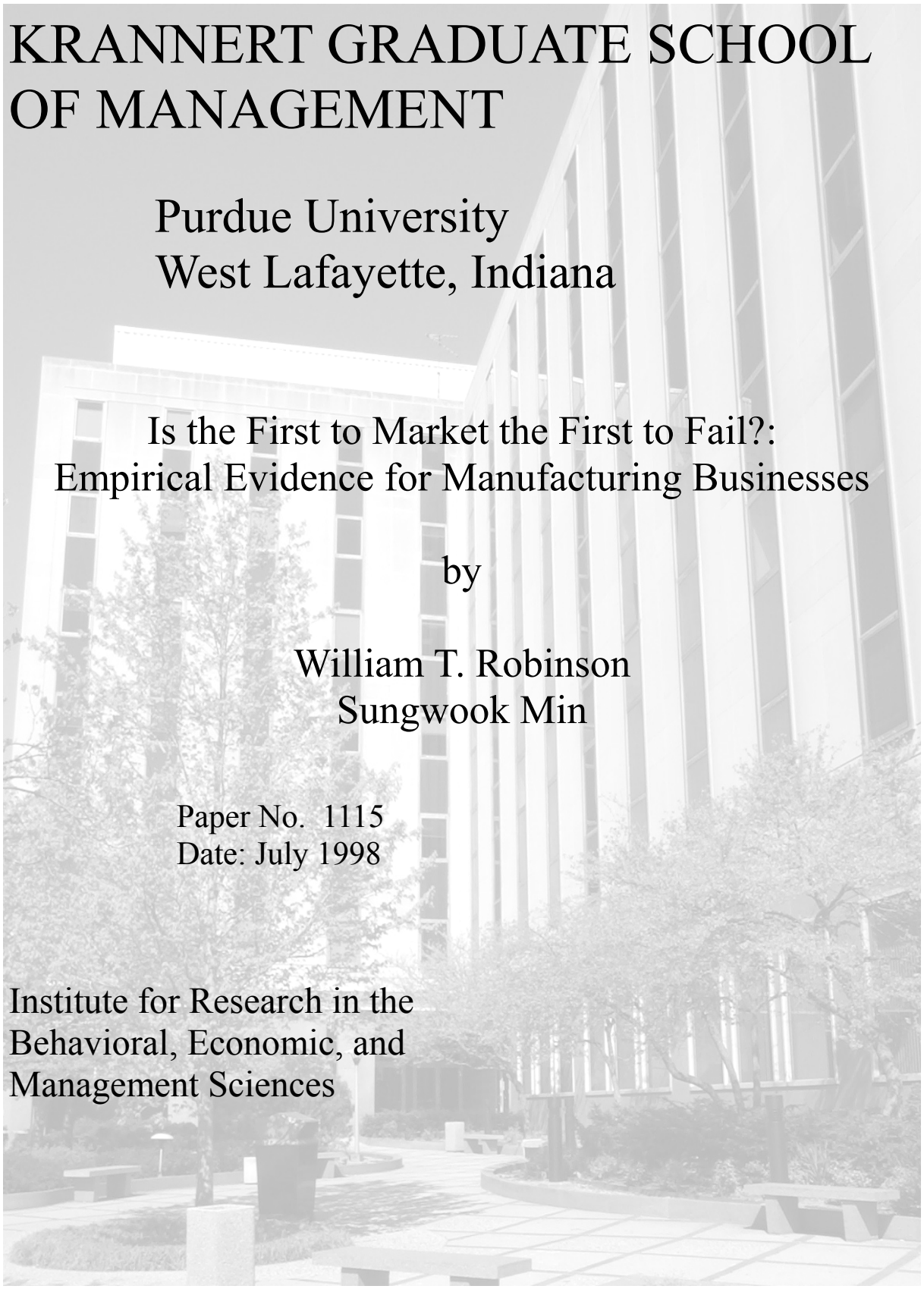

# KRANNERT GRADUATE SCHOOL OF MANAGEMENT

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## Is the First to Market the First to Fail?: Empirical Evidence for Manufacturing Businesses

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# Is the First to Market the First to Fail?: Empirical Evidence for Manufacturing Businesses

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## ABSTRACT

# Is the First to Market the First to Fail?: Empirical Evidence for Manufacturing Businesses

While the empirical relationship between order of market entry and firm survival has not been established, conventional wisdom describes how the market pioneer faces the greatest market and technological uncertainty. Memorable phrases reflect the associated survival risk, such as "the first to market is the first to fail" and "the pioneer is the one with the arrows in their back". To assess survival risk in the face of both market and technological uncertainty, this study compares survival rates for 189 market pioneers versus 320 early followers. In this sample, 60% of the market pioneers survived at least 10 years versus 45% of the early followers. The main conclusion is that market pioneer first-mover advantages more than offset the risks associated with market and technological uncertainty. These results are consistent with earlier research in the sense that first-mover advantages that increase the pioneer's market share also increase their survival rate.

# INTRODUCTION

Empirical research on long-lived advantages of market pioneers versus later entrants typically examines survivors. See Kalyanaram, Robinson, and Urban's (1995) review. While research reports various long-lived advantages for surviving market pioneers, the probability of surviving is also important. This is because if market pioneers have unusually low survival rates, due to greater market and technological risk, then later entry may be a more profitable strategy.

