantages can motivate a firm to speed to an untested market. Therefore, pioneering advantages alone are not an adequate guide for a firm to formulate its market entry strategy. The optimal decision may call for a firm to be a prudent laggard when pioneering advantages to the firm are substantial, or to become a market pioneer when facing pioneering disadvantages. We characterize different patterns of market entry as equilibrium outcomes for different configurations of the market reward structure and offer a conceptual framework for formulating market entry strategies that go beyond the conventional dichotomy: *speed* or *wait*. We show that the paradoxical phenomenon of "disadvantaged pioneers" can arise in a competitive context as the outcome of rational firms making rational choices.

To show that pioneering advantages alone are not the right litmus test for market entry decisions, we apply our general framework to a concrete case where consumer preference or the premium that consumers are willing to pay for the pioneering brand gives rise to pioneering advantages and laggard's disadvantages. We conclude that the firm with a larger pioneering premium may choose to wait, while a firm with a smaller pioneering premium speeds to the market.

Our analysis also sheds light on empirical research on pioneering advantages. Because firms may race into a market solely to avoid laggard's disadvantages rather than to capture pioneering advantages, pioneers are not necessarily the firms best positioned to establish, exploit, and maintain pioneering advantages. Therefore, it is not surprising that a significant percentage of pioneers fail, as documented by recent empirical research. Our normative investigation further suggests that this predicament in empirical research will not disappear even if we have complete data, use the right measurements, and employ perfect statistical techniques. Therefore, it is perhaps more fruitful to redirect our research effort in the search for pioneering advantages.

Finally, we extend our analysis to incorporate the effect of cannibalization on an incumbent firm's market entry strategy. We conclude that cannibalization can motivate an incumbent firm to wait, as the conventional wisdom suggests, but it can also be an impetus for a firm to become a market pioneer. We offer supporting evidence for our analysis and discuss managerial implications of our conclusions.

(*New Product Entry*; *Competitive Strategy*)

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1. Introduction

If two competing firms are both capable of introducing their own product into a new market, what should they do? Should a firm speed to the market, launching its product right away? Or should it wait until the rival has tested the market, or until uncertainties about the market have subsided? The executives at Airbus and Boeing have to address these questions when they consider whether to enter the 600-passenger super-jumbo-jet market (Zuckerman 1998). Those at Netscape and Microsoft also have to wrestle with the same questions in formulating their market entry strategies for Internet browsers (Lohr 1998). Indeed, executives in the consumer goods industry routinely confront these questions when making new product decisions.

It is not always clear what a firm should do or even how it should go about answering these questions. Being the first to a market, a firm clearly can capture many first-mover advantages such as securing a head start in the R&D race and establishing sustainable leadership in technology through learning by doing (Spence 1981, Ghemawat 1984, Gilbert and Newbery 1982); preempting rivals from acquiring scarce assets such as input factors, geographical and product locations, and retail shelf space (Prescott and Visscher 1977, Schmalensee 1978, Ghemawat 1986, Robinson and Fornell 1985); and locking in buyers through switching costs (Wernerfelt 1985, Klemperer 1987, Carpenter and Nakamoto 1989). Nevertheless, first movership involves risks and several disadvantages. As the first mover, a firm cannot free-ride on others in R&D and market development and must take on more investment risks because of market and technological uncertainties.[1]

Many experts suggest that a firm should weigh the benefits and costs of being a market pioneer, i.e., should look for a net pioneering advantage. For instance, in considering whether to launch a new drug for which patent protection is not effective, a pharmaceutical company should weigh the benefits of physician preference for the established pioneering brands, which can readily translate into long-lasting market share advantages, against the cost of having to bear the full burden of educating physicians and the public about the clinical effectiveness of the drug. The net trade-off could be negative, in which case the firm would be well advised to wait (Lieberman and Montgomery 1988, Olleros 1986). However, many empirical studies have concluded that pioneering is advantageous and hence the firm should not hesitate to take the plunge.[2] Indeed, academic research predominantly advocates early market entry.

This approach of using net pioneering advantages as a litmus test for making market entry decisions is not as plausible as it may seem, however. A company like Boeing can undoubtedly use the cost-benefit analysis of being a market pioneer to decide whether to speed to the jumbo-jet market if it is currently the only viable firm to enter the market. However, when both Boeing and Airbus stand ready to enter the market, whether or not Boeing can become a pioneer does not depend solely on its own action, and a simple cost-benefit analysis is no longer adequate for devising the optimal entry strategy. If, for instance, Boeing and Airbus conduct this analysis independently and both conclude that they can gain pioneering advantages if their own company becomes the pioneer, then they both have to brace for a surprise—neither firm will gain any pioneering advantage because neither is a first mover. Even if both firms are sophisticated enough to consider the possibility of the rival's entry, they will still face surprises if they are not certain of precisely what motivates the rival to enter the market.

In practice, firms do not always use this litmus test in their market entry decisions. Many examples in the consumer goods and hi-tech industries show that firms that have much to gain as market pioneers decide to wait, while firms that have little to gain or even much to lose choose to speed to a new market (Olleros 1986, Schnaars 1994). The introduction of low-quality bubble wraps by Sealed Air, disposable razors by Gillette, Cool Whip Dairy Based Whip Creme by General Foods, and Anheuser-Busch's late entry into China are some other documented examples of late entry by

[1]A review of literature on first-mover advantages and disadvantages is provided by Lieberman and Montgomery (1988).

[2]Robinson et al. (1993) and Kalyanaram et al. (1995) provide a good survey of empirical studies. See also Robinson and Fornell (1985), Urban et al. (1986), and Parry and Bass (1990). The first-mover advantages in the pharmaceutical industry are documented by Bond and Lean (1977).

dominant firms. More recently, Microsoft has disclosed that "the company's Internet plans were underway before Netscape rose to challenge Microsoft" (Lohr 1998). Yet Netscape, perhaps prompted by the fear that "the new company would have to move fast, or else Microsoft could destroy it," beat Microsoft to the market (Quittner and Slatalla 1998, p. 97). Microsoft's powerful push into the Internet software market did not come until the end of 1994, when Netscape had already proven the enormous mass appeal of the Internet and the commercial viability of Internet software. In this case, neither firm seemed to have been motivated mainly by "the positive net impact" of being a pioneer in their entry decisions. Another example is Coca-Cola. Its marketing manager admits, "The high ground is that we should be leading the way, but that's not our style. We let others come out, stand back and watch, and then see what it takes to take the category over" (Schnaars 1994, p. 2). It would be hard to argue that other firms are better equipped than Coca-Cola to capitalize on pioneering advantages.

If pioneering advantages are not an adequate guide for a firm to formulate its market entry strategy, how should the firm decide when to enter a new market? To address this question, we develop a parsimonious model that captures the most essential factors such as market uncertainty, firm heterogeneity, competition, cannibalization, and order-of-entry effects in a firm's market entry decision. We then use this model to explore the determinants of a firm's optimal entry strategy and develop insights about diverse market entry patterns.

