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PRODUCT INNOVATION AND START-UP BUSINESS MARKET SHARE PERFORMANCE

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Abstract

Product innovation's initial market share impact is estimated across a sample of start-up business ventures. The product's advantage relative to competing products measures the main innovation benefit. Holding the relative product advantage constant yields insights into potential barriers to adoption. In the regression results, the relative product advantage has the strongest market share impact. Incompatibility with customers' existing way of doing things does *not* have a meaningful market share impact. By reducing market share, a new and proprietary product technology tends to act as a barrier to adoption.

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Introduction

Should a start-up business venture develop and introduce an innovative or an imitative product? A profitable decision must examine dynamic revenue and cost trade-offs. The cost of an innovative product is generally higher in terms of both time and money. Mansfield, Schwartz, and Wagner (1981) estimate that developing and introducing an innovative product increases average costs by roughly 50%. The average time from the beginning of applied research to market increases by roughly 40%.

Will these higher product innovation costs be offset by revenue gains? Revenue gains are strongly influenced by initial market share performance. Initial market share performance for start-up ventures is explained by Biggadike (1976), Yip (1982), and Lambkin (1988). Market pioneering, competitive exit, and lower direct costs are found to increase market share. Product innovation though is not examined. Hence, this study estimates the impact of various product innovation characteristics on start-up venture market share.

The hypotheses are based on the diffusion of innovation literature. Because Rogers (1983, p. 232) concludes that five innovation attributes explain 49% to 87% of the adoption rate variance, this literature should yield important insights. While empirical studies examine product innovation diffusion through different customer groups, (see Srivastava et al. 1985 and Rao and Yamada 1988), they do not address the extent to which the innovating firm generally captures market share rewards. i. e. They take a demand rather than supply - based perspective.

For this paper's supply - based perspective, the Strategic Planning Institute's start-up business data are used. The data analysis covers the first four years of commercialization. Because the sample is limited to entered markets that are at

least 1 year old, the product innovations are more often evolutionary than revolutionary. The typical start-up business data entrant is a Fortune 500 diversification effort. Diversification entry though is not unusual. For example, Dunne, Roberts, and Samuelson (1988) estimate that 45% of recent U. S. manufacturing entrants were diversification efforts.

The product innovation characteristics measure the product's relative advantage as well as barriers to adoption. Such barriers can be very important. For example, Sheth and Ram (1987) say, "Innovations have consistently met with resistance. The steam engine was shunned initially, and airplanes were first considered evil magic for defying gravity" (p. vii).

In the regression results, the most important product innovation characteristic is a relative product advantage. A major product advantage typically generates major market share rewards, whereas a moderate advantage generates moderate rewards. Incompatibility with customers' existing way of doing things does *not* have a meaningful market share impact. Technological risk is measured by a new and proprietary technology. Because a new and proprietary technology tends to reduce market share, it acts as a barrier to adoption.

Hypotheses

The hypotheses are based on previous diffusion of innovation research and data availability. For example, Rogers (1983, Ch. 6) concludes that relative advantage, compatibility, complexity, trialability, and observability influence the diffusion of an innovation. While the start-up data include measures of the first two variables, the latter three variables are not included.

Equation 1 is the model specification that tests the product innovation hypotheses. In model estimation, equation 1 includes additional business and industry characteristics to reduce specification error.

$$MS_i = \beta_0 + \beta_1 MJRPA_i + \beta_2 MODPA_i + \beta_3 INCOMP_i + \beta_4 INCR_i + \beta_5 PAT_i + \varepsilon_i \quad (1)$$

where i = 1, 2, ... n, β_0 is the intercept term, β_1 to β_5 test the hypotheses, and ε_i is the random error term with variance σ^2_i. While Table 1 below provides specific definitions, the variables are:

MS = dollar market share,

MJRPA = 1 for a major product advantage versus competitive products, 0 otherwise,

MODPA = 1 for a moderate product advantage versus competitive products, 0 otherwise,

INCOMP = 1 if the product is very compatible with the customers' existing way of doing things, 2 if fairly compatible, and 3 if incompatible,

INCR = 1 for an incremental product innovation that attempts to meet customer needs *already being served* by existing products, but with a new technology or method, 0 otherwise, and

PAT = 1 if the entrant benefits significantly from product patents or trade secret protection, 0 otherwise.

