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**Abstract**
A model depicting first-mover dynamics is proposed wherein certain types of strategic barriers activated by the first-mover strategy figure prominently in preserving benefits in the time dimension. Strategic barriers conferring singularity (i.e., one-time benefit) are considered to be the most effective preservers of first-mover advantage. The theoretical model is tested empirically in a study of six major industries. Benefits operationalized as industry share and profit share were found to decline consistently with industry age according to an exponential function designated the opportunity curve.

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# FIRST-MOVER ADVANTAGE: THE OPPORTUNITY CURVE

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## ABSTRACT

A model depicting first-mover dynamics is proposed wherein certain types of strategic barriers activated by the first-mover strategy figure prominently in preserving benefits in the time dimension. Strategic barriers conferring singularity (*i.e.* one-time benefit) are considered to be the most effective preservers of first-mover advantage. The theoretical model is tested empirically in a study of six major industries. Benefits operationalized as industry share and profit share were found to decline consistently with industry age according to an exponential function designated the opportunity curve.

## INTRODUCTION

Few would argue with the assertion that time is a critical factor in the business world. At a micro level, time management is essential to executive success. At a macro level, strategic management can be considered the mechanism by which firms achieve time-efficient adaptation to their changing environments. Stalk (1988) appears to endorse these assertions in his exposition of the emerging focus on economies of time across organizational systems. Executives and firms alike are realizing afresh the value of responsiveness. Opportunity waits for neither, and the first one through an opportunity window may be the big winner or the only winner.

Even though timeliness and first movership are ubiquitous concepts in the strategy field from a practitioner viewpoint, the associated research stream is still in the formative stage. This is probably because the topics are so fundamental and so pervasive that not many researchers have recognized a need to wrap them in theoretical attire or test empirically what seems so obvious. The 1980s appear to mark an awakening to the need for scientifically underpinning first-mover phenomena. This timing is propitious since many business organizations are experiencing a very challenging shift in scope for first-movership contestation from national boundaries to the intensely competitive international arena.

The purpose of this article is to bring additional theoretical refinement to the study of first movership accompanied by confirmatory empirical support. It offers definitional clarification and proposes a theoretical model for addressing first-mover issues. The concept of first movership is more precisely

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specified, and temporal strategic barriers are distinguished from atemporal barriers in explicating the basis for preserving first-mover advantage. Strategic barriers which confer singularity or one-time benefit to the first mover also are discussed. The main contribution of the article is the opportunity curve, a functional relationship for representing first-mover advantage and the rate of subsequent opportunity dissipation.

The model and corresponding relationship are tested empirically in six industries: automobile, chemical, computer, insurance, oil, and retail. Consistent conformance of temporal benefits to the opportunity curve assumptions suggests that it is a highly generalizable function. Evaluation of opportunity curve parameters for the selected industries gives initial support to the view that temporal strategic barriers influence the rate of opportunity dissipation in a competitive context which, in turn, influences the magnitude of first-mover advantage.

## LITERATURE REVIEW AND SYNTHESIS

The expectation of first-mover benefits motivates timely behaviour in a broad array of business settings. The widely-accepted adaptive model of strategy (Chaffee, 1985) tacitly assumes that competitive advantage accrues to firms who are first to understand and adapt to environmental changes. Activities in support of strategy typically proceed under time pressure or 'deadlines' because managers realize that opportunity usually presents itself within a time-dependent window (Frohman, 1982). It is probably safe to conclude that practitioners already know that rewards frequently go to those who are first to move intelligently in the business area. In the strategy literature, first-movership benefits are being ever more widely documented while timeliness already permeates many strategy prescriptions. A priority of current scientific inquiry in this domain is development of a suitable theoretical framework for understanding first movership so that this ubiquitous phenomenon can be studied and managed more effectively.

Schmalensee (1982) develops a market model from the economics tradition which deals with consumers of experience goods (see Nelson, 1970) in a context of imperfect information about quality. He concludes that pioneering brands possess demand advantages over follower brands because consumer preference rests with the first brand tried that performs adequately. This barrier to entry becomes less effective if the follower offers a differentiated product.

Glazer (1985) reviews recent economics research on market entry and observes that first movers generally are more successful than immediate followers. However, failure rates of first and second movers are similar. First-mover success is attributed to advantages such as greater economies of scale, more extensive experiential learning, and clearer access to strategic opportunities. His analytical model suggests that these advantages do not result in a lower failure rate for the first mover because demand often fails to reach a critical threshold for viability.

A game theoretic approach is used by Esther Gal-Or (1985) to sort out





first-mover and second-mover benefits. Advantage goes to the first mover if the reaction function of the players is downward sloping. This corresponds to a market situation where pre-emption is possible. Second movers receive the advantage when the reaction function is upward sloping. This corresponds to a situation where followers may copy or undercut a leader.

