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STRATEGY THROUGH THE OPTION LENS: AN INTEGRATED VIEW OF RESOURCE INVESTMENTS AND THE INCREMENTAL-CHOICE PROCESS

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This article develops an option-theoretic perspective for organizational strategic management. Grounded in the basic intuition that people seek to "keep options open" in situations that involve an unforeseeable future, and supported by theory in financial economics, this view is a recent development in strategy. The theory integrates resource allocation, sense making, organizational learning, and strategic positioning in a unified framework, and it provides a new explanation for some counterintuitive empirical findings.

Strategy decisions usually, if not invariably, involve choices regarding the investment of organizational resources (e.g., Schendel & Patton, 1978) attended by some degree of uncertainty about future performance outcomes (e.g., Bettis, 1982; Bowman, 1980). Over time, the organizational process of sequential choice yields a pattern of resource deployment that is termed *strategy* (e.g., Mintzberg, 1978). Resource investments and unfolding strategy choices are two related elements in a single phenomenon. Invested resources often provide a platform for launching strategies. In this sense, it may be said that strategies emerge from resources. Strategies, in turn, often generate further resources. It may prove useful, therefore, to consider these two elements together. The objective of this article is to develop new theory to achieve this synthesis, using the analytical lens provided by option theory.

Through the option lens, strategy is seen as a process of organizational resource-investment choices, or *options* (Bowman & Hurry, 1987; Hurry, 1993, In press; Hurry, Miller, & Bowman, 1992; Kester, 1984; Kogut, 1991; Myers, 1977, 1984; Sharp, 1991). With a well-developed base in financial economics and empirical extensions to strategic management, the lens offers an economic logic for the behavioral process of incremental resource investment (Dixit, 1992). Previous researchers using option in-

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sights have restricted their attention to strategies centered around specific options. The present article extends this approach in the following ways. Rather than using specific strategies, it shows how strategies emerge from an organization's resources and unfold over time in different ways. Within this process, various interrelationships (between resources and choices, between investment and growth opportunities, and among organizational learning, investment size, and investment timing) are studied.

This article has five sections. The first briefly reviews option theory. The second develops new theory to describe the process by which strategies emerge from resources. The third section highlights theoretical refinements of value to strategy research and formulates propositions for empirical testing. The fourth section offers the option lens as a way to integrate strategy concepts such as resource allocation, sense making, learning, and strategic positioning. The article concludes with a new explanation for some counterintuitive findings.

THE DEVELOPMENT OF OPTION THEORY

Researchers in both option theory, as an area in financial economics, and strategic management study organizational investments—the former in terms of economic value, the latter in terms of action and performance. Both areas have origins in a behavioral phenomenon. For some centuries, the intuition of “keeping options open” against the unforeseeable future has motivated the development and use of option contracts in order for individuals to retain the right to future investment choices without being obliged to invest (Cox & Rubinstein, 1984: vii). “Calls” (options to buy), “puts” (options to sell), and the option clauses in automobile lease and house rental contracts form familiar examples of contracts that allow investors to hold a choice open at the risk of losing only the sunk cost of the option.

These contracts give expression to a typical pattern of investor behavior. The investor makes a small investment to buy the option, holds it open until the opportunity arrives (trading short-term gains for the possibility of long-term gains in the meanwhile), and finally decides between striking the option to capture the opportunity or abandoning it. In option theory, a *rational expectations* view of investment behavior led researchers to the position that this behavior reflected a verifiable valuation of the option contract (see the Appendix).