The first hypothesis addresses the main product innovation benefit: a relative product advantage. The others address potential barriers to adoption. Rogers' (1983) survey and Tornatzky and Klein's (1982) meta-analysis both conclude that innovations diffuse more rapidly as the relative advantage versus

close substitutes increases. Hence, a major ($\beta_1 > 0$) or a moderate ($\beta_2 > 0$) product advantage should increase a start-up venture's market share.

In the start-up data, used in this study, customer perceptions during the first two years of commercialization determine the product advantage[1]. For example, the Xerox 914 copier provided a major product advantage. Check-Up, the first antiplaque and antitartar toothpaste (Advertising Age 1987), initially had a moderate advantage, but the dentifrice leaders quickly introduced "me too" products. Because Check-Up could not maintain its advantage during the first two years, the product should be classified as similar to competition.

Even with a relative product advantage, there are often important barriers to adoption. Sheth and Ram (1987) say, "The change created by innovations ... generates barriers of resistance from both manufacturing corporations and potential customers. These resistance barriers can impede, stifle, or even destroy the innovation" (p. viii). The following hypotheses address potential barriers to adoption.

Rogers (1983) and Tornatzky and Klein (1982) conclude that adoption typically declines for an incompatible innovation. Hence, an incompatible innovation should reduce market share ($\beta_3 < 0$). (Because incompatibility is defined as the degree to which customers must change their current practice, it measures customer switching costs.)

The start-up data classifies a product as either very compatible, fairly compatible, or incompatible over the first two years of commercialization. Check-

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1 The relative product advantage measure does not specifically addresses perceptions, though perceptions are specifically addressed in the relative product quality measure. Because these two measures are closely related, the relative product advantage measure should incorporate customer perceptions.

Up toothpaste, for example, was very compatible. The Dvorak typewriter keyboard was incompatible because it required typists to make major changes in their typing habits. Though the Dvorak keyboard was more efficient than the standard QWERTY keyboard, incompatibility precluded its acceptance[2].

A new and proprietary technology often provides a means of entry that increases market share. However, the increase should be based largely on the relative product advantage. With the relative advantage held constant, a new and proprietary technology measures technological risk.

The start-up data defines a "new" product technology as an incremental product innovation at the time commercial operations begin. "Proprietary" product technology is *significant* product patent or trade secret protection over the first two years of commercialization.

Holding the relative product advantage constant, an incremental product innovation versus a similar technology should tend to *decrease* a start-up venture's market share ($\beta_4 < 0$). Sheth and Ram (1987) emphasize that both the entrant and customers face technological risk. Customers fear economic loss, physical danger, and reliability problems. The entrant fears lawsuits, warrantee claims, and a loss of credibility. These technological risks are both functional and psychological. For example, some early Xerox 914 copiers caught fire. To reduce functional risk, a fire extinguisher was attached to each unit. To reduce psychological risk, the fire extinguisher was labeled "*Scorch Eliminator*" (Dessauer 1971, p. 128).

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2 The QWERTY keyboard was "anti-engineered" in 1873 to slow typists who were jamming mechanical typewriters (Rogers 1983, p. 9-10). The Dvorak keyboard increases a typist's speed and reduces both fatigue and typographical errors. Despite these major advantages and the passing of more that 50 years, the QWERTY keyboard still dominates.

Holding the relative product advantage constant, product patent or trade secret protection should also *decrease* a start-up venture's market share ($\beta_5 < 0$). Market share should decrease when proprietary information creates quantity-reducing monopolistic behavior (see Scherer 1980, Ch. 16). Market share should also decrease when customers resist becoming dependent on a monopolist.

An alternative hypothesis predicts that a new and proprietary technology *increases* market share ($\beta_4 > 0$ and $\beta_5 > 0$). A new technology often helps justify an entrant's claim of a relative product advantage. When a greater proportion of customers perceive that a relative advantage exists, market share should increase. Also, Levin et al. (1987) find that a proprietary technology reduces the threat of competitive imitation. This can force customers to buy from a monopolist.