Porter (1985, p.186) contends that first movers reap benefits to the extent that they can preserve temporally won cost or differentiation advantages and ultimately 'define the competitive rules' in their domain. He enumerates several levers of first-mover advantage: establishing a unique reputation, pre-empting a product or market positioning, using switching costs to lock up sales, selecting unique distribution channels, exploiting learning curve economies, pre-empting access to facilities or scarce resources, defining the standards for technology, securing patents or special government-conferred status, and engaging in price skimming. First movership is considered disadvantageous when pioneering costs are excessive or when there is a substantial risk of changing conditions (*e.g.* demand).

Two marketing studies focus on market share effects of first movership. Robinson and Fornell (1985) report a PIMS study which specifically examines market share and marketing mix variables among consumer goods businesses. They found a strong relationship between order of entry and market share which they were able to associate with the higher product quality and broader product lines of pioneers. Distribution advantages conferred market share benefits for pioneers, but strong advertising activity was detrimental to pioneer share. Evidence supported a consumer information benefit for pioneers, but the effect of pioneering on direct costs was negligible. Urban *et al.* (1986) also report significant market share rewards to pioneering brands of consumer products. Share data derived from evoked consumer responses covering a total of 129 brands was explained by order of entry, advertising, and product positioning variables.

Lambkin (1988) associates the literature on entry barriers (Bain, 1956) and consumer information (Stigler, 1961) with the prevailing notion that first movership confers enduring benefits. Within a population ecology framework, she postulates that market pioneers would expect to outperform early followers or late entrants to the extent that they pursue a generalist strategy. She characterizes this strategy by market entry at large scale with context-related experience and eventual high competitive efficiency. Empirical results from the PIMS database were confirmatory for market share performance. However, return on sales, return on investment, and cash flow/investment patterns were inconsistent between the sample of start-up businesses and the sample of businesses from the main PIMS database.

Lieberman and Montgomery (1988) propose a theoretical model of first movership which sees opportunities arising endogenously from either firm proficiency or luck. Advantages flow from three primary isolating mechanisms: technological leadership, pre-emption of scarce assets, and buyer switching costs. Technological leadership is conferred by experience curve effects and R&D superiority, including patent protection. Natural resources, manufacturing or retailing locations, shelf space, product characteristic space, and productive capacity are among the factors amenable to pre-

emption. Switching costs arise from a buyer's sticky adaptation to a seller or contractual arrangement. Imperfect information about product quality also acts to anchor consumers to the first successful product (Schmalensee, 1982).

Lieberman and Montgomery (1988) mention four situations when a first-mover strategy may be significantly undermined. Followers may be able to 'free-ride' on the first mover's diffused technology and hired personnel, or they may possess important assets that are not yet in place for the first mover. Followers also may benefit from the resolution of technological or market uncertainty by first movers. Radical technology change or abrupt changes in customer need frequently erode the first-mover position in favour of followers. Finally, first movers may exhibit inertia with respect to fixed assets, product line, or organization structure which makes them susceptible to follower inroads.

Lilien and Yoon (1990) review marketing and economics literature related to leadership and followership positions regarding new product entry. Included is an exploratory analysis of 91 new industrial products launched by 52 French firms. Early (but not necessarily initial) competing products were most successful in developing into related product groups for their firms, particularly if entry occurred early in the product life-cycle. They conclude that entry strategy must balance risks of premature entry against opportunity diminution accompanying later entry.

The organizational learning literature forms another buttress for first-movership theory and defines a context within which the experience curve can be regarded as a special case (Schon, 1983). Argyris and Schon (1978) explain that:

> Organizational learning occurs when members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory-in-use, and embedding the results of their inquiry in private images and shared maps (Argyris and Schon, 1978, p.29).

The cognitive development implied by this description is time-dependent and suggests that reflection and sense-making with respect to accumulated experience (rather than reflexive responses) underpin the process (Fiol and Lyles, 1985). Since first movers initiate the build-up of experiential raw material first, they create for themselves the opportunity to develop the most advanced insights, associations, causal maps, *etc.* within a specified context, such as an industry. Of course first movership must be accompanied by utilization of appropriate (rapid) learning systems to generate sustained competitive advantage (DeGeus, 1988; Shrivastava and Grant, 1985).

*Temporal Strategic Barriers*

There appears to be a simple model which accommodates much of the literature on first movership. Figure 1 depicts first movership as a direct influencer of firm performance with temporal strategic barriers moderating this bi-variable relationship. Temporal strategic barriers provide a shield





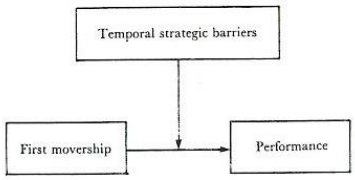


Figure 1. The first-mover model

which insulates the first mover to varying degrees from follower competition. It is a concept which encompasses entry barriers (Bain, 1956), mobility barriers (Caves and Porter, 1977), and isolating mechanisms (Lippman and Rumelt, 1982). All of these are strategic barriers which protect the firm, but they differ regarding scope (see figure 2). Also, some function with a temporal discipline, while others are atemporal. For example, the experience curve entry barrier confers benefit to temporally advantaged industry incumbents, while advertising as an entry barrier has no temporal dimension. The latter defends without regard to order-of-entry effects. Likewise, the mobility barrier of managerial skill confers greater benefit to strategic groups which have more (longer) contextual learning, while the mobility barrier of product line breadth has no time dependencies. Finally, patenting is an isolating mechanism which benefits the first mover, while organization structure as an isolating mechanism may not benefit the temporally advantaged because each firm is obliged to seek organizational alignment to its particular environment.