Option valuation started with Bachelier (1900), is based on the work of Einstein and Weiner in fluid diffusion, and took definitive form in accurate stock option valuation formulas (Black & Scholes, 1973; Cox, Ross, & Rubinstein, 1979). When it was realized that organizational resource investments are analogous to options (Myers, 1977), in other words, despite the absence of formal option contracts, they allow a similar pattern of investment behavior to occur, valuation expanded to this area. In most

situations, prior investment (and associated learning) is a necessary precondition for launching a successful new major investment. For example, for a full-scale investment in a new market or country to be successful, an initial trial investment in the form of a joint venture often forms an essential first step. The trial investment serves to hold the option open for the firm to make the full-scale investment, and it increases the chances of ultimate success. Insights from studies of option contracts were confirmed for organizational investments (e.g., Majd & Pindyck, 1987; McDonald & Seigel, 1985, 1986; Myers, 1977; Paddock, Siegel, & Smith, 1983; Trigeorgis & Mason, 1987), resulting in superior valuation results compared to neoclassical and discounted cash flow models (Myers, 1984).

Viewing organizational resource investments in terms of their ability to generate choices is helpful in the study of strategy. Option analysis has been applied to strategies of global expansion and alliances (Kogut, 1983, 1991), R&D and technology development (Hurry, Miller, & Bowman, 1992; Kogut & Kim, 1991; Mitchell & Hamilton, 1987), and corporate acquisitions and restructuring (Hurry, 1993). Although researchers considered these individual strategies, the present article is concerned with the strategy process itself.

STRATEGY THROUGH THE OPTION LENS

Resources and the Bundle of Options

The option lens provides a view of an organization's resources—its capabilities and assets—as a bundle of options for future strategic choice (cf. Myers, 1977). These options arise from the interplay of the organization's existing investments, its knowledge and capacities, and its environmental opportunities.

An option confers preferential access to an opportunity for investment choice—in the sense of gaining an advantage over competitors, or in the sense of being better suited for one among several possible courses of action. Options come into existence when existing resources and capabilities allow preferential access to future opportunities (e.g., opportunities for growth, or opportunities to earn capital gain by divestiture). A good illustration of how preferential access is gained is available from a study of Japanese acquisitions in the United States (Hurry, 1993). A firm may gain preferential access as a potentially friendly bidder by making a passive-interest equity investment in its joint venture partner. Because the firm has built up a relationship with its partner through the joint venture, and because it has consolidated this partnership by contributing to the partner's capital, this increases the probability that the partner will turn to the firm as a favored bidder should it ever become necessary to search for a friendly buyer (e.g., to stave off a hostile raider). Several Japanese firms have acquired their former U.S. venture partners through friendly takeovers predicated on such preferential access to the U.S. firm in comparison to other arms-length bidders.

Although accumulated learning and capabilities provide a platform for future action, the sunk cost of existing assets works like an option contract in limiting downside risk. Of course, existing resources also can give a firm preferential access simply by its being "in the right place at the right time." Organizational slack also forms a repository of options (Fox & Marcus, 1992). An organization's resources thus constitute a bundle of options for strategic choice.

Shadow Options and Sense Making

An organization exists as a process of strategic choice as well as a set of resources. Opportunities for strategic choice come into being only when decision makers recognize them. The option bundle contains several options awaiting recognition, or *shadow options* (Bowman & Hurry, 1987). If these options are to be struck, they must first be recognized.

The recognition of shadow options occurs through retrospective sense making (Hurry, Miller, & Bowman, 1992). Managers must "make sense" of organizational actions and resources before they can identify the potentially available courses of action. Organizations tend to define their own realities, given their own history, knowledge, and routines. Recognition of a shadow option on a particular investment opportunity, however, makes it likely that a strategy to capture that opportunity will emerge from the bundle of options.

Incremental Strategy and the Option Chain

When an option is struck, the resulting configuration of resources will, in turn, yield new options for future exercise. Strategies are produced by the sequential striking of this *option chain*. A strategy unfolds when decisions are linked over time. The nature of this linkage is both cognitive and economic—it involves the sequential recognition of shadow options and a series of sequential investments, with each conferring preferential access to the next option in the chain.