Research studies highlight market pioneer survival risk in both high- and low-tech markets. Technological risk arises because, "Firms that enter first frequently do so with first-generation technologies that quickly become obsolete" (Schnaars 1994, p. 200). In high-tech markets with radically new technologies, Olleros (1986) discusses pioneer burnout. He says, "again and again we see industries emerge 'over the dead bodies' of their early pioneers" (p. 8). Even for low-tech consumer goods, Golder and Tellis's (1993) widely cited research reports a lifetime market pioneer survival rate of only 53%. This result supports Lambkin and Day's (1989, p. 15) prediction of a high attrition rate for market pioneers.

Conventional wisdom on market pioneer attrition rates does not highlight first-mover advantages, which help the pioneer weather the storm in the market's early and often turbulent years. First-mover advantages include brand loyalty, switching costs, broad product lines that preempt competition, and scale economies. See Lieberman and Montgomery (1988), Kerin, Varadarajan, and Peterson (1992) and Robinson, Kalyanaram, and Urban (1994). Given these conflicting forces, it is not clear whether market pioneers have higher or lower survival rates versus early followers and late entrants.

In a recent stream of research, Agarwal and Gort (1996), Agarwal (1996), and Agarwal (1997) examine survival rates across different product life cycle stages. Their data from the Thomas Register of American Manufacturers show that late entrants have relatively low survival rates. One reason is that late entrants often have the misfortune of entering the market either just

before or during an industry shakeout. A second reason is that late entrants tend to have a relatively low market share and low share businesses are more likely to exit the market.

Because Agarwal (1997) reports survival rates by life cycle stage, market pioneer and early follower survival rates are combined in the introductory stage. Even if these survival rates were reported separately, 33 market pioneers would probably not yield conclusive results. This is because various industry studies estimate market pioneer versus later entrant survival rates, but the limited number of pioneers yield inconclusive results (Kalyanaram, Robinson, and Urban 1995).

Because market and technological risks are most prominent in a market's early years, our study compares market pioneers to early followers. Our sample from the Thomas Register of American Manufacturers yields 189 market pioneers (first entrants) and 320 early followers. In this sample, market pioneers have significantly higher 10 - year survival rates than early followers. Also, increasing pioneer leadtime tends to increase the pioneer's survival rate. Note, both market pioneering and increasing the pioneer's leadtime help develop first-mover advantages. The main conclusion is that during the first 10 years of commercialization, market pioneer first-mover advantages more than offset the survival risk from market and technological uncertainty. Although less important, the pioneer's temporary monopoly during their leadtime over the second entrant should also contribute to their higher survival rates.

## HYPOTHESES

Key factors influencing survival in the early years of a market's evolution are market risk, technological risk, and first-mover advantages. The hypotheses link these key factors to market pioneering and pioneer leadtime. The hypotheses apply to 10 - year survival. 10 - year survival is selected because most new entrants need to survive more than 5 years to be profitable. As Tellis and Golder (1996, p. 72) point out, "pioneers do not seek rewards that are limited to the early years of a category". A longer time horizon, such as 15 years, is not used. This is because

a longer horizon goes well beyond a market's early years and limits the sample's new markets from the 1980s. The null hypotheses below reflect conventional wisdom.

Market Pioneering and Survival

Market pioneers face the greatest market and technological risk. Market risk arises because it is notoriously difficult to forecast sales for a pioneering product. Even though research techniques such as information acceleration help forecast sales for a pioneering product (Urban et al. 1997), these techniques do not eliminate the uncertain customer response to a pioneering innovation. With this uncertainty, market entry is similar to "an archer shooting at a target shrouded by a veil of fog" (Hamel and Prahalad (1994, p. 238).

In contrast, market risk is lower for an early follower. To reduce uncertainty about customer needs and wants, an early follower can sit back and learn from the pioneer's mistakes. With this strategy, an early follower can "Wait until all the fog has cleared" (Hamel and Prahalad 1994, p. 238) [1]. When an early follower's product provides a closer fit to customer needs and wants, a second-but-better strategy should increase their chance of survival.

Olleros (1986) discusses pioneer burnout. Even though they are first to market, a pioneer can burnout after introducing a radically new technology. A long payback period for radical breakthroughs along with rapid obsolescence of first generation technologies can lead to bankruptcy. The sewing machine, automobile, typewriter, helicopter, and transistor markets illustrate pioneer burnout.

Yip (1982) describes how technological change provides a gateway for entry. Technological change is especially likely to arise during the market's early years. When early followers and late entrants have time to obsolete the pioneer's technology, a gateway for entry arises. Again, delayed entry reduces risk, which enhances the chance of survival.

While market and technological risk decrease the pioneer's chance of survival, first-mover advantages increase their chance of survival. First-mover advantages include a strong brand name, a broad product line, superior distribution, setting the industry standard, preempting

scarce resources, and learning advantages. See review articles by Lieberman and Montgomery (1988), Kerin, Varadarajan, and Peterson (1992), and Robinson, Kalyanaram, and Urban (1994). These review articles cite numerous studies that document first-mover advantages, but this literature is typically downplayed in discussions of market pioneer survival.

Empirical evidence on the relationship between order of entry and survival is mixed. Various industry studies cited in Kalyanaram, Robinson, and Urban's (1995) survey yield ambiguous results. Golder and Tellis (1993) report lifetime survival rates for market pioneers of 53%, but their sample does not cover either early followers or late entrants.

Agarwal and Gort (1996), Agarwal (1996), and Agarwal (1997) provide the most detailed insights into the relationship between order of market entry and survival. Agarwal's (1997) largest sample covers 33 product categories, such as antibiotics, artificial Christmas trees, radiation meters, and rocket engines. Table 1 reports 12-year survival rates across Gort and Klepper's (1982) product life cycle stages.