Temporal strategic barriers appear to have several different motivating principles (see table I). The experience curve specifically and organization

Table I. Taxonomy of strategic emulation barriers supporting the first-mover strategy

| *Motivating principle* | *Theoretical basis* |
|---|---|
| Learning | Experience curve (Henderson, 1973) |
| | Organizational learning (Argyris and Schon, 1978) |
| Pre-emption | Resource dependence (Pfeffer and Salancik, 1978) |
| Uncertain imitability | Causal ambiguity (Lippman and Rumelt, 1982) |
| Uniqueness | Differentiation (Porter, 1980) |
| Developmental seniority | Economies of scale |

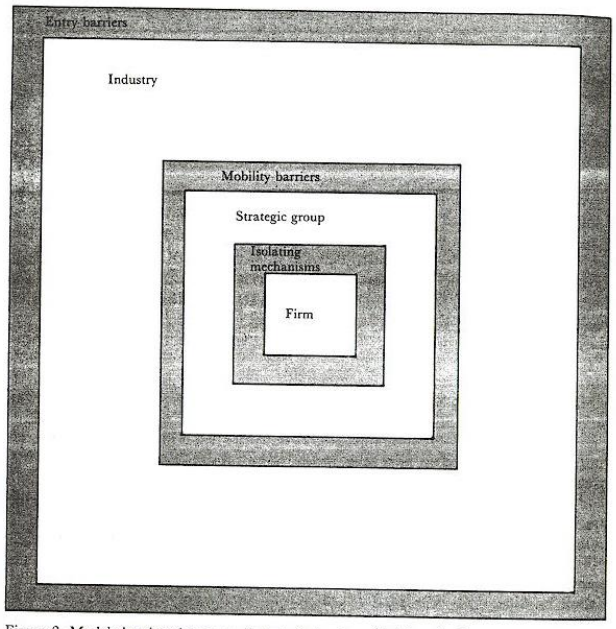


Figure 2. Model showing the scope of strategic barriers shielding the firm

learning in general provide theoretical bases for experience-dependent or time-dependent learning advantages for first movers. Resource dependence theory (Pfeffer and Salancik, 1978) largely explains the rationale behind pre-emption of scarce assets as a motivating principle. Lippman and Rumelt's (1982) theory of causal ambiguity and other isolating mechanisms accounts for the uncertain imitability of a first-mover's production function, another principle behind temporal strategic barriers. The generic strategy of differentiation (Porter, 1980) establishes uniqueness as a key beneficial pursuit of the first mover. Finally, economies of scale help to explain why first movers strive for developmental seniority regarding size.

It also is possible to distinguish temporal strategic barriers according to their ability to confer singularity to the first mover in a durable way. When some temporal barriers are activated, they tend to confine benefits to the first mover exclusively. Motivating principles of pre-emption and uniqueness are





mainly responsible for singularizing temporal barriers. Gaining control of key raw materials, developing proprietary technology, acquiring the choicest business locations, building a unique corporate culture or reputation for success, and pioneering a distinctive brand name exemplify this type of barrier.

## THEORETICAL FRAMEWORK

### *First Movership Defined*

According to Lieberman and Montgomery (1988) first movership is predominantly applied in a first-to-market context. However, greater generality and a strategic focus would be of benefit in strategy research. The following definition is offered:

> A *first mover* is an *organization* which is *first* to employ a particular *strategy* within a *context* of specified *scope*.

Hinging the definition on a strategy allows it to accommodate great diversity. Virtually any means used by a firm to accomplish its mission and objectives may be considered. Of course, only those strategies which activate temporal strategic barriers would be effective in preserving a position of primacy in the time dimension. Specifying the scope within which first moving occurs allows levels of generality to be distinguished and specifies the arena of contestation. Thus, first moves may occur within a global context, national context, industry context, market segment context, niche, *etc.* For example, Federal Express can be regarded as a first mover in overnight mail delivery (service strategy in a market segment), Ford would be a first mover regarding mass production of automobiles (process strategy in an industry), and Xerox would be considered a first mover regarding instant document copying (product and process strategy in a global context).