Our normative investigation contributes to the existing literature in four ways. First, the generality of our model allows us to take the literature one step further in identifying the structure and determinants of a firm's optimal strategy and to offer a different conceptual framework for formulating market entry strategies. We show that both pioneering advantages (the net impact of being a market pioneer) and laggard's disadvantages (the net impact of being a market laggard) can motivate a firm to speed to an uncertain market.

Second, we focus on characterizing a firm's optimal market entry strategy when firms differ in their abilities to exploit their pioneer status or to cope with their laggard status. Thus, our research fills the need "for more theoretical work linking individual firm characteristics to optimal timing strategy" (Lieberman and Montgomery 1988). The generality and completeness of our analysis allow us to identify a set of generic market entry strategies which go beyond the conventional dichotomy *speed* or *wait*. The research that is most directly related to ours is Chatterjee and Sugita (1990), which studies the optimal entry strategy with a symmetrical duopoly making an irreversible investment while facing a specific reward structure. Our model allows for firm heterogeneity, variations in the market reward structure, and exit at a cost.

Third, our analysis also identifies the phenomenon of "disadvantaged pioneers" as the outcome of rational firms making rational choices. Case studies in the past have long suggested that pioneers may be permanently "disadvantaged." We show that such a seemingly paradoxical outcome can indeed arise in a competitive context. As an optimal strategy, a firm that could gain substantial pioneering advantages may choose to wait, whereas a firm that has little to gain or even much to lose as a pioneer may choose to speed to an untested market. Thus, even if firms behave rationally, it is quite possible that pioneers fail or are leapfrogged by late entrants.

Fourth, our analysis helps to shed light on the empirical search for pioneering advantages. If rational firms speed to a new market to capture pioneering advantages, which are likely to persist over time, one would expect that pioneering firms tend to enjoy market share or profitability advantages. However, many studies, e.g., Glazer (1985), Dillon et al. (1979), and Freeman (1982), have found no, mixed, or positive order-of-entry effects, to the bafflement of researchers. The empirical puzzle has been attributed to misspecification problems (Mitchell 1991, Moore et al. 1991) and the problems of survivor bias and poor data quality (Golder and Tellis 1993). Those problems aside, our analysis provides a normative perspective on what we should expect to observe in the empirical quest and on how it should be carried out. We show that diverse patterns of market entry are possible, many of which are not motivated by pioneering advantages, and hence a single-minded search for those advantages is not advisable.

The rest of the paper is organized as follows. In the next section, we set up our basic model. We then explore a firm's optimal entry decision in a competitive context and offer a concrete analysis of competitive market entry strategies when consumers in the market favor the pioneering brand. Then, we provide some extensions to our basic model. In the final section, we conclude the paper with remarks on the directions of future research.

2. The Model

Consider two competing firms, each with a ready product, deciding independently whether to enter a new market.[3] We denote these two firms by A and B, respectively, where Firm A is designated as the incumbent firm. In this basic model, we assume that entry into the new market does not entail any cannibalization to the incumbent's existing market, so that each firm's entry decision is based solely on risks and rewards pertaining to the new market. In §5, we will relax this assumption and extend our analysis to allow for cannibalization.

2.1. Market Rewards and Order-of-Entry Effect

When a firm enters a new market, it typically incurs some fixed cost to develop the market and to build up its production capacity. We assume that firms incur identical fixed costs F upon their entry into a given market to control for the difference in entry cost as a factor that determines the order of competitive market entry. Moreover, a firm also faces uncertainty about the profitability of entering an untested market. We model this uncertainty by assuming that with probability p, the demand in the new market is "high" (H), and with probability $(1 - p)$ the demand is "low" (L). We assume that both firms have the same assessment of the market potential and hence exclude private information as a driving force in a firm's entry strategy.

A firm's payoffs in the new market depend on whether the realized demand there is high or low, and on the nature of market competition. To be as general as possible so that we can identify a framework for making market entry decisions, we use reduced-form payoff functions. In §4 we provide a concrete analysis of a firm's optimal market entry strategy when consumers prefer the pioneering brand. In the case where market demand is low (L), we assume that demand is so low that neither firm wants to enter or stay in the market even if it holds a monopoly in the market.[4] Thus, when demand is low, the best either firm can do is either to exit the market (if it has already entered it) with a salvage value of its investment in the amount of f, where $F > f$, or to stay out of the market (if it has not already entered it).

In the case where market demand is high (H), let $\pi_i^H(e)$ be firm i's payoffs excluding its entry costs, given entry order e. The variable $e = 0$, A, or B indicates whether both firms enter the market at about the same time so that neither gains a head start from order of entry effects ($e = 0$) or whether Firm A (B) enters the market before the rival ($e = A(B)$). Past research has shown that a firm's payoffs in the new market are in general contingent on the order of entry. The payoffs can be taken as the present value of the future profit stream as computed in Chatterjee and Sugita (1990). Thus, if Firm A enters the market before Firm B, Firm A's payoffs, excluding entry costs, are given by $\pi_A^H(A)$. If Firm A and Firm B happen to enter together, Firm A's payoffs are given by $\pi_A^H(0)$. Furthermore, if Firm A enters the market after Firm B, Firm A's payoffs become $\pi_A^H(B)$. Similarly, Firm B's payoffs are, respectively, $\pi_B^H(A)$, $\pi_B^H(0)$, and $\pi_B^H(B)$. To ensure that both firms actually enter if the realized demand in the market is high, we assume that a firm always makes positive overall profits regardless of entry order ($\pi_A^H(e) > F$ and $\pi_B^H(e) > F$).

[3]By this assumption, we exclude the issues related to innovation and R&D race and focus on market entry decisions. Those issues are interesting in their own right and are dealt with extensively elsewhere. See, for example, Kamien and Schwartz (1982) and Reingahum (1983).

[4]The case where the low market can sustain two competing firms is trivial. Both firms will speed to the new market because they face no material market uncertainty in that case. If we allow one firm to operate profitably in the low market, we can show that the substance of our analysis remains the same, although notations will be slightly more complex. What happens under this alternative assumption is that both firms have more incentives to rush into the new market and have fewer incentives to wait because expected loss in the low market is smaller.

2.2. Market Entry Game

Because of the uncertainty about market potential and less than full recovery of investment expenditures through divestment if the market turns out to be unprofitable ($F > f$), market entry is a judicious decision in response to ever-changing market conditions. We use a three-stage entry game to highlight the opportunities and perils associated with market entry amid changing market conditions and to capture the strategic rivalry between competing firms. In the first stage, either firm can opt to enter a new market under uncertainty. In the second stage, uncertainty in the market resolves, either because the market is tested by one or both firms, or because more information becomes available for some exogenous reasons (in §5, we will relax this assumption and assume that uncertainty persists if neither firm has tested the market).[5] At this stage, if a firm has already entered, it has the opportunity to exit the market if so desired. If a firm has not entered, it has a second chance to enter. In the third stage, firms' payoffs are realized, depending on previous entry/exit decisions and on the nature of competition in the post-entry market. Here we deliberately assume, for simplicity, that a firm's payoffs are realized only in the third stage, after uncertainty in the market is resolved. If instead a firm also has some expected payoffs immediately upon entry in the first stage, the expected gain or loss in that period will add to a firm's total expected payoffs, and our qualitative conclusions will not change.