Net entry, or the number of entries less the number of exits, determines the five stages. Stage 1 is the life cycle's introductory stage, with a limited number of entrants. Stage 2 is the early growth stage where entry accelerates. Stage 3 is the growth stage where entry roughly equals exit. Stage 4 is the transition from the growth to maturity stage, where a market shakeout yields far more exit than entry. Stage 5 is the maturity stage where entry again roughly equals exit.

In Table 1, at 55.9%, stage 1 entrants have the highest survival rates. Because stage 1 combines market pioneers and early followers, their survival rates can not be compared. At 38.4% and 37.5%, stage 3 and stage 4 entrants have the lowest survival rates. These late entrants had the misfortune to enter either just before or during the stage 4 market shakeout. Assuming that late entrants arrive in stages 3, 4, and 5, their average 12-year survival rate is only 41.5%. Thus, while late entrants have relatively low survival rates, empirical evidence for market pioneers versus early followers is lacking.

In summary, discussions of market pioneer survival in the early years of a market's evolution typically emphasize market and technological risk. With their delayed entry, early followers reduce risk by learning more about the market and technology. Memorable phrases reflect the fact that pioneers face the greatest risk. The phrases include "the first to market is the first to fail" and "the market pioneer is the one with the arrows in their back". While these risks may be offset by first-mover advantages, first-mover advantages are not highlighted. For example, a phrase such as "first-mover advantages protect the market pioneer from outright failure" could not be located in the literature.

Empirical research indicates late entrants have relatively low survival rates, but survival rates for market pioneers and early followers are not established. Since these survival rates are not established, conventional wisdom yields:

H1: Market pioneering has a negative impact on the chance of surviving 10 years.

Pioneer Leadtime and Survival

There is both a short-term and a long-term reason why increasing pioneer leadtime should increase pioneer survival. A short-term benefit arises when the pioneer has a temporary monopoly during their leadtime over the second entrant. Because leadtime below measures the number of years between the first and second entries, it corresponds exactly to the length of this temporary monopoly. Without having to face any competitors, market pioneer survival should be easier.

A long-term benefit arises when increasing leadtime strengthens first-mover advantages. See Brown and Lattin (1994) and Huff and Robinson (1994). This is because increasing leadtime helps the pioneer establish an even stronger brand name (Schmalensee 1982), move customers' ideal points closer to the pioneer's attribute mix (Carpenter and Nakamoto 1989), and help the pioneer further broaden its product line (Robinson and Fornell 1985). Thus, by having a longer monopoly and stronger first-mover advantages, we have:

H2: Increasing pioneer leadtime increases the market pioneer's chance of surviving 10 years.

Since increasing pioneer leadtime makes the pioneer stronger, to the extent that the pioneer and an early follower are competing for scarce resources, an early follower's chance of survival should decrease. Under this scenario, even a short delay hurts an early follower.

H3: Increasing pioneer leadtime decreases an early follower's chance of surviving 10 years.

An alternative hypothesis predicts that an inverted-U relationship arises between pioneer leadtime and early follower survival. This is because in the first year or two of the market's evolution, early follower learning about the market and technology should yield substantial benefits. At this time, developing the market is a high priority for the pioneer, in terms of say building customer acceptance for the product's key benefits. Because market development helps all firms, the pioneer's initial strength will not necessarily hurt an early follower's chance of survival. Thus, at least for the first year or two, delayed entry may actually help an early follower's chance of survival.

As time goes by, additional early follower learning about the market and technology will be limited, at best. With limited additional learning and a pioneer who is getting stronger and stronger, more delay will start to hurt an early follower's survival chance. This scenario yields an inverted-U relationship, with delayed entry initially helping, but eventually hurting an early follower's survival chance.

# DATA

Lavin (1992, p. 129) says, "The Thomas Register is a comprehensive, detailed guide to the full range of products manufactured in the United States." The Thomas Register of American Manufacturers achieves comprehensive coverage by subscribing to a broad range of industry newsletters, searching for start-up ventures in university incubators, and, last but not least, by providing a free listing in each annual issue[2].

This national buying guide's 1998 issue includes roughly 155,000 firms. Because the Thomas Register is a national buying guide, firms with exclusively local sales are typically excluded. International firms are included if they have a manufacturing facility, office, or distribution channel in the United States. Interested firms can register by mail, fax, or over the Internet.

With roughly 60,000 product categories, Thomas Register market boundaries are relatively narrow. Examples include steering columns, disposable fabrics, magnetic tape erasers, and bomb shelter doors. This market boundary breadth is probably broader than Urban et al. (1986), whose narrow product categories include instant freeze-dried coffee and anti-dandruff shampoo. It is narrower than Golder and Tellis (1993), who examine broad categories such as microwave ovens, soft drinks, and paint.

Key exceptions to the Thomas Register's comprehensive coverage are food and food-related products (Lavin 1992). By excluding food and food-related products, our sample mainly covers industrial goods.

## Identifying Market Pioneers, Early Followers, and Firm Exit

In the data collection process, making year-over-year comparisons identifies new markets. A new market is identified when it is not represented in the previous year. This follows Golder and Tellis's (1993) recommendation to use historical analysis to identify market pioneers in the year a new market started. Historical analysis avoids hindsight bias. Hindsight bias arises when

an unsuccessful first entrant is forgotten and a successful early entrant is mistakenly called the market pioneer.

In our university library storage, the Thomas Register begins in 1960. Because most of the data were gathered in 1997, 10-year survival could not be assessed for any new market that started after 1987. Thus, the most recent new market started in 1987.