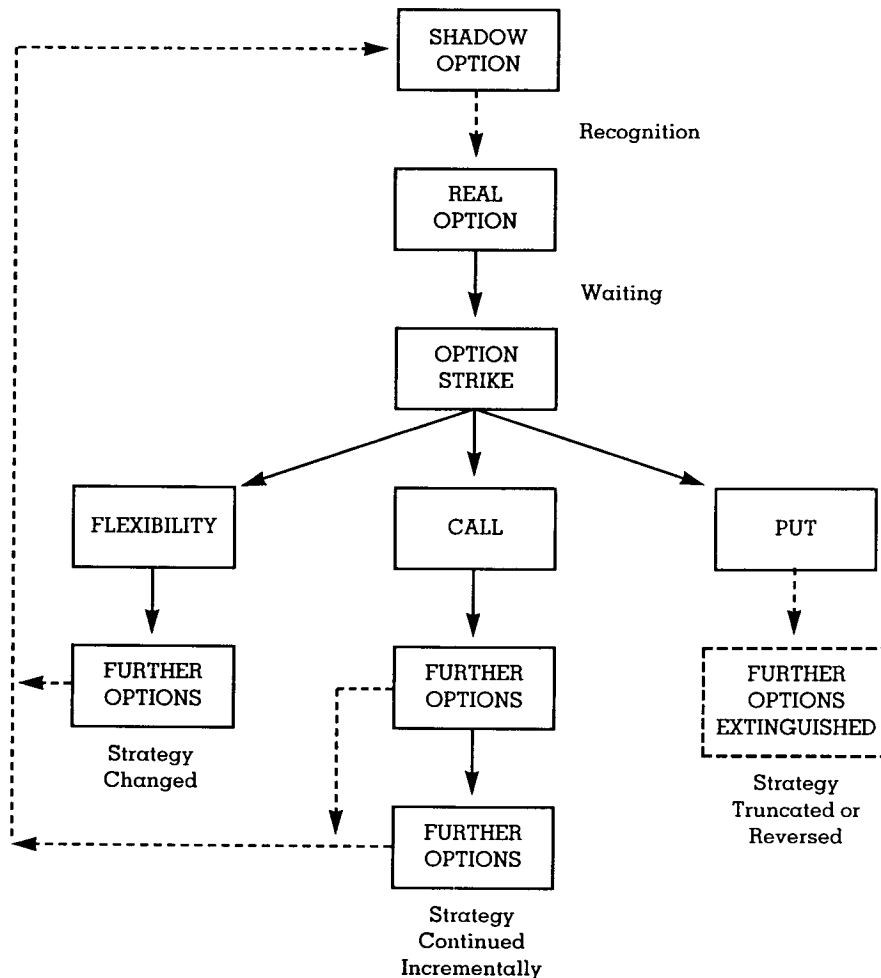
Strategies unfold in different ways depending on their constituent options. Options fall into two basic categories: *incremental* options and *flexibility* options (Sharp, 1991). Incremental options take the form of simple calls and puts. Strategies are continued by striking successive calls, but they are reversed by striking puts (or by abandoning calls). Furthermore, options also may be sold. The sale of joint ventures, for instance, constitutes an example of the sale of an option on the underlying business, technology, or market to which the venture relates. The sale of a call option is equivalent to the creation of a put option. Strategic change occurs when flexibility options (i.e., choices to switch investment streams) are exercised. For example, by continuing to invest in expansions of a product line based on a particular technology, a firm continues its current product strategy (e.g., making and selling fossil-fuel-driven automobiles), whereas by maintaining investments in alternative technologies (e.g., adding investments in electric-powered cars) the firm

gains the option to switch product strategies over time. Options thus form the choice mechanism that underlies strategy (see Figure 1).

The Activation of Options

Within the option chain, a fixed sequence of actions is involved in the activation (i.e., the recognition and striking) of options. Upon recognition of a shadow option, managers are motivated to secure preferential access (i.e., to strengthen the linkage to the opportunity), to wait and see if the opportunity materializes, and to develop the skills necessary to exploit it fully. In other words, they are motivated to convert the shadow option into a real option. Given uncertainty, this move usually involves making a

FIGURE 1
The Option Chain



small investment rather than a large, risky investment. When the opportunity materializes, and the organization is ready to exploit it, the option will be struck when managers make a larger investment. Although the motivation to secure preferential access and skill development is at the heart of creating the option, investment is necessary for the option to be fully activated.