2.3. First-Mover Advantages and Late-Mover Disadvantages

If a firm succeeds in beating its competitor to a new market, it gains benefits above and beyond mere participation in the market. These incremental benefits, which are solely attributable to a firm's achieving first-movership, are the first-mover advantages to the firm. In our model, we can naturally define a firm's first-mover advantages, α_i, as the incremental profit attributable to its first-mover status relative to a level playing field of simultaneous entry where no firm enjoys any advantage or suffers from any disadvantage resulting from order-of-entry effects. Algebraically, we have $\alpha_A = \pi_A^H(A) - \pi_A^H(0)$ for Firm A and $\alpha_B = \pi_B^H(B) - \pi_B^H(0)$ for Firm B. A firm also suffers from adverse profit impact δ_i if the firm enters a market late. We define $\delta_A = \pi_A^H(0) - \pi_A^H(B)$ and $\delta_B = \pi_B^H(0) - \pi_B^H(A)$ as late-mover disadvantages, respectively, for Firm A and Firm B.

In general, a firm's first-mover advantages need not be related to its rival's first-mover advantages when these advantages are derived from supply-side factors. This is because the ability, skills, and resources required to exploit the early entry status and to establish market advantages are frequently firm-specific (Mitchell 1991). By the same token, a firm's first-mover advantages need not be related to its rival's late-mover disadvantages either, because the ability to overcome any market disadvantage is also firm specific. However, when these advantages are derived from the demand-side factors, a firm's first-mover advantages may be correlated with its rival's first-mover advantages or late-mover disadvantages, as we show through a detailed example in §4. In our general analysis, we impose no such restrictions so that we can explore market entry strategies under all possible reward structures. Specifically, we allow α_i and δ_i to differ across the firms and hence allow for heterogeneity in market conditions and firm skills and abilities that together define a broad array of market reward structures. Our analysis will show that it is precisely because of this heterogeneity that diverse entry strategies arise in a competitive context.

Note that a firm's first-mover advantages and late-mover disadvantages as we define them fully characterize a firm's ex post (after market uncertainty has been resolved) preference over winning, losing, and drawing in a competitive game of market entry. Our definition of first-mover advantages differs conceptually then from that in many empirical studies. For the convenience of dummy variable regression analysis, first-mover advantages are defined as the difference in a performance measure—frequently, market share as a proxy for profitability—between the first mover and a late entrant. This measure is equivalent to $(\pi_A^H(A) - \pi_A^H(B))$ for Firm A and $(\pi_B^H(B) - \pi_B^H(A))$ for Firm B. Henceforth, we will refer to this measure as

[5]This assumption is made mainly for simplicity of exposition. However, uncertainty about a market (say, the market for home exercise equipment) can resolve because a related market (say, the market for diet beverages) is tested.

DPFL (the *D*ifference in *P*rofitability between the *F*irst mover and the *L*ate entrant). We can easily generate *DPFL* for a firm in our model as $\alpha_i + \delta_i$, i.e., the sum of first-mover advantages and late-mover disadvantages as we define them.

3. Market Entry Strategies

In our basic model, Firm A, the incumbent firm, makes $\bar{\pi}_A$ from the existing market. Its payoff (and the rival's) from the new market depend on their entry decisions and the resolution of market uncertainties. To determine the optimal entry strategy for a firm facing a given reward structure, we derive in this section the sub-game perfect equilibrium for our basic model by working backward.

3.1. Reward Structure

Because of the general nature of our payoff functions in the third stage, we can go directly to the second stage to examine a firm's entry or exit decision once uncertainties in the market are resolved. A firm's decision at this stage, and its subsequent payoffs, depend on whether the firm has entered in the first stage under uncertainty and how demand uncertainty is resolved.

In the case where neither firm has entered the market under uncertainty, a firm's entry decision now is contingent on the realized demand. Both firms will enter if the demand is high, so that firms' payoffs are, respectively, given by $(\pi_A^H(0) - F)$ and $(\pi_B^H(0) - F)$. If the demand is low, neither will enter, so each gets zero payoff.

If both firms have already entered the market under uncertainty, each firm's exit decision is contingent on the realized market demand. Both firms will stay if the demand is high, and their payoffs in the second stage are, respectively, $\pi_A^H(0)$ and $\pi_B^H(0)$. However, both will exit if the demand is low. Each firm's payoffs will then be the salvage value of their previous investments f. If only Firm A has entered under uncertainty, Firm A will stay and Firm B will enter if the realized demand is high. In this case, Firm A's payoffs are given by $\pi_A^H(A)$, while Firm B's payoffs are $(\pi_B^H(A) - F)$. If the demand is low, Firm A will exit the market with f as its payoffs, and Firm B will not enter, so that its payoffs are zero. Similarly, if only Firm B has entered, the payoffs for Firm A and Firm B are respectively given by $(\pi_A^H(B) - F)$ and $\pi_B^H(B)$ if the realized demand is high, and by 0 and f if the demand is low.

In the first stage, each firm independently decides whether to speed to the market under uncertainty (*Speed*), or to wait (*Wait*), anticipating subsequent entry or exit decisions contingent on the realized demand in the new market. In the case where both firms choose the strategy *Speed*, the expected payoff for firm i is equal to the sum of the state-dependent payoffs, $\pi_i^H(0)$ and f, weighted by the probabilities p and $(1 - p)$, minus investment costs F. Firm A also makes $\bar{\pi}_A$ from a separate market. We can similarly derive each firm's expected payoff for the rest of the strategy combinations resulting from each firm's independent entry decisions. The normal form of the entry game in the first stage is given by Table 1.