By defining a market pioneer as the market's first entrant (Golder and Tellis 1993), the data only cover markets with a unique first entrant. Because a unique first entrant could not be identified, 72 markets with multiple first year entrants are excluded[3]. The sample has 189 markets with unique first year entrants. Table 2 describes these markets using two-digit SIC codes.

Once a new market with a unique first entrant is identified, the market is traced forward on an annual basis until another entrant is identified. This entrant and any other entrants in that year are called early followers. Because the literature does not define an early follower as being unique (Lambkin and Day 1989), the sample includes markets with multiple early followers. The 189 markets yield 320 early followers, which averages 1.7 early followers per market.

Tracking the 189 Thomas Register markets over time is relatively straightforward. Each market survived at least 10 years[4]. Consistent with other survival research, such as Agarwal and Gort (1996) and Golder and Tellis (1983), our sample explains entrant survival in markets that survived. It can not explain why some attempts at starting a new market succeeded, while other attempts failed. There was only one minor name change, with the Lead Silico Fluoride market being changed to Lead Silicofluoride.

Identifying firm exit follows Agarwal's (1997, p. 574) guidelines. An exit arises when the firm's name and address are both missing from the product category in a given year. This avoids the problem of confusing an exit with just a name change, such as a conglomerate merger, or confusing an exit with just an address change from office relocation.

Note, after two competing firms in the same market merge, the smaller firm is typically classified as exiting and the larger firm as surviving. This is effective when the smaller firm is

failing. When both firms are healthy though, it misclassifies the smaller firm as failing. While this problem arises in other survival research, such as Gort and Klepper (1982) and Dunne, Roberts, and Samuelson (1989), there is no reason to expect that it materially biases market pioneer versus early follower survival rates.

A second measurement limitation arises when a surviving firm is inadvertently deleted from the Thomas Register. Because the Thomas Register is a national buying guide, it is in the firm's best interest to maintain its "free" listing. Also, when a business does not respond to its annual update request, the Thomas Register initiates multiple contacts to see if they are still in business. Thus, both participating firms and the Thomas Register attempt to minimize inadvertent deletions.

## DESCRIPTIVE STATISTICS

Table 3 compares average survival rates for market pioneers versus early followers. 60% of the market pioneers survived for 10 years versus 45% of the early followers. With a total sample size of 509 observations, the difference is statistically significant at the 1% level.

How do these results compare to the earlier studies that motivated this research? Agarwal's 12-year survival rate for stage 1 entrants is 56%. Because stage 1 entrants include both market pioneers and early followers, this is close to our average 10-year survival rate of 51%. Golder and Tellis (1993) report a lifetime survival rate of pre-World War II pioneers of 50%, post-World War II pioneers of 56%, and an overall average of 53%. While this is lower than our pioneer survival rate of 60%, lifetime survival rates should be lower than 10-year rates. Thus, despite using different samples and databases, survival rates across these three research studies are generally consistent.

Table 4 describes the relationship between pioneer leadtime and survival. As expected, market pioneer survival rates tend to increase as pioneer leadtime increases. A much different pattern though arises for early followers. When pioneer leadtime ranges from 1 to 9 years, early

follower survival rates follow an inverted-U pattern, with rates peaking at a two to three year pioneer leadtime. For early followers who trail the pioneer by 10 to 21 years, their survival rate increases to the sample average of 45%. With the exception of this last category, early follower survival rates fit the inverted-U relationship predicted by H3's alternative hypothesis.

While it is not shown in the table, recall that because of multiple first year entrants, the sample excludes 72 markets. With 365 first year entrants, entrants are practically swarming into these new markets. The 10-year survival rate for these new entrants is 48%, which is somewhat below Table 4's average survival rate of 51%. A lower survival rate is not surprising because these markets have a higher proportion of early followers and Table 4 indicates that early followers have a lower survival rate than market pioneers.

## FULL MODEL SPECIFICATION

Table 5 provides the variable definitions. To estimate the importance of first-mover advantages, survival is specified as a function of market pioneering and pioneer leadtime. To test H1, a market pioneer dummy variable equals 1 for the market pioneer, 0 for each early follower. To test H2 and H3, interaction terms estimate a different leadtime impact for market pioneers and early followers. Each interaction term multiplies pioneer leadtime by the respective dummy variable. To reflect diminishing marginal returns, model estimation uses the natural logarithm of each continuous variable, such as pioneer leadtime.

Because the dependent variable is 10-year survival, pioneer leadtime is capped at a maximum value of 10 years for the market pioneer interaction term. This is because leadtime after 10 years does not retroactively influence their survival. By definition, the second entrant arrives after the leadtime period. Thus, pioneer leadtime is not capped for the early follower interaction term.

The model specification includes additional variables that influence survival. To estimate a different impact for market pioneers and early followers, each business characteristic includes

market pioneer and early follower interaction terms. Because important differences do not arise for the industry characteristics, the industry characteristics estimate a uniform impact for both market pioneers and early followers.

The additional business characteristics cover 1) new firm versus diversifying entry and 2) relatively small firm assets. Diversifying entrants often share their parent's skills and resources. Sharing a parent's skills and resources should increase the chance of survival for both market pioneers and early followers. As expected, Agarwal and Gort (1997) report higher survival rates for diversification entrants and lower rates for new ventures.

Relatively small firm assets attempt to measure a suboptimal scale of entry. This variable equals one for the lowest quartile of firm assets by the decade of entry, zero otherwise[5]. Again, because of the challenges of entering a new market, relatively small firm assets should reduce the chance of survival for both market pioneers and early followers.