Data

The start-up business data of the Strategic Planning Institute (SPI) provide unique and detailed information on start-up business ventures. A start-up business venture is a new business that is viewed as a new source of supply by its customers and a new entrant by its competitors. Each observation describes the entry strategy, entered market, competition, operating results, and balance sheet information. Because detailed and confidential information is divulged, the entrant and entered industry are anonymous. (For more details, see Robinson 1988b).

Two data bases are used. STR2 covers years 1 and 2 and STR4 covers years 3 and 4. Though detailed information is provided, the product innovation measures are not updated in years 3 and 4. The problem does not appear to be

serious. When only the product innovation measures explain market share, the explained variation increases from .14 in years 1 and 2 to .26 in years 3 and 4[3].

A second measurement problem is that each key measure has a subjective component. For market share, defining market boundaries is especially difficult for new and emerging markets. Also, the relative product advantage measures are reported after the first two years of commercialization. High share entrants may simply report a major advantage and low share entrants an inferior product.

To reduce the problem, the Start-Up Data Manual (1978) encourages the entrant to seek relatively objective sources, such as market surveys (when available) and employees with direct end-user contact. These sources reduce, but can not eliminate the subjectivity. As Tornatzky and Klein (1982) point out, subjective rating problems arise whenever *perceived* innovation characteristics are measured.

The sample has additional limitations. First, the typical entrant benefits from a Fortune 500 firm's skills and resources. Even though Dunne, Roberts, and Samuelson (1988) find that most diversifying entrants benefit from established skills and resources[4], entrants in the start-up data should receive even greater parent firm benefits.

Second, Biggadike (1976) developed the start-up database in the hope of comparing failed entrants with survivors. Managers though are not interested in

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3 Even so, random measurement error biases an individual coefficient estimator towards zero. Because Mansfield, Schwartz, and Wagner (1981) report, "Within 4 years, 60% of the patented successful innovations in our sample were imitated" (p. 913), this bias may be especially strong for the product patent or trade secret estimator.

4 For example, Dunne, Roberts, and Samuelson (1988, p. 504) report 81% of the diversification entrants used existing manufacturing plants. Only 19% built a new plant.

submitting data on "dead businesses" (p. 39). Hence, the results are conditional on surviving at least the first two years of commercialization. Because surviving more than two years is generally necessary to break even, explaining survivors' market share is important.

Third, erratic start-up business market share performance yields a number of extreme outliers. Though outliers often provide crucial information, certain market share outliers are harmful because they mask general tendencies. For harmful outliers, Belsley, Kuh, and Welsch (1980, p. 9) recommend data deletion, model reformulation, or downweighting extreme observations. In the regression analysis, generalized least squares (GLS) estimation downweights extreme market share values.

Data deletion is also used. Market pioneers who entered their market first, major innovators that "attempted" to serve customer needs for the first time, and markets without any competitors in the year prior to entry are deleted. Analyzing innovations in markets that are at least 1 year old helps eliminate market share outliers and also improves sample homogeneity[5].

To improve sample homogeneity further, nonmanufacturing businesses are deleted. Entrants that did not submit a full set of variables for the regression analysis also are deleted. The deletions account for roughly 25% of each data base. The sample size is 144 entrants in years 1 and 2 and 94 in years 3 and 4.

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5 Three observations with extreme values that may have resulted from respondent error, data entry error, or a unique situation are deleted also. One late entrant reports a market share of 100% in the first two years of entry. Two entrants report average per-unit prices at less than 7% of the average prices charged by the three leading competitors.

Descriptive Statistics

Market share averages 9% in years 1 and 2 and 13% in years 3 and 4. Across the two time periods, the market share correlation equals .86. In years 3 and 4, 14% of the entrants lost market share, 73% gained zero to 10 share points, and 13% gained more than 10 points. Hence, the typical start-up venture gains share in years 3 and 4, but gains exceeding 10 share points are infrequent.