3.2. Equilibrium of Competitive Entry Game

Each of the four cells in Table 1 can be a pure strategy equilibrium for the entry game. A pure strategy equilibrium exists where both firms speed to the market if

$$-F + p[\bar{\pi}_A + \pi_A^H(0)] + (1 - p)(f + \bar{\pi}_A) \geq p[\bar{\pi}_A + \pi_A^H(B) - F] + (1 - p)\bar{\pi}_A, \quad (1)$$

$$-F + p\pi_B^H(0) + (1 - p)f \geq p[\pi_B^H(A) - F]. \quad (2)$$

Using the definitions in §2, we can further simplify these inequalities as

$$\delta_A \geq \psi, \text{ and } \delta_B \geq \psi, \quad (3)$$

where $\psi = (1 - p)(F - f)/p$. Multiplying both sides of the two inequalities in Equation (3) by p, we can see

Table 1 Entry Game Without Cannibalization

	Firm A *Speed*	Firm A *Wait*
Firm B *Speed*	$-F + p[\bar{\pi}_A + \pi_A^H(0)] + (1 - p)(f + \bar{\pi}_A)$ $-F + p\pi_B^H(0) + (1 - p)f$	$p[\bar{\pi}_A + \pi_A^H(B) - F] + (1 - p)\bar{\pi}_A - F$ $+ p\pi_B^H(B) + (1 - p)f$
Firm B *Wait*	$-F + p[\bar{\pi}_A + \pi_A^H(A)] + (1 - p)(f + \bar{\pi}_A)\, p[\pi_B^H(A) - F]$	$p[\bar{\pi}_A + \pi_A^H(0) - F] + (1 - p)\bar{\pi}_A\, p[\pi_B^H(0) - F]$

(The first entry in each cell is the expected profit for firm A and the entry below is for firm B.)

that the left-hand side corresponds to a firm's ex ante assessment of the disadvantages it may suffer if it is late to the market and tries to break in. The right-hand side corresponds to the expected loss if the market turns out to be disappointing, or to first-mover disadvantages. Viewed from a different angle, the expression $(1 - p)(F - f)$ is also the expected value of waiting for both firms, or "advantages enjoyed by late-mover firms" (Lieberman and Montgomery 1988), because a firm can avoid such investment failures by waiting for uncertainty to resolve. However, a firm may not want to wait even if the cost of failure is high. This is because it has no control over the rival's entry decision and it may suffer substantial late-mover disadvantages in competing with its rival in the high market if it waits and its competitor enters first. Thus, if the prospect of a high market is sufficiently encouraging and sunk costs are sufficiently low, or if late-mover disadvantages are sufficiently large for both firms, they will enter the market despite market uncertainty.

Similarly, a pure strategy equilibrium exists where both firms choose to wait if

$$\alpha_A \leq \psi, \text{ and } \alpha_B \leq \psi, \tag{4}$$

i.e., expected first-mover advantages are smaller than the value of waiting for both firms. In this case, both firms wait until they are certain of their success and then enter. Furthermore, a pure strategy equilibrium exists where firm i enters under uncertainty and the other competing firm enters upon a high realized demand if

$$\alpha_i \geq \psi, \text{ and } \delta_{-1} \leq \psi. \tag{5}$$

In this equilibrium, a firm is motivated to enter under uncertainty by advantages the first mover can establish, while the competing firm waits because its late-mover disadvantages are sufficiently small that waiting is an attractive alternative.

When a pure strategy equilibrium does not exist, a unique mixed strategy equilibrium does. The mixed strategy equilibrium is the only equilibrium if one firm has substantial first-mover advantages ($\alpha_i \geq \psi$) and few late-mover disadvantages ($\delta_i \leq \psi$), but the competing firm faces exactly the opposite incentives. In the mixed strategy equilibrium, each firm randomizes its entry strategy. In practical terms, we can interpret the randomization as the assessment by the managers about the likelihood of a firm's entry. The equilibrium probabilities of market entry for Firms A and B are, respectively, given by

$$\sigma_A = \frac{\psi - \alpha_B}{\delta_B - \alpha_B}, \ \alpha_B = \frac{\psi - \alpha_A}{\delta_A - \alpha_A}. \tag{6}$$

Using Conditions (3) through (6), it is straightforward to characterize a firm's equilibrium entry strategy for all possible configurations of the reward structure represented by a 4-tuple $(\alpha_A, \delta_A, \alpha_B, \delta_B)$, which we summarize in Table 2. As a firm's equilibrium strategy is the optimal strategy, Table 2 will allow us to identify the generic strategy that a firm can pursue when facing a specific market reward structure.

3.3. Optimal Timing of Market Entry

From Table 2 we can see that the existence of first-mover advantages (α_i) need not be a sufficient reason for a firm to strive to become a pioneer in a new market. A pioneering firm also suffers from first-mover disadvantages (ψ). However, a simple cost and benefit analysis of these two factors, i.e., $\alpha_i - \psi$, could sometimes lead to the optimal market entry strategy for the firm. As we see from the second and fifth columns (rows) of Table 2, when Firm A (B) faces pioneering disadvantages ($\alpha_i - \psi \leq 0$), the firm's optimal strategy is to wait regardless of its rival's entry strategy, but

Table 2 Equilibrium Market Entry Strategies*

Reward Structure	$\delta_A \leq \psi$ $\alpha_A \leq \psi$	$\delta_A \geq \psi$ $\alpha_A \leq \psi$	$\delta_A \leq \psi$ $\alpha_A \geq \psi$	$\delta_A \geq \psi$ $\alpha_A \geq \psi$
$\delta_B \leq \psi$ $\alpha_B \leq \psi$	(W_A, W_B)	(W_A, W_B)	(S_A, W_B)	(S_A, W_B)
$\delta_B \geq \psi$ $\alpha_B \leq \psi$	(W_A, W_B)	(S_A, S_B) (W_A, W_B)	(σ_A, σ_B)	(S_A, S_B)
$\delta_B \leq \psi$ $\alpha_B \geq \psi$	(W_A, S_B)	(σ_A, σ_B)	(S_A, W_B) (W_A, S_B)	(S_A, W_B)
$\delta_B \geq \psi$ $\alpha_B \geq \psi$	(W_A, S_B)	(S_A, S_B)	(W_A, S_B)	(S_A, S_B)

*S_i stands for Speed for firm i, W_i for Walt, and $\psi = (1 - p)(F - f)/p$. Two entries indicate multiple equilibria. The mixed strategy equilibrium is refined out when a pure strategy equilibrium exists.

when it faces pioneering advantages ($\alpha_i - \psi > 0$), the firm should speed to the market.

In general, however, pioneering advantages are not the right litmus test for a firm to decide whether to pioneer a market. In a competitive context, a firm's entry decision should weigh not only pioneering advantages ($\alpha_i - \psi$), as experts have suggested in the past, but also laggard's disadvantages ($\delta_i - \psi$), especially when a firm faces conflicting incentives with regard to market entry (either $\alpha_i - \psi \geq 0$ but $\delta_i - \psi \leq 0$ or $\alpha_i - \psi \leq 0$ but $\delta_i - \psi \geq 0$). In those cases, as we see from the third and fourth columns (rows) of Table 2, a firm's optimal entry strategy cannot be inferred from the firm's pioneering advantages ($\alpha_i - \psi$) alone. This is because, with competing firms vying for the same market, a firm that chooses not to pioneer a market would confer on its rival the chance to do so, and hence would have to deal with any adverse consequence of being a market laggard if the market turns out to be inviting.