The industry characteristics assess the 1) number of early followers, 2) industry growth rate, 3) high-tech status, 4) calendar year of entry, and 5) industry capital intensity. The number of early followers is the number that entered in the year the first early follower entered. The predicted sign for the number of early followers is ambiguous. On the one hand, an increasing number of early followers help develop the market, which increases the survival chance for both the market pioneer and early follower. On the other hand, an increasing number of early followers increase competitive rivalry, which decreases the chance of survival.

Industry growth is measured at the four-digit SIC code level[6]. Growing markets typically provide more new customers, more new product opportunities, and higher profit margins than mature markets. Thus, increased market growth should tend to increase both market pioneer and early follower survival rates.

Following Agarwal (1996), the high-tech industry dummy variable uses Hadlock et al.'s (1991) classification. It is based on the ratio of R&D employees to total personnel in 1987 for 3-digit SIC codes. Survival in high-tech industries increases when pioneers and early entrants benefit from learning and experience curve advantages. Survival decreases though when late

entrants introduce a new generation of technology. For Agarwal's (1996) stage 1 entrants, she reports a 12-year survival rate of 61% for technical products versus 48% for non-technical products. Hence, both market pioneer and early follower survival rates should be higher in high-tech industries.

Has competition become more intense over time? In recent decades, increasing international competition yields more intense competition in many key industries, such as automobiles and computer chips. Another signal of more intense competition is shorter new product development cycle times. Griffin (1997, p. 450) reports that over the last five years, "60% of all firms report that they have shortened cycle times for incremental products, major revisions, and new-to-the-firm projects". While controversial, if the product life cycle has been speeding up over time (Bayus 1992), then competition should be more intense during this compressed life cycle. In summary, if competitive intensity has increased from the 1960s to the 1990s, then survival rates should be negatively influenced by the calendar year of entry.

Industry capital intensity equals total fixed assets in millions of dollars divided by total 1987 employment at the four-digit SIC code level. Agarwal and Gort (1997) point out that capital intensive industries are relatively difficult to exit. Because their empirical results support this prediction, market pioneer and early follower survival rates should increase as capital intensity increases.

## RESULTS

Table 6 presents the logit regression results. Statistical significance is based on conservative two-tailed tests. The first model explains survival as a function of market pioneering, the pioneer leadtime interaction term, the early follower leadtime interaction term, plus other explanatory variables. Consistent with the descriptive statistics, both market pioneering and increasing pioneer leadtime significantly increase the chance of survival. Recall that increasing leadtime increases both first-mover advantages and the length of the pioneer's

temporary monopoly. Thus, these results indicate that first-mover advantages plus the pioneer's temporary monopoly more than offset the survival risks associated with technological and market uncertainty.

In the first model, the early follower * pioneer leadtime interaction term does not have a meaningful impact on survival. To test for an inverted-U relationship, the second model adds a squared interaction term. The early follower interaction term and its squared value support the inverted-U functional form, but neither value is statistically significant. Overall, the first two models show that the loglinear impact of pioneer leadtime on early follower survival is not even close to being statistically significant. There is some evidence, although weak, that the relationship represents an inverted-U.

To test the robustness of these results to outliers, pioneer leadtime in six markets ranges from 11 to 21 years. These markets are outliers in the sense that pioneer 10-year survival is evaluated with the pioneer not having faced a single competitor. These markets are also outliers in the sense that an entrant that arrives 11 to 21 years after the pioneer is still called an early follower. An early follower though typically enters a rapidly growing market. For example, see Lambkin and Day (1989). Because most markets are mature within 11 to 21 years, these markets appear to have only market pioneers and late entrants. If so, then the second entrants should be deleted from the early follower sample. To remove both sets of outliers, the sample deletes six pioneers and 10 so-called early followers.

With these deletions, the third model shows that market pioneering and pioneer leadtime both remain statistically significant. An interesting result is that the inverted-U relationship between pioneer leadtime and early follower survival is now statistically significant. By setting the first derivative of the linear and squared terms equal to zero, the inverted-U relationship peaks when pioneer leadtime equals 2.5 years. This suggests that some delay helps an early follower resolve the market and technological uncertainty. Additional delay though hurts an early follower's survival chances.

This conclusion has three important caveats. First, when an early follower delays their entry, it assumes that another entrant does not preempt them. Research shows that a later order of market entry typically reduces market share. See Kalyanaram, Robinson, and Urban (1994). Later entrant disadvantages that reduce market share should also reduce their chance of survival. Second, recall that these markets all started in the 1960s, 1970s, or 1980s. Because a two to three year delay in earlier decades may not hurt an early follower nearly as much as it would today, the inverted-U relationship may peak faster in today's new markets. Third, for frequently purchases consumer goods, Kalyanaram and Urban (1992) report that second through fifth entrants reach 95% of their asymptotic market share within 16 weeks. When first-mover advantages and later entrant disadvantages are established this quickly, an inverted-U relationship may not arise.

While the hypothesis testing results are statistically significant, are they also managerially significant? Managerial significance multiplies each coefficient estimate in model three by the corresponding mean value for market pioneers and early followers. The first set of mean values profiles market pioneers; the second set profiles early followers. For these profiles, the predicted market pioneer and early follower survival rates are 60% and 44%. Holding the other model variables at the market pioneer mean, increasing pioneer leadtime from 1 to 10 years increases the pioneer's predicted chance of survival from 49% to 76%. Holding the other model variables at the early follower mean, when pioneer leadtime increases from 1 to 4 years, early follower survival rates are 39%, 51%, 51%, and 48%. With a 10-year pioneer leadtime, the predicted early follower survival rate declines to 25%. Overall, the managerial significance of the hypothesis testing results provides a close fit to the descriptive statistics in Tables 3 and 4.