In years 1 and 2, 15% of the ventures report a major product advantage, 49% report a moderate advantage, and 36% report either a similar or inferior product. Thus, product imitation and moderate advantages are widespread, but major advantages are relatively infrequent. Forty two per cent state their product is very compatible with the target market's current way of doing things, 45% say it is fairly compatible, and 13% say it is incompatible. Forty nine per cent declare an incremental innovation and 31% declare significant product patent or trade secret protection.

The sample includes roughly 75% industrial and 25% consumer goods entrants. This distinction is addressed in the Results section below. Because almost 80% of the businesses entered during the product life cycle's introductory or growth stage, the markets are relatively young and growing . Frequent entry in growing markets is also reported by researchers, such as Hause and Du Rietz (1984).

Model Specification

In addition to the product innovation variables in equation 1 above, the model specification includes four additional entry strategy variables and two industry characteristics. Table 1 lists the variable definitions and the year 1 and 2 means and standard deviations.

The additional entry strategy variables are market pioneering, relative product line breadth, relative marketing expenditures, and relative price. Lambkin (1988) finds that market pioneers in the start-up data typically have higher market shares. She finds no meaningful difference between early follower and late entrant share levels. Hence, a market pioneer dummy variable equals 1 for a pioneer that was not first to enter, and 0 otherwise[6]. An increase in product line breadth should increase market share, as should an increase in relative marketing expenditures. An increase in relative price should decrease market share.

The industry characteristics are average industry market share and market growth. Robinson (1989) reports that the average industry market share impact, measured by 100/(estimated number of industry competitors), is positive. Aaker and Day (1986) argue that market share gains are typically easier to achieve in growing markets.

Model Estimation

In cross-sectional estimation, one often encounters a heteroskedastic random error term (ε_i). (Heteroskedasticity arises when $E(\varepsilon_i^2) = \sigma^2_i$ for $i = 1, \ldots, n$ and $\sigma^2_i \neq \sigma^2_t$ for some $t > 1$.) With heteroskedasticity, it is well known that the ordinary least squares (OLS) coefficient estimator is unbiased, but inefficient. Because the t-statistics are biased, hypothesis testing often leads to faulty inferences.

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6 The start-up data classify market pioneers in two categories. The distinction depends on whether or not the pioneer was the first entrant. The sample excludes pioneers that were first. In certain situations, even though a firm is not first, it can still qualify as the pioneer. Theoretically, a market pioneer is the entrant most responsible for starting a new market. For example, Ford was not first, but is nevertheless considered the automobile manufacturing pioneer.

The heteroskedasticity should be positively related to expected market share. This is because the absolute difference between actual and expected market share should increase as expected market share increases. For example, it is more likely that a 60 share point forecast will be off by 10 share points than a 15 share point forecast.

A modified version of White's (1980) test strongly supports heteroskedasticity in years 1 and 2[7]. In an attempt to correct the problem, generalized least squares (GLS) estimation specifies:

$$\sigma^2_i = \sigma^2 [E(MS_i)]. \qquad (2)$$

where market share predicted by OLS is a consistent estimator of $E(MS_i)$[8]. See Kmenta (1971, p. 262).

In years 1 and 2, White's modified test indicates GLS effectively eliminates the heteroskedasticity. The results for year 3 and 4 are not as straightforward. In both OLS and GLS estimation, White's modified test cannot reject the null hypothesis of homoskedasticity. The inconclusive results indicate that for this relatively small sample, the test's power is low[9]. This is not a major problem

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7 White's test regresses the squared residual on the independent variable squared and cross-product terms. With sample sizes of only 144 and 94, the test's power should be increased by using only the squared variables.

8 The minimum value for predicted market share is set equal to 1.0, which eliminates the problem of a negative market share forecast. It also eliminates the GLS estimation problem of entrants with a predicted share between 0.0 and 1.0 receiving an inflated weight.

9 Logit regression, that specifies the dependent variable as Ln MS/(1-MS), was also used in an attempt to eliminate the heteroskedasticity. White's modified test indicates the

because the estimation method influences only one hypothesis. Table 2 reports both the OLS and GLS results.