This insight about pioneering advantages highlights the inadequacy of *DPFL* as a litmus test for market entry decisions. As has been noted previously by Chatterjee and Sugita (1990) and Golder and Tellis (1993), *DPFL* for a firm, i.e., $\alpha_i + \delta_i$, fails to account for the risk ψ that the first mover must bear. Our analysis takes this critique one step further, showing that even if the risk is properly accounted for, e.g., in an expected *DPFL* measure, it has questionable value in guiding a firm's market entry decision in a competitive context. This is because *DPFL* does not capture a firm's preference over winning, losing, or drawing in a competitive game of market entry. Not surprisingly, it does not enter a firm's decision calculus for formulating an entry strategy as shown in Table 2. From Table 2, we note that entering the market early versus late is a function of the precise configuration of δ_i, α_i, for $i = A, B$, and not $\delta_i + \alpha_i$ ($i = A, B$). If we were to use *DPFL* as the measure of the order-of-entry effect, we would have concluded that a firm's entry strategy should be dichotomous. Firm i should always wait if $DPFL_i \leq 2\psi$ and should always speed to the market if $DPFL_i \geq 2\psi$. Such an analysis would have given us a very partial view of the market entry patterns. All other possible equilibria in Table 2, except for (W_A, W_B), (W_A, S_B), (S_A, W_B), and (S_A, S_B) on the four (inside) corners, would have been overlooked.

More importantly, *DPFL*, being an aggregate measure, obscures the role of $\delta_i - \psi$, laggard's disadvantages. From Table 2, we see that all else being equal, a firm's likelihood of speeding to an untested market in a competitive context is nondecreasing in its pioneering advantages and laggard's disadvantages. Available empirical studies that specify the sources of a firm's pioneering advantages or its laggard's disadvantages in the context of a specific market offer support for this conclusion. In studying the diagnostic imaging industry, Mitchell (1989) offers evidence that firms with specialized assets, such as reputations, distribution systems, and service networks, all of which can help them to overcome late-mover disadvantages, tend to be late entering a new imaging subfield. Sullivan (1992) shows that brand extensions tend to work well for late-entering firms. This finding is consistent with our conclusion, because brand assets help a firm to overcome late-mover disadvantages.

The full view presented in Table 2 reveals that a firm's optimal strategy goes beyond the conventional dichotomy, *Speed* or *Wait*, as stated in the following proposition.

Proposition 1. *If a firm's first-mover advantages are substantial ($\alpha_i \geq \psi$) but its late-mover disadvantages are not ($\delta_i \leq \psi$), it should play the strategy of an opportunistic pioneer: Speed to the new market when the rival is inclined to wait, but wait when the rival is inclined to hasten. If a firm's late-mover disadvantages are substantial ($\delta_i \geq \psi$) but its first-mover advantages are not ($\alpha_i \leq \psi$), the firm should play the strategy of a reluctant pioneer: speed to the new market if the rival is so inclined but wait if the rival has little inclination to hasten.*[6]

3.4. Laggard's Disadvantages and Competitive Market Entry

According to conventional wisdom, the firm that can gain more pioneering advantages than its rival is expected to be the market pioneer. This is wrong when laggard's disadvantages are present. Indeed, one implication of Proposition 1 is that, in a competitive context, a firm that has much to gain as a pioneer may

[6]We thank Don Lehmann and the area editor for suggesting the terms "reluctant" and "opportunistic" pioneer.

rationally choose to wait, while the rival firm that has little to gain or even much to lose as a pioneer speeds to the market, provided that the latter faces laggard's disadvantages and the former does not. From Table 2, we see that when Firm B (A) faces laggard's disadvantages, or $\delta_B - \psi \geq 0$ ($\delta_A - \psi \geq 0$), while Firm A (B) does not, Firm B (A) will be the market pioneer even when Firm A (B) can reap more pioneering advantages in the market, or $\alpha_A - \psi > \alpha_B - \psi \geq 0$ ($\alpha_B - \psi > \alpha_A - \psi \geq 0$). Furthermore, there is a real possibility for the phenomenon of "disadvantaged pioneers" to occur (Olleros 1986). As we see from the fourth column and the third row and also from the third column and the fourth row, a firm having everything to *lose* as a market pioneer—i.e., one that suffers pioneering disadvantages ($\alpha_i - \psi \leq 0$)—may speed to a new market, while the firm having everything to *gain* from pioneering the market—i.e., one that faces pioneering advantages ($\alpha_{-i} - \psi \geq 0$)—waits.

It is important to note that the phenomenon of "disadvantaged pioneers" is not an artifact of the way we define first-mover advantages and late-mover disadvantages. We can reach the same conclusion if we use *DPFL* instead. For instance, if $\psi = 2$, $\alpha_A = 7$, $\delta_A = 1$, $\alpha_B = 2.5$, and $\delta_B = 2.5$, the equilibrium of the entry game is characterized by (W_A, S_B) (the fifth row and fourth column in Table 2): Firm B speeds to the market, but Firm A waits. However, we have in this case $DPFL_A = \alpha_A + \delta_A = 8 > DPFL_B = 5$. Similarly, if $\psi = 1$, $\alpha_A = 5$, $\delta_A = 0.5$, $\alpha_B = -4.5$, and $\delta_B = 4$, we have a unique mixed strategy equilibrium, by Equation (6), where $\sigma_A = \frac{11}{17}$ and $\sigma_B = \frac{8}{9}$. This means that even though Firm B has everything to lose as a market pioneer by the conventional measure ($DPFL_B = -4.5 + 4 = -0.5$), while Firm A has everything to gain ($DPFL_A = 5 + 0.5 = 5.5$), Firm B's chance of becoming the sole market pioneer is about 31% ($\sigma_B(1 - \sigma_A) = \frac{16}{51}$).

Proposition 1 provides a rational explanation as to why many industry leaders, such as Coca-Cola, Anheuser-Busch, and P&G, with unsurpassed skills in advertising and distribution and abundant financial resources, choose not to speed to new, uncertain markets again and again. In fact, in three-quarters of the 28 cases Schnaars (1994) has studied, pioneers are not firms that can rely on their marketing clout, distribution channels, and financial resources to push others in their respective industries to the sidelines.

4. Preference for Pioneer's Product and Laggard's Disadvantages

In this section we apply our general framework to a concrete case where consumer preference for the pioneering brand drives pioneering advantages and laggard's disadvantages (Carpenter and Nakamoto 1989).

Suppose that when demand is high, the market is characterized by the familiar Hotelling model. We maintain the standard assumptions that consumers, the number of which is normalized to one, are uniformly distributed along a unit line between zero and one, and that they purchase only one unit of the product supplied competitively by two differentiated firms—A and B, respectively—at a constant marginal cost. We normalize the cost to zero for simplicity. In this analysis, we take a firm's product positioning decision as given, and focus only on order-of-entry effects on price competition. Specifically, we assume that if one firm occupies one end of the line, the other will occupy the other end; cf. d'Aspremont et al. (1979). Our general framework can, however, incorporate models such as Moorthy (1988), where competing firms also choose their product positioning.[7]

To establish the benchmark case where none of the firms experience advantages or disadvantages due to entry, we assume that if both firms enter the market together, consumers have an identical reservation price v and incur a travel cost of t per unit distance.[8] Once the entry is made, both firms independently decide on their prices. The equilibrium prices are simply $P_A^0 = P_B^0 = t$ and the payoffs are, in the notation of our model, $\pi_A^H(0) = \pi_B^H(0) = \frac{t}{2}$.