A few other Table 6 results are worth noting. Diversifying entry has a significant impact on both market pioneer and early follower survival. The impact on early follower survival has the expected positive sign, but the market pioneer impact is negative.

While the negative impact is surprising, it may arise because industry outsiders often introduce revolutionary new products. For example, Scherer and Ross (1990, p. 653) say, "new

entrants without a commitment to accepted technologies have been responsible for a substantial share of the really revolutionary new industrial products and services". Since diversification entrants are often linked to a parent's shared skills and resources; their innovations are more likely to be incremental than really revolutionary. Thus, instead of sharing the parent's skills and resources, the negative impact of diversification entry on pioneer survival may simply reflect reduced product innovation.

Finally, the calendar year of entry has a negative and significant impact on survival. This suggests that entrant survival has been more difficult in the 1980s and 1990s than it was in the 1960s and 1970s.

## SUMMARY

Market pioneers face more market and technological risk than early followers and late entrants. Market risk arises because it is very difficult to forecast customer response to a pioneering innovation. Technological risk arises because a pioneer's first-generation technology may not work very well, like personal computers in the 1970s. Even if it does work well, it can be quickly outdated, like personal computers today. When early followers learn from the pioneer's successes and failures, their risks are clearly reduced.

Market pioneers though often benefit from important first-mover advantages. First-mover advantages include customer loyalty, setting the industry standard, having superior distribution, and a broad product line. While first-mover advantages are discussed in numerous contexts, conventional discussions of pioneer survival typically emphasize market and technological risk.

Because market and technological risks are most prominent in the market's early years; survival rates are compared for 189 first entrant market pioneers versus 320 early followers. The 10-year survival rate for market pioneers is 60% versus 45% for early followers. The higher

pioneer survival rate indicates that first-mover advantages more than offset the market and technological risk.

A similar conclusion arises when additional variables that influence survival rates are also considered. The additional variables cover diversification versus new firm entry, firm asset size, the number of early followers, industry growth rate, high versus low tech industries, industry capital intensity, and the calendar year of entry. When these additional variables are held constant, market pioneering and increasing leadtime continue to have a key impact on pioneer survival. Because first-mover advantages arise from market pioneering and are strengthened by increasing leadtime, both results support the importance of pioneer first-mover advantages.

The pioneer's temporary monopoly that arises prior to the second entrant's arrival should also influence their higher survival rate (60% versus 45%). This is because the impact of leadtime on pioneer survival rates includes two separate benefits. The long-term benefit from first-mover advantages and the short-term benefit from a temporary monopoly. Because this study estimates leadtime as the entry time difference between the first and second entrant, it corresponds exactly to the length of the pioneer's temporary monopoly.

While first-mover advantages and the pioneer's temporary monopoly are both important, which one has a greater impact on 10-year survival? First-mover advantages often span the entire 10 years, while the temporary monopoly only averages 3 years. First-mover advantages arise from both market pioneering and increased pioneer leadtime, but the temporary monopoly only arises from increased pioneer leadtime. For both statistical and managerial significance, market pioneering is roughly comparable to pioneer leadtime. In total, these results indicate that first-mover advantages have a greater impact on 10-year survival.

While increasing leadtime increases the pioneer's chance of survival, does this yield a corresponding decrease in early follower survival? This occurs when the pioneer and early followers are competing for scarce resources, with one firm's gain being the other's loss. In the early years of a market's evolution though, a stronger pioneer that helps develop a market can

benefit both the pioneer and early followers. Also, early follower learning from a delayed entry can help their chance of survival.

The data supports these latter points in the sense that increasing pioneer leadtime does not consistently decrease early follower survival. If anything, the evidence indicates that delayed entry initially increases, but eventually decreases an early follower's chance of survival. The initial increase can arise from greater learning about the market and technology. The eventual decrease is from both diminished learning benefits and from a pioneer who becomes stronger and stronger over time.

Implications

Because our sample mainly covers industrial goods, are market pioneer higher survival rates for consumer goods also relatively high? Empirical research reports that market pioneer first-mover advantages are somewhat stronger for consumer than industrial goods. See Robinson and Fornell (1985) and Robinson (1988). Technological risk should typically be lower for consumer goods. While market risk may or may not be lower, there is no reason to expect that increased market risk more than offsets reduced technological risk and increased first-mover advantages. Thus, consumer goods pioneers should also have relatively high survival rates versus early followers.

Survival rates are strongly influenced by how an entrant is defined. A Thomas Register entrant only needs to sell their product in a regional market. In the Golder and Tellis (1993) sample, it only needs to sell in a local market[7]. In other studies, such as Urban et al. (1986), an entrant in a national market must sell their product nationally. By excluding small entrants who failed to achieve a national scope, the Urban et al. sample yields higher pioneer survival rates. This helps explain why Urban et al. (1986, p. 655) did not locate any market pioneer exits, while our study and Golder and Tellis (1993) report market pioneer exit rates in the 40% to 50% range.

From this perspective, three key steps arise in the market pioneering process. First, investing in the attempt to pioneer a new market. Second, entering the market on a local or

regional scale. Third, expanding to a national scale. Urban et al. (1985) provide survival insights from step three forward. Our study and Golder and Tellis provide survival insights from step two forward. Thus, once the second and third steps have been reached, market pioneers appear to have survival rates that are at least as high, if not higher than early followers.