### *First-Mover Time/Benefit Model*

First movers can be viewed as creators of potential benefit which becomes actualized over time. In a time/benefit continuum, a first mover positions itself at the apex of a benefit stream that typically expands with time to some maximum potential and subsequently may contract in a manner consistent with product or industry life-cycle dynamics. The entire benefit stream would accrue to the first mover were it not for the entrance of followers who establish niches in time/benefit space. The rapidity with which these followers establish a niche depends primarily upon the degree to which the first-mover strategy has activated temporal strategic barriers. Temporal barriers conferring singularity afford greatest protection from rapid followership. Similarly, the size and viability of the niche that becomes established in time/benefit space is an inverse function of the height of temporal barriers underpinning the first-mover strategy. However, once a niche is established, its size and viability also depends upon dimensions of head-to-head competitive strategies which are specifically called into play by the first mover and the niche maker. An

established niche may remain viable and take a stable or increasing portion of the first mover's time/benefit space, or it may shrink and converge to extinction because either the first-mover strategy is so robust that it ultimately denies viability to the niche strategy or the head-to-head battle of competitive strategies is lost by the niche maker.

If the first-mover strategy is well supported by temporal strategic barriers, it should be successful in preserving early benefit flows for the first mover and in discouraging early followers. This period relatively free of distracting head-to-head competitive strategy confrontations should afford the first mover an opportunity to augment the strategic barrier shield via learning and scale economies, for example, and thereby solidify its position.

Under conditions where a first-mover strategy has appropriate architecture, the foregoing logic would suggest a distribution of benefit streams ranging from large for the first mover, intermediate for the early followers, and small for late followers. The later the followers, the greater the first-mover benefit owing to the delay in others' tapping benefits from the stream and intensification of the strategic barrier shield with time. Accordingly, benefit opportunities in contexts where the first-mover strategy is robustly enabled should be a decreasing function of time. This function may be regarded as an opportunity curve exhibiting time-dependent opportunity decay.

## HYPOTHESES

If the first-mover strategy is widely appreciated and practised in an industry context, then behaviour conforming to the time/benefit model and its correlate, the opportunity curve, should be discernible phenomena there. The degree of benefit accorded first movers would be expected to vary among industries, as would the rate of opportunity dissipation. The power of temporal strategic barriers to preserve industry leaders necessarily depends upon which ones are invoked from the vast array available. Those conferring singularity possess greatest potency. At the simplest level of abstraction, temporal strategic barriers in an industry context can be thought of as individual building blocks of different size which are uniquely selected by temporal leaders to fashion a composite barrier to competition inside and outside the industry. A more realistic conceptualization could treat synergies among temporal barrier combinations as well as differences in context-specific efficacy. For the purposes of this article, however, the simpler view suffices.

The concept of market share provides a useful starting point for confirming the functional form of the opportunity curve. Market share has emerged as a key factor in the strategy field (Schoeffler *et al.*, 1974), and can be viewed as both a performance driver and a performance indicator (Prescott *et al.*, 1986). Buzzell (1981) observed that a descending array of market shares in narrow product markets follows a semi-logarithmic function. This type of highly skewed distribution has been seen with regularity by researchers dating back to Simon and Bonini (1958), who studied organizational sizes across the entire economy. A most intriguing question is whether or not this





ordering of market shares is explained by time of entry into the market for each competitor. Order-of-entry studies conducted by Lambkin (1988), Robinson and Fornell (1985), and Urban *et al.* (1986) provide encouraging evidence that a continuous exponential function will fit.

The arguments underpinning the time/benefit model suggest that not only market share, but other measures of performance as well should be a decreasing function of industry age at time of entry. In this connection, performance can be equated to benefit, and the functional relationship can be thought of as an opportunity curve with time-dependent exponential benefit decay. The exponential form is a theoretically attractive assumption because it attaches a uniform value to the opportunity decay rate. Thus, economic value may be ascribed to time.

Against this backdrop, the central hypothesis of the study now can be proposed:

*H1:* Firm performance attributes in an industry where temporal strategic barriers protect firms possessing a time-of-entry advantage will follow a negative exponential function of industry age at time of entry for each current competitor.

A possible rival hypothesis might be formulated which would account for the decay of opportunity by the simple fact that followers have less time to develop and, consequently, reach correspondingly smaller performance levels. However, this alternate explanation naively regards temporal barriers. Were all comers free to grow unencumbered by barriers protecting the first mover, they would easily duplicate and improve upon the first-mover's strategy and quickly surpass him. Such a scenario would give way to an opportunity curve with zero or increasing slope and benefits biased towards newcomers.

The basic model of first movership (figure 1) implies that first movers obtain performance advantages to the extent that temporal strategic barriers are in place to protect them. In an inter-industry context, this means that the first-mover benefit will be greater in those industries where the more efficacious barriers are present in greater quantity. This leads to the second hypothesis:

*H2:* First-mover performance differences among industries where first movership is a key strategy will be directly related to differences in strength of the temporal strategic barrier shield operating in each industry.

Finally, opportunity curve dynamics suggest that opportunity in an industry will dissipate over time in a manner dependent upon strength of the shield constituted by temporal strategic barriers present in the industry. The exponential coefficient of the opportunity curve should be a direct indicator of this shield strength. Accordingly:

*H3:* Magnitude of the negative exponential coefficient from the opportun-

ity curve will be directly correlated with the height of temporal strategic barriers operating in an industry.