Results

The GLS results are emphasized because heteroskedasticity is found in years 1 and 2 and it may or may not be present in years 3 and 4. A conservative approach bases statistical significance on two-tail tests. In Table 2, the R^2 values range from .28 to .40. For cross-sectional data on start-up ventures, the R^2 values seem reasonable[10].

For the first set of GLS results in Table 2, the major product advantage estimates are consistently positive and statistically significant. (The second set of GLS results which includes interaction terms is discussed below.) The GLS estimate is five share points in years 1 and 2 and 14 share points in years 3 and 4.

In both time periods, a moderate product advantage versus a similar or inferior product yields three to four share points. Both estimates are statistically significant. The OLS estimates are also positive, but they are not statistically

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heteroskedasticity is still present in years 1 & 2. Similar to OLS and GLS, the year 3 & 4 results are inconclusive.

10 Additional model validation insights for years 1 and 2 are provided in Robinson (1989). A jacknifing procedure deletes one observation, estimates the model, and then forecasts the deleted observation. The market share variation explained by the forecasted observations is virtually the same as the explained variation in the pooled estimation model. This suggests that the coefficient estimates are relatively stable and hence potentially useful for forecasting.

significant. The results indicate a moderate product advantage generally yields a moderate market share gain.

Though the incompatibility estimates are positive, they are not statistically significant. Because Tornatzky and Klein's (1982) meta-analysis and Roger's (1983) survey support a negative sign, how can the positive sign be explained? Severe multicollinearity often causes a sign reversal, but does not appear to be a problem here. This is because (1) the descriptive statistics and simple correlations are also positive and (2) the incompatibility standard errors are the lowest for the five product innovation variables. A second explanation is that interactions with other product innovation variables are important. Again, this explanation does not appear to apply because none of the GLS interactions are statistically significant.

A more likely specification problem is that incompatibility acts as a proxy for early entry because (1) the market pioneer dummy variable crudely controls for order of entry and (2) early entrants often introduce incompatible products. As Robinson and Fornell (1985), Urban et al. (1986), and Robinson (1988a) find an inverse relationship between order of market entry and market share, the positive order of entry impact may be overwhelming the negative incompatibility impact.

For a new and proprietary technology, the incremental product innovation and product patent or trade secret protection estimates are consistently negative. The only statistically significant estimate is for product patent or trade secret protection in years 1 and 2. Even so, the GLS sum in both time periods indicates a four share-point loss. The two-tail tests are statistically significant at the 5% and 20% levels. Though the model does not accurately sort out the individual

estimates, a new and proprietary product technology seems to act as a barrier to adoption[11].

Dynamic Coefficient Changes

The hypotheses do not address coefficient changes, but the major product advantage GLS estimate increases over the two time periods from five to 14 share points. This is consistent with the typical S-shaped diffusion curve. For example, Urban and Hauser (1980) say, "Innovators try first and information is passed to later adopters through word of mouth and advertising. Initial purchasing will be low relative to later levels of sales" (p. 409).

The increase is economically significant, but is it also statistically significant? Based on conservative two-tail tests, the OLS ten-share-point increase is significant at the 10% level (See Kmenta 1971, p. 519). The GLS nine-share-point increase is significant at the 20% level. While the statistical support is modest, the z-values are more than twice the size of the model's next largest value. Hence, if any regression coefficients change over time, the major product advantage coefficient is the most likely candidate.

Industrial versus Consumer Goods

Are the estimated relationships homogeneous across consumer and industrial goods industries? Consumer goods interaction terms are added for each variable in the model. Because the relative product advantage has the only

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11 Though the incremental innovation estimate is negative, the mean difference tests show a higher average market share. Entrants with an incremental innovation often receive market share gains from market pioneering and a relative product advantage. When these additional explanatory variables are controlled, incremental innovation has a negative sign.

statistically and economically significant interactions, they are retained. In Table 2, the consumer goods interactions are all negative. The magnitudes are so large that the market share rewards for consumer goods are essentially eliminated. The industrial goods estimates, though, remain both economically and statistically significant.