If one of the firms enters the market first, consumers always favor its product. We can model consumers' preference for the pioneer's product by assuming that

[7]Moorthy (1988) and (1991) develop a model where two competing firms choose their respective locations in the quality space and then prices.

[8]The unit travel cost t can be taken as a measure of product differentiation in a market. This measure may vary across product-market situations with implications for market entry strategy.

consumers' reservation prices are higher for the pioneer's product than for the late entrant's.[9] Specifically, when Firm A (B) enters the market first, a consumer's reservation price for Firm A's (B's) products is v_A (v_B), and the reservation price for Firm B's (A's) product is v, as in the case of simultaneous entry, with $v_A > v$ ($v_B > v$). To maintain the viability of post-entry competition, we assume $\Delta v_i \leq 3t$, where $\Delta v_i = v_i - v > 0$ for $i = A, B$. The consumer preference for the pioneering brand may arise because the pioneering firm has the opportunity to influence consumer perceptions about its product attributes, quality, and performance.

It is straightforward to derive the equilibrium of the pricing game with order-of-entry effects. The payoffs are summarized below in the notation of our model:

$$\pi_A^H(A) = \frac{(\Delta v_A + 3t)^2}{18t}, \pi_B^H(A) = \frac{(\Delta v_A - 3t)^2}{18t}, \quad (7)$$

$$\pi_A^H(B) = \frac{(\Delta v_B - 3t)^2}{18t}, \pi_B^H(B) = \frac{(\Delta v_B + 3t)^2}{18t}. \quad (8)$$

The market pioneer in this case always makes a higher profit than the late entrant and also gains a higher market share.[10] We can qualify a firm's first-mover advantages and late-mover disadvantages by using the definitions we have developed. They are summarized below:

$$\alpha_A = \frac{\Delta v_A(\Delta v_A + 6t)}{18t} > 0,$$

$$\alpha_B = \frac{\Delta v_B(\Delta v_B + 6t)}{18t} > 0, \quad (9)$$

$$\delta_A = \frac{\Delta v_B(6t - \Delta v_B)}{18t} > 0,$$

$$\delta_B = \frac{\Delta v_A(6t - \Delta v_A)}{18t} > 0. \quad (10)$$

From Equations (9) and (10), we can see that this market rewards the first mover, but punishes the late mover, as both firms' first-mover advantages are positive and so are their late-mover disadvantages.[11] Does this mean that firms should always speed to this market?

The answer is "no" when the risk of market entry ψ is considered. Rivalry, risk, and firm-specific rewards generate many possible entry patterns, depending on the magnitude of Δv_i, which we illustrate in Figure 1.[12] Both firms may choose to speed to the market, as one might expect, when consumers in the market are willing to pay a large premium for either pioneering brand, i.e., $\Delta v_i > \lambda_2$ for $i = A, B$. However, they may choose to wait when the premium is too small to justify the risk associated with early market entry, i.e., $\Delta v_i \leq \lambda_1$ for $i = A, B$. Furthermore, the firm that commands more premium for its pioneering product may choose to speed to the market, while the one that has less premium to capture waits, if $\lambda_1 \leq \Delta v_i \leq \lambda_2$ and $0 \leq \Delta v_{-i} \leq \lambda_1$. However, all these do not imply, surprisingly, that a firm should speed to an untested market whenever the market offers a sufficiently large premium for its pioneering product.

PROPOSITION 2. *In a market where consumers are willing*

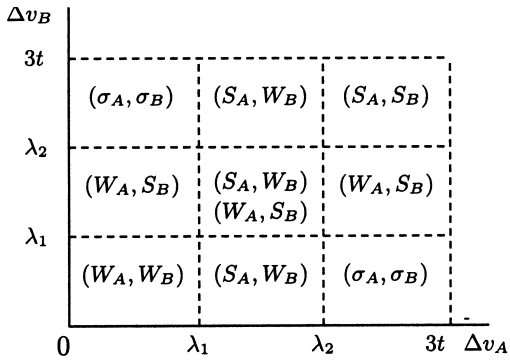
[9]We thank the area editor for making this suggestion.

[10]The market share for Firm A is $1/2 + \Delta v_A/6t$ when it is the market pioneer and $1/2 - \Delta v_B/6t$ when it is not.

[11]Moorthy's model (1988) generates a similar market reward structure. Applying our definitions to Moorthy's model, we have $\alpha_A = 0.0047\ b^3/\alpha$, $\delta_A = 0.0064\ b^3/\alpha$, $\alpha_B = 0.0025\ b^3/\alpha$, and $\delta_B = 0.0086\ b^3/\alpha$.

[12]To generate all entry patterns, we assume $\psi \leq t/2$ in our derivations. We thank an anonymous reviewer and the area editor for suggesting this analysis.

Figure 1 Consumer Preference for Pioneer Product and Equilibrium*



**Note:* We define $\lambda_1 = 3\sqrt{t(2\psi + t)} - 3t$ and $\lambda_2 = 3t - 3\sqrt{t(t - 2\psi)}$

to pay a premium for a pioneering brand, the firm with the larger pioneering premium may choose to wait, while a firm with a smaller pioneering premium speeds to the market.

We can deduce Proposition 2 from Figure 1. When $\lambda_2 < \Delta v_B(\Delta v_A) < 3t$ and $\lambda_1 < \Delta v_A(\Delta v_B) < \lambda_2$, it is Firm A (Firm B), rather than Firm B (Firm A), that speeds to the market. Even if a firm gains little premium as the market pioneer ($0 \le \Delta v_i < \lambda_1$), while its rival has much to gain as the market pioneer ($\lambda_2 < \Delta v_{-i} \le 3t$), there is a significant chance, which can be computed using Equation (6), that this firm will speed to the market while the rival waits. This arises because, in this specific market, a firm's first-mover advantages are positively correlated with the rival's late-mover disadvantages. When consumers are willing to pay a high premium for, say, Firm A's pioneering product but not as much for Firm B's, Firm A has more incentives than Firm B to speed to the market at any given level of market risk ψ. However, the fact that Firm A may gain a large first-mover advantage also motivates Firm B to speed to the market to preempt Firm A, because Firm B will be severely handicapped as a late entrant. Correspondingly, because its late-mover disadvantages are moderate, Firm A chooses to wait.

The Net browser market is a recent case in point. With a head start over the rival, either Netscape or Microsoft (especially the latter) could do many things to command consumer preference that it would not otherwise be able to do. It could have undivided attention from its potential customers, it could lock in all the best customers for Internet software, and it could stay one step ahead of competition in product design and customer service through learning by doing. All these advantages accruing to the first mover will translate into added profits to the pioneering firm. Microsoft stands to benefit most from them, as its entry at the time would have convincingly sanctioned the Internet as "the information highway."