## METHODOLOGY

*Sample*

The Office of Management and Budget lists approximately 1000 industries in the US (*Standard Industrial Classification Manual*, 1987). Prudent selection of a few of these for analysis could form the cornerstone of a larger endeavour to study the extent of first-mover benefits and better understand the dynamics of this phenomenon. If first movership is a significant strategic concept, then it should impact industries where truly great gains or losses hang in the balance. Demonstrating its merit in a few instances involving high stakes carries much more weight than numerous tests in settings with limited economic impact. Accordingly, focus will be on some of the largest industries in the American economic system: automobiles, chemical, computer, insurance, oil, and retail. Within this set are contrasts in industry life-cycle position (growth versus mature), activity (manufacturing, service, and extractive), and technology emphasis (high technology and basic manufacturing). These contrasts will test robustness of the first-mover phenomenon and bring into play a diverse array of temporal strategic barriers. The latter should create discernibly different levels of first-mover benefit in terms of performance response.

Participants in each industry were drawn primarily from major categories of *Standard & Poor's Industry Surveys* (1988). In all cases, firms generating less than $250 million in total revenue were excluded. Filtering out smaller firms focuses the empirical analysis on the most interesting part of the opportunity curve, and avoids biasing the fit towards numerous small players who account for a limited portion of total industry business. For the automobile industry, included segments were automobiles, trucks and trailers, primarily original equipment suppliers, and primarily automotive aftermarket companies. Of the 44 firms listed by Standard & Poor, 26 met the requirements of size and history traceability (12 fell below the size specification and 6 were not traceable). For the chemical industry, diversified companies, producers of industrial chemicals and synthetic materials, and producers of speciality chemicals were included. Here, size and traceability criteria reduced the sample from 48 to 23 firms (6 fell below the size specification and 19 were not traceable). Computer industry participants comprised computer system manufacturers, makers of peripheral equipment and subsystems, personal computer manufacturers, computer software firms, vendors of computer services, and manufacturers of data storage equipment. Only 37 out of the 71 listed firms met the sampling criteria (30 fell below the size specification and 7 were not traceable). The insurance sample included life insurance firms, multiline insurers, and property-casualty insurers. Twenty-one of the 23 firms listed were useable (2 were not traceable). The oil industry comprised integrated international companies, integrated domestic companies, refiners/marketers, and oil/gas producing, exploration and gathering companies. Only 27 of the 45 firms listed met the sampling criteria (15 fell below the size specification and 3 were not traceable). Finally, the retail industry was represented by department stores, general merchandise chains, and discount department stores. Seventeen of the 19 firms listed were useable (2 were not traceable). In total, 151 firms drawn from 6 industries comprise the sample. Selecting the firm as the unit of analysis rather than strategic business units (as in PIMS studies) or products (as in product market studies) distinguishes this research from most predecessor investigations.

Information on the date of origin for each firm in the study was extracted from *Standard & Poor's Standard Corporation Descriptions* (1987–1988). Usually, the date of original incorporation was employed. However, when dates for the origin of predecessor organizations were furnished, the earliest of these was selected. If incorporation dates were not available or if predecessors or acquisitions were mentioned without dates of origin, firms were excluded from the sample. Firms spun off from predecessors in the same industry also were ignored. Incorporated subsidiaries were omitted unless a full history was given. A few instances of firms not mainly in the business of the industry led to exclusions, too. Finally, firms of foreign origin were disregarded. Reliance on entry time rather than entry order distinguishes this research from preceding studies.

*Variables*

There should be numerous performance attributes sensitive to temporality. Certainly market share is a logical candidate because its familiar skewed distribution may be time-related. However, temporal data at the brand or strategic business unit level are not as widely available as at the firm level. Also, the gravity of strategic choice at the firm level is far greater. Here, business unit and brand decisions are aggregated, strategic choice assumes a distinct entrepreneurial character, and outcomes significantly impact the long-term viability of the firm as well as the economy. Accordingly, a new variable, designated industry share, will be introduced to reflect firm performance at the highest level of aggregation.

Net profit would be another key performance attribute, particularly if it is cast as a profit share (to parallel the industry share variable). First movers also should be the beneficiaries of superior returns, such as return on assets, return on sales, and return on equity. Only the latter two were added to the performance battery used in this study because ROA was not furnished by the database employed.

Specific operationalization of the variables included in the battery of dependent performance indicators[1] used to test *H1* follows:

(1) Industry Share (IS) – annual total revenue of an individual firm is divided by the sum of annual total revenues from all firms in the industry sample. Values are expressed as percentages.
(2) Net Profit Share (NPS) – annual net profit of an individual firm is divided by the sum of annual net profits for all firms in the industry sample. Values are expressed as percentages.

(3) Return on Sales (ROS) – annual net income is divided by annual total revenue for an individual firm. Values are expressed as percentages.
(4) Return on Equity (ROE) – annual net income is divided by stockholders equity for an individual firm. Values are expressed as percentages.