These results suggest that product innovations typically diffuse faster in industrial markets. The reasons could be that industrial entrants usually have fewer customers who are easier to reach and that well-informed purchasing agents may adopt innovations faster than consumers. Also, because consumer products often are evaluated subjectively, the results may be influenced by greater relative product advantage measurement error.

Implications

How can a later entrant offset the share advantages that typically arise for market pioneers? The results indicate that when a later entrant has a major product advantage, important share gains are obtained. For example, Procter & Gamble was the market pioneer in Japan's disposable diaper market (Business Week 1986). However, three years after introducing a superior diaper, Uni-Charm had captured nearly 50% of the market.

For most later entrants, introducing a product with a major advantage is not feasible. Only 9% of the later entrants report a major product advantage versus 33% of the market pioneers. (The difference is statistically significant at the 1% level.) Hence, major product advantage opportunities tend to arise in the market's early years.

A related point is that entry timing often determines the product's advantage. When two competitors develop an identical product and the first to market has a major advantage, the second will have only a "me too" product. If a

crash program is necessary to gain a major advantage, then costs can escalate quickly. For example, Mansfield et al. (1971) find that as the expected time to entry is reduced, expected product innovation costs typically increase at an increasing rate. Hence, entrants that attempt to develop a major product advantage often face important cost and revenue trade-offs.

When does a new and proprietary technology generate initial market share rewards? The sum of the incremental innovation and product patent or trade secret estimates indicates a four-share-point loss. If a major product advantage is generated, the 14 share point gain in years 3 and 4 yields a positive market share reward. However, the loss eliminates the moderate product advantage share gain over the first 4 years of commercialization. Hence, a new and proprietary technology can generate meaningful market share rewards when it leads to a major product advantage. A moderate product advantage is not sufficient.

How frequently does a major product advantage arise? For entrants that report both an incremental innovation and product patent or trade secret protection, only 26% report a major advantage. Hence, most entrants that successfully developed a new and proprietary technology did not receive initial market share rewards.

Summary and Conclusions

While the regression results only yield "ballpark" estimates, they provide insights into both direction and magnitude. Which product innovation characteristic tends to have the greatest market share impact? A product advantage in relation to competitors plays a central role. A major advantage increases market share by five share points in years 1 and 2 and by 14 points in years 3 and 4. The

gain over time probably occurs because it often takes years for innovative product sales to escalate. Moderate product advantage gains are constant over time at roughly three to four share points. Though tentative, some evidence suggests that initial market share rewards for a relative advantage are greater in industrial than in consumer markets.

Genentech's TPA, introduced to treat heart attacks, illustrates the importance of a major product advantage. The Wall Street Journal (1988b) says, "survival studies since the FDA approval show only a modest advantage for TPA - not the huge advantage earlier predicted." When TPA's perceived advantage declined, sales plunged by as much as 50% below forecast.

When should a start-up venture attempt to introduce a product with a major advantage? The chances for success tend to be greater in the market's early years. Expected revenue gains though must be balanced against higher expected costs and delayed entry. If a crash program is necessary for a product to have a major advantage, costs can escalate quickly.

With the relative product advantage held constant, a new and proprietary product technology reduces market share by roughly four share points. Hence, a new and proprietary technology, per se, often acts as a barrier to adoption.

When does a new and proprietary technology generate initial market share rewards? Market share rewards typically arise when the new and proprietary technology leads to a major product advantage. A moderate advantage is not sufficient. In the sample, only 26% of the entrants that report both a new and proprietary technology also have a major product advantage. This suggests that most entrants that successfully develop a new and proprietary technology do not generate initial market share rewards.

Incompatibility with the customer's current way of doing things does not have a meaningful market share impact. The nonresult is surprising because

other empirical research points to a negative impact. It is consistent though with Rogers' findings (1983, p. 226) in the sense that a relative advantage is more important.

Limitations

Marketing research procedures help forecast initial market share, but often such procedures are not used by start -up ventures. Barrie Spelling, Colgate Venture's president says, "We move more quickly and we have the leeway to act on instinct, rather than wait for exhaustive market research" (Wall Street Journal 1988a). Without customized marketing research, this study may help a start-up venture forecast market share.