However, the costs of failing to be a pioneer are not the same for both firms. Netscape would suffer tremendously if Microsoft could beat it to the market. A "one-trick pony," as it was called by its marketing vice president at the time, Netscape had little financial resources, marketing prowess, and distribution power to leverage, and even less hope to break into a market where Microsoft was well established. Microsoft, on the other hand, had "more money, more programmers, more experience, and a firmly entrenched monopoly over the operating systems of personal computers" so that it could easily catch up whenever it decided to "extend and embrace" the market (Quittner and Slatalla 1998, p. 5).

Thus, as our theory suggests, when Microsoft faced a determined Netscape, for whom waiting was not a palatable option, it looked the other way and did not speed to the market. Only after Netscape had tested the commercial viability of Internet software did Microsoft start to power its way into the browser market by leveraging the popularity of its operating systems and its strength in financial and human resources. Indeed, Microsoft's earlier experience as a late entrant to the spreadsheet application market and its ongoing effort to "extend and embrace" the market for music and video players all show that its superior ability to overcome late-mover disadvantages has diminished its penchant for being the first mover in an untested market (Gross 1996, Bank 1999).

5. Extensions

In this section we relax two key assumptions in our basic model, namely, that the market entry by a firm does not cannibalize its existing business and that market uncertainty resolves in the second stage even when neither firm tests the market.

5.1. Cannibalization and Market Entry

The issue of cannibalization is "one of the toughest challenges facing corporate strategists" today, especially in the emerging e-economy (Huey 1999). Should a firm's entry strategy change radically due to cannibalization? The answer is "yes" according to the conventional wisdom which holds that cannibalism is "something to be avoided at almost any cost" (Howard 1981).

We examine the merits of this managerial wisdom in a competitive context by incorporating cannibalization into our basic model. In general, the extent to which cannibalization may occur once a new market is open depends on factors such as product substitutability between the existing and the new markets, and demand conditions and price competition in the new

market (Ghemawat 1991). This means that the extent of cannibalism will depend on the order of entry and demand conditions in the new market, and can range from the annihilation of profitability in the existing market to unscathed profitability. To maintain the generality of our analysis, let $\kappa(e) \geq 0$ denote the magnitude of cannibalization to Firm A's profit in the existing market when demand in the new market is high and the order of entry is e, where $e = 0, A, B$ as before. We interpret $\kappa(e)$ as Firm A's loss of profit in the existing market due to the opening up of the new market. Thus, all else being equal, $\kappa(e)$ is larger, for instance, if the quality or positioning of the product in the new market is more similar to that of the existing product (Moorthy and Png 1992) or the price competition in the new market is more intense (Ghemawat 1991). To facilitate comparison with our basic model, we maintain our previous assumptions about market parameters, i.e., F, p, and f, and we also retain the assumption that when demand is low in the new market, neither of the two firms can profitably stay in the new market.[13]

With these modified assumptions, we can again derive each firm's expected payoffs, contingent on both firms' entry decisions under uncertainty in the first stage. The results are summarized in Table 3. Note that if $\kappa(e) = 0$ for all $e = 0, A, B$, i.e., cannibalization is absent, Table 3 is identical to Table 1. In equilibrium, both firms speed to the new market if

$$\delta_A + [\kappa(B) - \kappa(0)] \geq \psi, \text{ and } \delta_B \geq \psi. \quad (11)$$

Firm A waits, but Firm B speeds to the market if

$$\delta_A + [\kappa(B) - \kappa(0)] \leq \psi, \text{ and } \alpha_B \geq \psi. \quad (12)$$

On the other hand, Firm B waits but Firm A speeds to the new market if

$$\alpha_A + [\kappa(0) - \kappa(A)] \geq \psi, \text{ and } \delta_B \leq \psi. \quad (13)$$

Finally, both firms will optimally choose to wait if

[13]It is also reasonable to assume that cannibalization may enable a single firm to build a profitable business even when demand is low in the new market. In that case, all else being equal, Firm B always has more incentive to speed to the market and stay there once entered because cannibalization removes Firm B's risk of market failure. However, under this alternative assumption we have the same qualitative conclusions about the effect of cannibalization on the incumbent firm's entry decision.

Table 3 Entry Game with Cannibalization

	Firm A *Speed*	Firm A *Wait*
Firm B *Speed*	$-F + p[\bar{\pi}_A - \kappa(0) + \pi_A^H(0)] + (1-p)(f + \bar{\pi}_A)$ / $-F + p\pi_B^H(0) + (1-p)f$	$p[\bar{\pi}_A - \kappa(B) + \pi_A^H(B) - F] + (1-p)\bar{\pi}_A - F$ / $+ p\pi_B^H(B) + (1-p)f$
Firm B *Wait*	$-F + p[\bar{\pi}_A - \kappa(A) + \pi_A^H(A)] + (1-p)(f + \bar{\pi}_A)$ / $p[\pi_B^H(A) - F]$	$p[\bar{\pi}_A - \kappa(0) + \pi_A^H(0) - F] + (1-p)\bar{\pi}_A\, p[\pi_B^H(0) - F]$

$$\alpha_A + [\kappa(0) - \kappa(A)] \leq \psi, \text{ and } \alpha_B \leq \psi. \quad (14)$$

Comparing equilibrium Conditions (11)–(14) with (3)–(6) in § 3.2, we see that our analysis only partially supports the conventional wisdom that cannibalization deters an incumbent firm from pioneering a new market. In comparison with the basic model, where cannibalization is absent, the incumbent firm is less inclined to hasten, as shown in Conditions (11) and (13), and more inclined to wait, as shown in Conditions (12) and (14), when cannibalization is present and $\kappa(B) < \kappa(0) < \kappa(A)$ holds. This condition can arise, for instance, if the incumbent's early entry has the effect of sanctioning or legitimizing the existence of a new market so as to trigger more market entry or more intense price competition in that market, or if pioneering in the new market induces the new entrant to choose a differentiating position while as a second mover it would have chosen a "me-too" position. However, in this case, our model clarifies that it is not the severity of cannibalization that motivates the incumbent firm to wait, but what the incumbent firm can do to minimize the effect of cannibalization.

More interestingly, cannibalization can also be an impetus for the incumbent firm to enter a new market. Conditions (11)–(14) show that the presence of cannibalization, rather than its absence, should make the incumbent firm more inclined to pioneer a new market when the effect of cannibalization is least detrimental to itself if it becomes the market pioneer, and most detrimental to itself if the rival firm does, i.e., $\kappa(B) > \kappa(0) > \kappa(A)$. The key question, of course, is whether cannibalization is more severe if the incumbent enters first or if it lets a new entrant enter first. That may

depend on how the incumbent and the new entrant position themselves in the new market, as first movers and as second movers. Johnson & Johnson's initial effort to position its new ibuprofen brand, Medipren, for body aches and pains rather than for headache, Tylenol's positioning domain, shows how cannibalization can be reduced by an incumbent firm through positioning (Hodock 1990). Similarly, one can speculate that had P&G introduced liquid soap before Minnetonka and positioned it as a beauty aid, its bar soap business would have been better shielded from competition in the liquid soap market.