Data on firm origins were collected in date form. These were transformed into an independent continuous temporal variable, T, which inversely measures opportunity responsiveness by industry age in years at the time a currently competing firm entered the industry:

(5) Industry Age at Time of Entry (T) – subtract the date of origin of the oldest firm in the industry from the date of origin of a current industry competitor.

The dependent variable used to test *H2* is the performance intercept, A, of the opportunity curve calculated by log-linear regression of the function, $Y = Ae^{Bt}$. This depicts magnitude of the first-mover performance opportunity in each industry. The associated independent variable is the perceived height of temporal strategic barriers operating in each industry based on a mail survey of ten strategy experts at five business schools in the Pittsburgh, Pennsylvania area. Seven faculty members active in business policy from Carnegie Mellon University, Pennsylvania State University, Robert Morris College, and the University of Pittsburgh provided judgements on a 5-point, summated scale regarding barrier height for eight temporal strategic barriers. These were extracted from Porter's (1980) enumeration of entry barriers and consisted of scale economies, product differentiation, experience curve, proprietary technology, raw material access limitation, asset cost advantage, location advantage, and distribution channel access limitation. Since the entire industry was the unit of analysis, temporal mobility barriers or isolating mechanisms were not factored into the survey.

For *H3*, collective temporal strategic barrier height in each industry drawn from the expert opinion survey served as the dependent variable. The independent variable was the exponential decay coefficient, B, also calculated by log-linear regression from the opportunity curve function. This variable is regarded as an *ex post* indicator of temporal strategic barrier shield strength within each industry.

*Statistical Approach*

Linear regression analysis was employed to determine if the relationship between each performance variable and the temporal variable conformed to a negative exponential function of the type, $Y = Ae^{Bt}$. The logarithmic form was evaluated. Model adequacy was based upon the magnitude of the coefficient of determination ($R^2$), the standard error of estimate, significance in the F test, and analysis of residuals. Favourable results here provide support for *H1*.

Contingent upon validation of the exponential model according to the above, a second series of log-linear regressions was run with the temporal variable sales-weighted. This biases the models towards information in the few firms having greatest economic impact and away from the numerous firms with small economic significance. With a weighted variable, the regression diagnostics are distorted beyond usefulness. Thus, logic and visual inspection become the main defence of these models. They were used as the analytic cornerstone for the balance of the study.

Correlation analysis employing both Pearson's product moment correlation coefficient and Spearman's rank-difference correlation coefficient was used to measure the association between expert opinion regarding temporal strategic barrier height in each industry and parameters A and B in the opportunity curve functions derived for each industry. Significant correlation provides support for *H2* and *H3*.

More discriminating statistical methods were included in the testing of *H2* and *H3* to compensate for the low degrees of freedom present in correlation analyses. Expert assessment of temporal strategic barrier heights in each industry were evaluated using Kruskal-Wallis' multi-sample test to identify significantly differing industries. The set of significantly differing pairs were then tested in Wilcoxon's signed-rank test for differences among parameters A and B from the opportunity curves for each industry.

## RESULTS

Log-linear regressions of industry share and net profit share against temporal variable, T, resulted in models of the expected form (with B negative) for all industries sampled which were significant at the 0.10 level or higher. Firms recording losses were excluded from net profit share analyses because of undefined transforms. Summary statistics appear in table II. These results form the basis for partial acceptance of *H1*.

Neither return on sales nor return on equity produced statistically significant regressions of the hypothesized form against the temporal variable, T. Again, firms recording losses were excluded from these analyses because of undefined transforms. Visual inspection of two-dimensional scatter plots failed to reveal any hint of exponential decay phenomena.

Log-linear regression of the two validated performance variables on the sales-weighted temporal variable produced the results in table III. A significant pragmatic basis for preferring these models for subsequent analysis over those in table II is their closer conformity to actual share data for industry leaders. Visual inspection reveals the presence of an envelope curve positioned essentially atop the bulk of the data (see examples in figures 3 and 4). Since the opportunity curve is intended to reflect potential, this positioning is preferred to that produced by the averaging effect of unweighted least squares.

Correlation between coefficient A from the opportunity curve and expert perceptions of temporal strategic barrier height in each industry produced a Pearson correlation coefficient ($r$) of 0.19 for IS data and 0.76 for NPS data, the latter significant at $p = 0.08$. Spearman's correlation coefficient (*rho*) was 0.48 and 0.77, respectively, the latter significant at $p = 0.1$.