Still, critical model inputs needed to forecast market share are often uncertain prior to entry. For example, Genentech did not accurately predict TPA's relative product advantage. This uncertainty reduces the model's forecasting value. Though the model cannot reduce independent variable uncertainty, it reduces uncertainty by providing a forecast conditional on a given set of independent variables.

Generalizability is limited because most of the entrants are in Fortune 500 firms. Because smaller firms often lack the skills and resources to penetrate a market rapidly, their initial market share rewards for a relative product advantage should be dampened. Also, if customers perceive a greater risk when buying a smaller firm's new and proprietary technology, market share rewards should be further dampened.

Finally, most of the sample entered in the 1970's. Because intellectual property rights have strengthened over time (Business Week 1989), the true

relationship for a new and proprietary technology may very well differ in the 1990's.

Conclusions

Porter (1985) says, "When considering risky and uncertain moves into new territory, a challenger's management may be particularly sensitive to setbacks or signs of early success or failure" (p. 486). The empirical results help reduce the uncertainty about the prospect for early market share success or failure. This reduced uncertainty can improve the managerial Go / No Go decision, as well as more numerous How to Go decisions.

Are initial market share rewards maintained over the long term? Long-term rewards are especially likely for start-up ventures with a major product advantage. This is because the evidence suggests their market share rewards increase over time. Hence, even though introducing a product with a major advantage is usually more costly and time consuming, patient managers can capture substantial market share rewards. Since Japanese managers often have a longer time horizon and are more market share driven that U. S. managers (Fortune 1989), who will be introducing products with a major advantage in the 1990's and beyond?

TABLE 1

Variable Definitions and Descriptive Statistics

Variable	Definition[a]	Years 1 & 2 Mean	Years 1 & 2 S.D.
Market Share	The entrant's dollar sales divided by total served market dollar sales.	9.11	12.39
Major Product Advantage	During the first two years of commercialization, how would you rate the customer advantage to the business products or services vs. competition?		
	1 if the entrant had a very strong relative product advantage over competitive or substitute products; 0 otherwise.	.15	.36
Moderate Product Advantage	Same as above, except for a moderate product advantage.	.49	.50
Incompatibility	During the first two years of commercialization, how incompatible were the products or services of this business with the customers' current way of doing things? 0 = Products or services were very compatible; customers did not have to make any changes. 1 = Products or services were fairly compatible; customers needed to make only minor changes. 2 = Products or services were incompatible; customers had to make major changes in their current practices.	.72	.68
Incremental Product Innovation	How did the customers perceive the degree of product or service innovation when commercial operations began? 1 = These products or services attempted to meet customer needs already being served by existing products, but they met those needs with a new technology or method. 0 = These products or services attempted to meet customer needs already being served by existing products using basically the same technology and methods.	.49	.50
Product Patent or Trade Secret	1 if the entrant benefited to a significant degree from patents, trade secrets, or other proprietary methods of production or operation during its first two years of commercialization, 0 otherwise.	.31	.46
Market Pioneer	1 if the entrant was one of the pioneers in developing products and services in the market, but was not first to enter, 0 otherwise.	.28	.45

TABLE 1 (Cont.)