For the first step, empirical research has not yet linked order of market entry to survival or success rates. The authors speculate this is where market pioneer hopefuls have the most difficulty. This is because market pioneer hopefuls do not benefit from first-mover advantages. Also, it is very difficult to both generate and commercialize a truly novel idea. To address these problems, Hamel and Prahalad (1994, Ch. 11) recommend experimenting with multiple options that are fast, and inexpensive. While experimentation leads to many small failures, these losses are easily offset by the large gains from preempting competition in markets of the future.

## Conclusion

Conventional discussions of market pioneer survival rates highlight both market and technological risk. While market pioneers face the greatest risks, they also benefit from first-mover advantages. Because market pioneers have higher survival rates than early followers, the empirical results indicate that first-mover advantages more than offset these market and technological risks. By surviving past the early and turbulent years of a market's evolution, the market pioneer is not first to fail. Instead, because first-mover advantages help protect the pioneer from outright failure, the market pioneer is more likely to be the last to fail.

# FOOTNOTES

[1] Note, Hamel and Prahalad (1994, p. 239) do not recommend that a manager wait until the fog has cleared. "What counts most is not hitting the bulls eye the first time, but how quickly one can improve one's aim and get another arrow on the way to the target."

[2] Based on a telephone conversation with Glenn H. Moore, an editor of the Thomas Register.

[3] While we considered calling individual companies and asking them to identify the market's first entrant, this would be difficult to do because these relatively small markets all started at least 10, 20 or even 30 years ago. Also, the 72 markets have a total of 365 entrants, which magnifies the problem of identifying a unique first entrant.

[4] This is not to say that all Thomas Register markets survive. Locating new markets is a time consuming process. Rather than making year-over-year comparisons, it is faster to compare a list of markets that are 10 years apart and then zero in on the new markets. For all practical purposes, this data collection process misses new markets that were started and promptly ended. Thus, our sampling approach does not effectively identify fad products or failed attempts at starting new markets.

[5] Firm asset size in the Thomas Register is categorical. Until 1981, the largest category was $1 million or more in assets. Because many firms fall in this category, especially in the 1970s and early 1980s, it does not yield precise insights for large firms. Thus, our measure highlights small rather than large firm assets.

[6] The Thomas Register does not estimate market sales. As a proxy, 10-year industry growth should reflect increased opportunities that are available in the new market.

[7] The Golder and Tellis data include local markets, such as the Brooklyn, New York market for Trommer's Red-Letter light beer. The Thomas Register excludes most, but not all local markets.

# Table 1

## 12-YEAR SURVIVAL RATES BY PRODUCT LIFE CYCLE STAGE FOR 33 PRODUCT CATEGORIES

| *Product Life Cycle Stage* | *12-Year Survival Rates* | *Number of Entrants* |
|---|---|---|
| | (%) | |
| Stage 1: Introduction | 55.9 | 238 |
| Stage 2: Early Growth | 48.5 | 1911 |
| Stage 3: Growth | 38.4 | 229 |
| Stage 4: Transition to Maturity | 37.5 | 431 |
| Stage 5: Maturity | 45.3 | 626 |

From Agarwal (1997, Table I). The product life cycle stage descriptions, such as introduction, early growth, etc., have been added to her table.

# Table 2

## SAMPLE DESCRIPTION BY 2-DIGIT SIC CODE

| *SIC* | *SIC Description* | *Number of Markets* |
|---|---|---|
| 20 | Food & Kindred Products | 1 |
| 22 | Textile Mill Products | 4 |
| 23 | Apparel & Other Textile Products | 1 |
| 24 | Lumber & Wood Products | 5 |
| 25 | Furniture & Fixture | 1 |
| 26 | Paper & Allied Products | 2 |
| 27 | Printing & Publishing | 2 |
| 28 | Chemicals & Allied Products | 27 |
| 29 | Petroleum & Coal Products | 3 |
| 30 | Rubber & Miscellaneous Plastics Products | 10 |
| 32 | Stone, Clay & Glass Products | 8 |
| 33 | Primary Metal Industries | 6 |
| 34 | Fabricated Metal Products | 17 |
| 35 | Industrial Machinery & Equipment | 61 |
| 36 | Electronic & Other Electronic Equipment | 20 |
| 37 | Transportation Equipment | 1 |
| 38 | Instruments & Related Products | 17 |
| 39 | Miscellaneous Manufacturing Industries | 3 |
| | Total | 189 |

# Table 3

## 10-YEAR SURVIVAL RATES FOR MARKET PIONEERS VERSUS EARLY FOLLOWERS

| *Thomas Register Sample* | *10-Year Survival Rates* |
|---|---|
| Market Pioneers (n=189) | 60% |
| Early Followers (n = 320) | 45% |
| t-statistic | 3.18*** |
| Average | 51% |

*** is significant at the 1% level.

# Table 4

## PIONEER LEADTIME AND 10-YEAR SURVIVAL RATES FOR MARKET PIONEERS AND EARLY FOLLOWERS

| | *Market Pioneers* | | *Early Followers* | |
|---|---|---|---|---|
| *Pioneer Leadtime* | *10-Year Survival Rates* | *n* | *10-Year Survival Rates* | *n* |
| 1 year | 49% | 53 | 42% | 78 |
| 2-3 years | 57% | 68 | 55% | 141 |
| 4-5 years | 62% | 39 | 43% | 56 |
| 6-7 years | 75% | 12 | 24% | 17 |
| 8-9 years | 80% | 10 | 29% | 17 |
| 10-21 years | 100% | 7 | 45% | 11 |
| Full Sample | 60% | 189 | 45% | 320 |