Correlation between expert perceptions of temporal strategic barrier

Table II. Results of opportunity curve regression analysis

| *Industry* | *Performance intercept (A)* | *Exponential decay coefficient (B)* | *Std. error* | $R^2$ | *Significance level* | *n* |
|---|---|---|---|---|---|---|
| *Dependent variable: industry share* | | | | | | |
| Auto | 1.90 | −0.0429 | 4.30 | 0.17 | 0.037 | 26 |
| Chemical | 8.59 | −0.0115 | 2.30 | 0.19 | 0.037 | 23 |
| Computer | 13.10 | −0.0346 | 2.45 | 0.52 | 0.000 | 37 |
| Insurance | 6.25 | −0.0086 | 2.68 | 0.14 | 0.095 | 21 |
| Oil | 9.86 | −0.0398 | 3.13 | 0.51 | 0.000 | 27 |
| Retail | 13.27 | −0.0337 | 3.10 | 0.43 | 0.004 | 17 |
| *Dependent variable: net profit share* | | | | | | |
| Auto | 1.49 | −0.0479 | 5.94 | 0.15 | 0.057 | 25 |
| Chemical | 8.76 | −0.0123 | 2.43 | 0.19 | 0.036 | 23 |
| Computer | 5.85 | −0.0248 | 3.29 | 0.25 | 0.003 | 33 |
| Insurance | 1.43 | −0.0136 | 4.36 | 0.16 | 0.079 | 20 |
| Oil | 19.08 | −0.0442 | 3.31 | 0.58 | 0.000 | 21 |
| Retail | 25.38 | −0.0488 | 5.19 | 0.43 | 0.008 | 15 |

heights and coefficient B from the opportunity curves produced $r = 0.45$ and $rho = 0.60$ for IS data and $r = 0.50$ and $rho = 0.60$ for NPS data, none of which were significant at $p < 0.05$.

Kruskal-Wallis' multiple comparison test of survey data revealed significant differences (alpha = 0.05) in temporal strategic barrier height for 6 industry pairs: auto > insurance, auto > retail, chemical > insurance, oil > computer, oil > insurance, and oil > retail. Associated pairwise comparisons of parameter A from the opportunity curves using Wilcoxon's signed-rank

Table III. Results of sales−weighted opportunity curve regression analysis

| *Industry* | *Performance intercept (A)* | *Exponential decay coefficient (B)* |
|---|---|---|
| *Dependent variable: industry share* | | |
| Auto | 56.67 | −0.0936 |
| Chemical | 23.52 | −0.0154 |
| Computer | 57.23 | −0.0388 |
| Insurance | 14.04 | −0.0097 |
| Oil | 23.03 | −0.0351 |
| Retail | 21.64 | −0.0229 |
| *Dependent variable: net profit share* | | |
| Auto | 63.13 | −0.1071 |
| Chemical | 23.29 | −0.0161 |
| Computer | 47.42 | −0.0354 |
| Insurance | 4.98 | −0.0210 |
| Oil | 57.80 | −0.0505 |
| Retail | 25.75 | −0.0268 |






Figure 3. Oil industry opportunity curve and scatter plot for industry share

test were significant at $p < 0.08$ for IS data and $p < 0.05$ for NPS data. Associated comparisons of parameter B in the same test were significant at $p < 0.05$ for both IS and NPS data. Collective consideration of correlation results and results of Kruskal-Wallis and Wilcoxon tests provides support for acceptance of *H2* and *H3* in the restricted realm of IS and NPS performance variables.

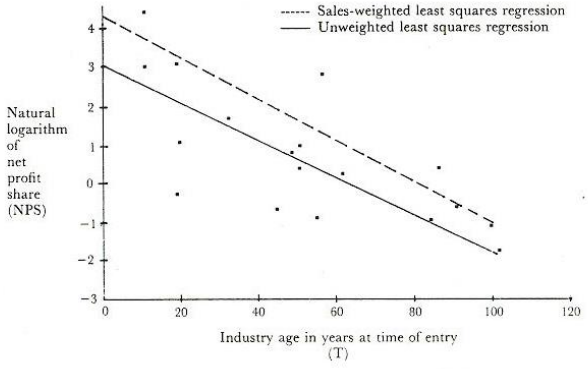


Figure 4. Oil industry opportunity curve and scatter plot for net profit share

## DISCUSSION AND RECOMMENDATIONS

Partial acceptance of *H1* makes a credible case for proposing the time/benefit model and opportunity curve as elements of general theory in strategic management. Certainly more industries need to be studied to establish the limits of generality, but the current evidence is compelling.

It is interesting to speculate why share measures of performance (IS, NPS) fit the opportunity curve while ratio measures (ROS, ROE) did not. These subsets appear to have differing emphases regarding performance. The former register high as indicators of economic strength. They are the fruits of success won by the largest and most effective business organizations. The latter have more to do with operational efficiency.

So, why aren't the apparent beneficiaries of experience curve phenomena, economies of scale, *etc.* duplicating their record in the pursuit of economic strength with their record in the pursuit of operational efficiency? Most likely, these firms are creating sizeable surpluses, but they invest them internally to achieve what Chakravarthy (1986, p.449) calls 'adaptive generalization'. This is the use of organizational slack to assure long-term survival in an uncertain environment. Developing technological competencies through investments in R&D, building superior plant and equipment, committing resources to strategic planning, *etc.* would characterize this behaviour. Accordingly, first movers persist and prevail in their environments because they make this a strategic priority surpassing that of pure operational efficiency. As long as returns are not actually worse than available elsewhere (among followers), satisficing is effected and stakeholder support for the first movers apparently remains intact.