Variable	Definition	Years 1 & 2 Mean	S.D.
Relative Product Line Breadth	Relative to the weighted average of the product lines of competitors already established in this market, estimate the breadth of the product line of this business during the first two years of entry: 1 = Narrower 2 = Same 3 = Broader	1.58	.73
Relative Marketing Expenditures	Comparisons of total dollar amounts are requested because ratios are unsuitable for start-up businesses. "About the Same" is identified as within ± 20% of the average amount spent by the three largest competitors. "Somewhat More or Less" means 20% to 50% more or less. "Much More or Less" means this business's expenditures were over 50% more or less. 1 = Much less 2 = Somewhat Less 3 = About the Same 4 = Somewhat More 5 = Much more Relative marketing expenditures is the mean of relative salesforce, relative advertising, and relative promotion expenditures.	2.31	1.05
Relative Price	Estimate the average level of selling prices of this business's products and services, relative to the average price of the three largest competitors. The average for the leading competitors equals 100%.	109.81	50.73
Average Industry Market Share	100 divided by the estimated number of competitors. The estimated number of competitors equals 1.0 (for the entrant) plus the estimated number of competitors in the served market in the year prior to entry. Competitors with less than 1% of the served market are ignored. 50 = 1 competitor prior to entry. 22 = 2-5 competitors prior to entry. 9 = 6-15 competitors prior to entry. 4 = 16-30 competitors prior to entry. 2 = more than 30 competitors prior to entry.	15.00	11.58
Log Industry Dollar Sales Growth	For the three previous years, estimate the average annual percentage growth rate of the value of total shipments by suppliers in the served market. The natural logarithmic functional form is used, with the minimum growth rate set equal to 1.0.	2.67	1.10

[a] Variable definitions are derived from the start-up data forms.

TABLE 2

Ordinary and Generalized Least Squares Results

Variable and Expected Sign	Market Share					
	Years 1 & 2 (n=144)			Years 3 & 4 (n=94)		
	OLS	GLS	GLS	OLS	GLS	GLS
Constant (+/-)	-4.77	2.09	2.03	-4.97	-.51	.37
	(-.98)[a]	(.65)	(.64)	(-.80)	(-.09)	(.06)
Product Innovation						
Major Product Advantage (+)	6.86	5.41	8.51	16.64	14.22	18.11
	(2.05)**	(1.74)*	(2.32)**	(3.37)***	(2.28)**	(2.61)***
Moderate Product Advantage (+)	1.67	2.74	3.23	3.10	3.74	5.39
	(.77)	(1.99)**	(2.16)**	(1.09)	(1.66)*	(2.05)**
Incompatibility (-)	2.29	1.09	.67	2.95	1.34	.63
	(1.54)	(1.05)	(.66)	(1.42)	(.71)	(.34)
Incremental Product Innovation (+/-)	-1.38	-.95	–1.08	-2.81	-2.34	–1.91
	(-.55)	(-.59)	(–.74)	(-.86)	(–.88)	(–.73)
Product Patent or Trade Secret (+/-)	-4.15	-2.95	–2.75	-2.26	-1.29	–1.45
	(-1.96)**	(-1.90)*	(–1.96)**	(-.80)	(-.48)	(–.56)
Consumer * Major Product Advantage (+/-)			–11.13			–14.91
			(–2.70)***			(–1.42)
Consumer * Moderate Product Advantage (+/-)			–1.75			–4.58
			(–.93)			(–1.42)
Other Entry Strategy Variables						
Market Pioneer (+)	6.97	6.22	5.86	5.48	4.59	3.81
	(2.77)***	(2.59)***	(2.64)***	(1.58)	(1.26)	(1.06)
Relative Product Line Breadth (+)	2.39	1.65	.94	3.49	1.39	1.21
	(1.80)*	(1.46)	(.93)	(1.83)*	(.74)	(.67)
Relative Marketing Expenditures (+)	1.70	.50	.97	2.65	1.31	1.71
	(1.76)*	(.68)	(1.42)	(1.94)*	(1.05)	(1.39)
Relative Price (-)	-.02	-.02	–.02	-.03	.00	–.01
	(-.91)	(-1.36)	(–1.18)	(-.87)	(.03)	(–.23)
Industry Variables						
Average Industry Market Share (+)	.19	.17	.15	.17	.22	.19
	(2.18)**	(1.97)**	(1.90)*	(1.09)	(1.24)	(1.16)
Log Industry Sales Growth (+)	.69	-.16	–.02	.56	.24	.28
	(.78)	(-.25)	(–.04)	(.47)	(.21)	(.25)
R^2	.30	.28[b]	.32	.39	.37	.40

[a] The values in parentheses are z-statistics. All tests are two-tailed with * = 10%, ** = 5%, and *** = 1% significance.

[b] The GLS R^2 values are calculated from the raw variables and the GLS estimates by multiplying and summing these values to predict market share and then squaring the correlation with actual market share.

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