# Table 5

## VARIABLE DEFINITIONS

| *Variable* | *Definition* | *Mean (S.D.)* | *Data Source* |
|---|---|---|---|
| *Business Characteristics* | | | |
| 10-Year Survival | 1 if the entrant survives at least 10 years, 0 otherwise. | .51 (.50) | TRP |
| Market Pioneer | 1 for the market's first entrant, 0 otherwise. | .37 (.48) | TRP |
| Market Pioneer * Ln Pioneer Leadtime | For the market pioneer, the natural logarithm of their leadtime in years over the second entrant, 0 otherwise. | .34 (.62) | TRP |
| Early Follower | 1 for each entrant in the year the second entrant entered, 0 otherwise. | .63 (.48) | TRP |
| Early Follower * Ln Pioneer Leadtime | For early followers, their delay in years after the pioneer's entry, 0 otherwise. | .57 (.72) | TRP |
| Early Follower * Ln Pioneer Leadtime Squared | The squared value for the interaction term above. | .84 (1.49) | TRP |
| Market Pioneer * Diversifying Entry | 1 if the entrant is both a market pioneer and is part of an existing firm, 0 otherwise. | .29 (.45) | TRC |
| Early Follower * Diversifying Entry | 1 if the entrant is both an early follower and is part of an existing firm, 0 otherwise. | .38 (.48) | TRC |
| Market Pioneer * Small Firm Assets | 1 if the entrant is both a market pioneer and has firm assets in the bottom 25% for the decade it entered the market, 0 otherwise. | .10 (.30) | TRP |
| Early Follower * Small Firm Assets | 1 if the entrant is both an early follower and has firm assets in the bottom 25% for the decade it entered the market, 0 otherwise. | .15 (.35) | TRP |

# Table 5 (continued)

| *Variable* | *Definition* | *Mean (S.D.)* | *Data Source* |
|---|---|---|---|
| *Industry Characteristics* | | | |
| Ln Number of Early Followers | The natural logarithm of the number of early followers in the year the second entrant entered. | .61 (.67) | TRP |
| Ln Industry Growth Rate | The natural logarithms of the sales growth rate at the 4-digit SIC code level for the first 10 years following market entry. | .69 (.53) | C |
| High-Tech Industry | 1 if the product belongs to an R&D intensive industry at the 3-digit SIC code, 0 otherwise. | .40 (.49) | H |
| Ln Calendar Year of Entry | The natural logarithm of the calendar year in which the entrant is first listed in the Thomas Register less 1900. | 4.30 (.09) | TRP |
| Ln Industry Capital Intensity | The natural logarithm of fixed assets in millions of dollars per employee in 1987 at the 4-digit SIC code level. | -3.10 (.78) | C |

For the data sources, TRP is the Thomas Register product section, TRC is the Thomas Register company profile section, C is the U.S. Department of Commerce Census of Manufacturers, and H is from Hadlock et al. (1991, p. 27). Four-digit SIC codes for each Thomas Register product category are available through the online database, DIALOG. SIC codes are used to estimate the industry growth rate, identify high-tech industries, and estimate industry capital intensity.

# Table 6

## LOGIT REGRESSION RESULTS THAT EXPLAIN 10-YEAR SURVIVAL

| *Variable* | Model 1 (n=509) | Model 2 (n=509) | Model 3 (n=493) |
|---|---|---|---|
| Constant | 10.88 | 10.34 | 9.87 |
| | (2.16)** | (2.04)** | (1.92)* |
| Market Pioneer | 1.21 | 1.39 | 1.46 |
| | (2.47)** | (2.73)*** | (2.85)*** |
| Market Pioneer * Ln Pioneer Leadtime | .60 | .60 | .51 |
| | (2.68)*** | (2.68)*** | (2.22)** |
| Early Follower * Ln Pioneer Leadtime | -.02 | .56 | 1.07 |
| | (-.11) | (1.24) | (1.99)** |
| Early Follower * Ln Pioneer Leadtime Squared | | -.27 | -.59 |
| | | (-1.36) | (-2.16)** |
| Market Pioneer * Diversifying Entry | -1.27 | -1.28 | -1.25 |
| | (-3.02)*** | (-3.03)*** | (-2.97)*** |
| Early Follower * Diversifying Entry | .40 | .42 | .38 |
| | (1.66)* | (1.76)* | (1.56) |
| Market Pioneer * Small Firm Assets | -.28 | -.27 | -.23 |
| | (-.76) | (-.74) | (-.62) |
| Early Follower * Small Firm Assets | .11 | .12 | .12 |
| | (.41) | (.43) | (.43) |
| Ln Number of Early Followers | -.07 | -.11 | -.15 |
| | (-.49) | (-.72) | (-.99) |
| Ln Industry Growth Rate | .18 | .18 | .16 |
| | (.95) | (.91) | (.83) |
| High-Tech Industry | -.57 | -.07 | -.06 |
| | (-.29) | (-.38) | (-.33) |
| Ln Calendar Year of Entry | -2.64 | -2.55 | -2.43 |
| | (-2.28)** | (-2.18)** | (-2.06)** |
| Ln Industry Capital Intensity | -.02 | -.01 | .00 |
| | (-.16) | (-.09) | (.03) |
| $\chi^2$(d.f.) | 40.00(12)*** | 41.92(13)*** | 37.73(13)*** |
| $\rho^2$ | 5.7% | 5.9% | 5.5% |

The values in parentheses are t-statistics with * = 10%, ** = 5%, and *** = 1% significance.

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