Acceptance of *H2* and *H3* provides encouraging empirical support for the relationship in figure 1 and the basic logic of the time/benefit model. It offers preliminary evidence that temporal strategic barriers perform the function of preserving benefit for temporally advantaged firms, especially the first mover, and that the exponential opportunity decay coefficient is a useful measure of this effect. In this study, decay rates varied between about 1 per cent and 10 per cent. Each percentage point change appears to affect the first-mover's benefit by somewhere between 5 and 7 percentage points (for either IS or NPS). Considering the dollar magnitudes represented by share data, this is a very potent strategy variable. Future research on the linkage between temporal strategic barriers and the exponential decay coefficient of the opportunity curve should be interesting and valuable.

The opportunity curve should stimulate greater interest in inter-industry studies. It could be an effective way to differentiate among temporal strategic barriers and isolate effects upon the exponential decay coefficient. This line of research could enrich the domain of corporate-level strategy and bring a new array of tools to the corporate strategist. A thrust of this type is timely given the increasing proliferation of multi-industry firms.

As the issue of temporal precedence comes into greater focus, strategies which are complementary to first movership will become more evident. Consider, for example, pricing strategy. Two of the most generalized alternatives are skimming pricing and penetration pricing. The former strategy





prices new products high to recoup development costs and make quick profits. The latter prices product introductions low to maximize demand and garner a dominant market position. Skimmers are more likely to attract market entrants sooner than penetrators. However, astute first movers may want to discourage entrants from achieving close proximity to them on the opportunity curve. Such competitors, over the long haul, will come to enjoy economies of scale, learning advantages, *etc.* more nearly like their own and constitute a more serious challenge to their leadership than later comers. Hence, a penetration pricing strategy seems to be the complementary choice.

In an age when business ethics come under increasing scrutiny, it is perhaps appropriate to close the discussion with some legal/ethical comments. The opportunity curve and temporal strategic barriers, particularly those conferring singularity, are potentially powerful concepts and subject to abuses of power. Certainly the threat of antitrust litigation will deter the otherwise unrestrained from engaging in predatory strategic behaviour (Comanor and Frech, 1984). However, a higher ethic does exist. Ohmae (1988) recommends a passive posture regarding competition coupled with a zealous pursuit of value for the customer. Avoid battling competitors and there will be more opportunity to excel at the central task: serving the customer.

Prudent managers appear to chart a course somewhere between the poles of predation and pure customer service. The business world is competitive, and finding long-term security in the activity of serving customers is a privilege that largely goes to those who pursue strategies that others cannot easily mimic. Certainly there are firms that steer a high ethical course but remain cognizant of the duplicability of their strategic choices. Exactly where an organization positions itself along the continuums of legitimacy and competitiveness is the stuff from which corporate reputations are made.

## CONCLUSION

This article has attempted to review recent literature on first movership and bring theoretical refinement to this important strategy domain. An attempt was made to generalize current literature within a framework where temporal strategic barriers figure prominently. These are strategic barriers which help to preserve advantages in the time dimension. Such barriers were differentiated according to whether or not they confer singularity: one-time benefit accorded the first firm to activate the barrier.

The main contributions of this research are the time/benefit model proposed to explain first-mover phenomena and empirical confirmation of a predicted functional relationship designated the opportunity curve. The latter relates current benefits (performance) to time of action as a negative exponential function. Opportunity curves of the expected form were found in automobile, chemical, computer, insurance, oil, and retail industries for the performance variables of industry share and net profit share. The article also reports relationships between temporal strategic barriers operating in an industry and the magnitude of first-mover benefit or the magnitude of the exponential coefficient from the industry opportunity curve. The latter

depicts the rate of opportunity diminution with time and qualifies as a surrogate measure of temporal strategic barrier shield strength in an industry.

These findings suggest that first movership is a liberally rewarded strategy when pioneering organizations are able to draw upon a large or potent array of temporal strategic barriers. The size and composition of this array appear to be dependent upon both context and managerial resourcefulness. Some contexts (*e.g.* high technology) may present the first mover with a richer endowment of barrier building blocks, while others (*e.g.* service industries) grant less. Regardless of context, however, astute management appears to be needed to preserve or augment the barrier stockpile, evaluate composition of the inventory, and orchestrate barrier erection. To the extent that first movership can be regarded as a distinct managerial skill, future research may show that the organizations which establish a pattern of successful, well-defended first moves are best able to maintain their position on the high frontier of the opportunity curve.

## NOTES

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[1] The approach used to calculate IS and NPS tends to overstate actual share values slightly due to exclusion of small firms and unavoidable sample situations. Since the largest firms from relatively concentrated industries and industry segments are well represented, this should not materially affect results.

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