5.2. Persistent Uncertainty

For our basic model, we assume that market uncertainty resolves in the second stage regardless of whether any firm has entered the market in the first stage. This assumption allows us to focus on the role of first-mover advantages and late-mover disadvantages in a firm's market entry decision. However, it is straightforward to relax this assumption to accommodate the possibility that uncertainty persists if neither firm enters the market in the first stage.[14] We do so here by assuming that there is no resolution of uncertainty, following the example of Chatterjee and Sugita (1990), if both firms decide to wait in the first stage.

With this extension to our basic model, the firms' payoffs in Table 1 do not change except for the cell where both firms wait. When both firms wait in the first stage, and hence uncertainty does not resolve at all in the second stage, they will continue to wait in the second stage, as neither firm can update its assessment of the new market. Therefore, the status quo continues and both firms have zero payoff from the new market. This modification to Table 1 changes the equilibrium Conditions (4) to

$$\alpha_{\mathrm{A}} \leq \psi_{\mathrm{A}}, \text{ and } \alpha_{\mathrm{B}} \leq \psi_{\mathrm{B}}, \tag{15}$$

and the first condition in Equation (5) to $\alpha_i \geq \psi_i$, where $\psi_i = \psi - [\pi_{\mathrm{i}}^{\mathrm{H}}(0) - F]$ is the adjusted value of waiting for firm i, given that the rival firm waits. The downward adjustment is necessary because uncertainty in the market no longer resolves by itself. As a result, a firm can no longer count on market entry in the second stage when demand is high, which would have brought to the firm the payoff of $[\pi_{\mathrm{i}}^{\mathrm{H}}(0) - F]$. This payoff must be subtracted from the value of waiting for a firm, given that its rival waits, as the firm will miss the market altogether.

Therefore, this extension to the case where uncertainty persists if neither firm enters in the first stage does not alter qualitatively the equilibrium market entry strategies contained in Table 2. The quantitative difference this extension engenders is that each firm has more incentives to speed to the market, given that its competition does not. The equilibrium strategies with this extension can be easily derived by substituting ψ_{i} for ψ whenever α_{i} appears in Table 2.[15]

6. Conclusion

Market entry is an important yet very complex marketing decision that critically affects a firm's bottom line. For instance, in a typical year over fifteen thousand new products are introduced in the United States alone in the packaged goods industry, many of which are aimed at a new market or a new market niche. However, the failure rate is equally impressive. According to a recent estimate, 80% of new consumer packaged goods fail, and about 33% of new industrial products fail at launch.[16] Undoubtedly, a firm's bottom line can be significantly improved if it has a better framework for making better decisions about the timing of market entry.

Our analysis shows that in making a market entry decision, a firm should not focus its attention exclusively on pioneering advantages. It should also consider the cost of conferring on its rival the opportunity to become a pioneer, or laggard's disadvantages. Only when a firm considers the full consequences of its decisions and weighs the rival's incentives in market entry can it hope to avoid premature or belated entry. The optimal decision may call for a firm to be a prudent laggard when pioneering advantages to the firm

[14]We thank an anonymous reviewer for suggesting this extension.

[15]With this extension, the mixed strategy equilibrium is given by $\sigma_A = [\psi_B - \alpha_B]/[\delta_B - \alpha_B - (\pi_B^H(0) - F)]$ and $\sigma_B = [\psi_A - \alpha_A]/[\delta_A - \alpha_A - (\pi_A^H(0) - F)]$.

[16]See Kotler and Armstrong (1996, p. 313).

are substantial, or to become a market pioneer when facing pioneering disadvantages.

Specific to a market where consumers prefer the pioneering brand, we show that the conventional litmus test for market entry decisions does indeed break down when rivalry and uncertainty exist. The firm that is most preferred by consumers as the market pioneer or the firm that is the most resourceful in building consumer loyalty for its pioneering brand need not become the pioneer. Nor should it always strive to become one. Rather, a firm's market entry decision should be made with the calculus that we have proposed, the calculus that incorporates each firm's first-mover advantages and late-mover disadvantages and investment risks.

Our analysis further points out that the incumbent's entry decision is indeed affected by cannibalization. However, mere cannibalization should not always deter the incumbent firm from speeding to an untested market. What the incumbent firm should be concerned about is not the magnitude of cannibalization per se, but what it could do to minimize cannibalization. As a result, cannibalization can indeed be an impetus for an incumbent firm to speed to a related market.

Most interestingly, our analysis uncovers a rational mechanism that sheds some light on the question of why incumbent firms are frequently slow to enter an untested market. To the extent that incumbent firms are frequently better equipped to create their first-mover advantages and overcome their late-mover disadvantages, while a new entrant has little surviving chance as a late-entrant, our analysis shows that it is optimal for an incumbent firm to wait and let a new entrant assume the risk of testing the market. As a managerial implication, this implies that a firm's investments in areas such as distribution channels, customer and brand equity, production and marketing capabilities, process innovations, and even sleeping patents, assume strategic importance in product management. Such investments reduce a firm's late-mover disadvantages and hence provide a "hedge" against entering a market late. Effectively, a firm's ability to overcome late-mover disadvantages affords it a second chance so that it can avoid any hasty market entry.

Besides the managerial implications of market entry decisions, our analysis also sheds some light on empirical research in pioneering advantages. The general nature of our analysis has given us a broad perspective on what one should or should not expect to occur when rational firms make market entry decisions in a competitive context, and what one need or need not measure in conducting empirical studies. In this regard our analysis suggests that it is difficult to generalize across industries and across firms within the same industry whether or not pioneers have long-lasting advantages. Because firms may race into a market solely to avoid laggard's disadvantages, and pioneers need not be the firms that are best positioned to establish, exploit, and maintain pioneering advantages, it is not surprising that empirical research has so far generated mixed results. This predicament will not disappear even if we have complete data, use the right measurements, and employ perfect statistical techniques.

Thus, it seems that a more fruitful research program may be to address a different question: In what kind of industries and for what kind of firms is early or late entry into a market optimal? Research on this question can potentially produce many managerially relevant and empirically generalizable insights. In fact, a welcome start in that direction has already been made by Mitchell (1991) and Robinson et al. (1992). In a different direction, future research can also investigate the more specific determinants of the market reward structure through more detailed modeling, as we have done in §4. Such investigations can help to uncover the relationships between firm-specific factors, such as brand loyalty, switching costs, and specialized assets, and the timing of a firm's market entry in different risk environments, which can then be tested though data analysis or experiment.[17]

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