As an example, consider the acquisition strategies of Japanese firms (Hurry, 1993). Their U.S. acquisitions often begin as joint ventures. After several years of profitable joint operations, the Japanese management retrospectively recognizes a shadow option embedded in the venture—it has gained sufficient expertise to operate in the United States and has sufficient cash and other resources to acquire its partner. Upon recognition of the shadow option, the firm buys a passive-interest equity stake in its U.S. partner. This investment establishes the Japanese firm as a potential friendly bidder for the U.S. firm, should one be needed in the future. In other words, this investment secures preferential access for the Japanese firm (compared to other bidders) and keeps the choice open for the future.

After holding the option with no further investment for some years, the Japanese firm finally strikes the option by making a friendly acquisition in response to an invitation by the U.S. firm. Thus, an acquisition strategy emerges from the bundle of options. Over time, new shadow options arise out of the new resources and capabilities generated by the acquisition, and these are recognized and activated incrementally. Such unfolding strategies are, of course, not uniquely Japanese. For example, AT&T's merger with NCR unfolded in a similar way (a recommendation in favor of this type of approach, including decisions made after a consideration of option value, has been made recently by Haspeslagh & Jemison, 1991). The option lens, however, clarifies details of the underlying choice mechanism.

The foregoing description of the temporal unfolding of strategy, as seen through the option lens, has implications for empirical research. These will now be considered in the form of testable propositions. Parallel theoretical refinements will be introduced to enhance analytical precision.

THEORETICAL REFINEMENTS AND RESEARCH PROPOSITIONS

Because options exist as the choice mechanism underlying strategy, the theory has the potential to cover a vast range of applications. This article is confined to applications that convey the core insights of option theory in a form that has not yet been used in strategy research.

Downside Risk and Optimal Inertia

An organization's bundle of options cushions the downside risk of future investments, strengthening its ability to expand aggressively and to withstand losses during the course of growth.

Organizational investment behavior contains an element of inertia. The presence of sunk costs (i.e., in existing investments) produces hysteresis—the spillover effect of past investment—creating a pressure on the organization to hold on to investments and to defer new investments, for some time (Dixit, 1992).

Proponents of traditional Marshallian economics expect organizations to adjust investment quickly in anticipation of profit and to enter or exit industries based on straightforward comparisons of revenues versus costs. In reality, however, organizations show investment inertia, adjusting investments (by entry or exit) only very slowly. Anticipated profits must exceed a hurdle rate several times the cost of capital in order to trigger a firm's entry into a new market of industry, or they must decline substantially in order to trigger a firm's exit. This phenomenon has been explained in industrial organization economics as the result of monopolistic power and mobility barriers (leading to the development of industrial organization-based strategy theory). The existence of a particular industry structure (number of firms, entry and exit rates) is often thought to reflect the existence of strategic barriers to new entrants. However, an industry's structure may be explained more simply as the result of investment behavior under uncertainty.

When a firm enters or exits an industry, there is usually a positive value in waiting for "good news" about future profits before taking a step that might prove difficult to reverse (Bernanke, 1983). This value will remain positive until anticipated profits (or losses) rise above a certain level. Trigger points for minimum profit and maximum loss can be calculated (using assumptions derived from option theory about the diffusion process governing the value of the underlying opportunities over time). The range between these points forms a zone of *optimal inertia*, in which organizational investment (and, hence, a firm's entry or exit into an industry) will tend to stay constant (Dixit, 1992).

An organization's zone of optimal inertia is also related to the extent to which its option bundle protects it against downside risk. The more protection an organization has against downside risk, the wider its zone of optimal inertia is likely to be. If it has several well-developed options that ensure relatively safe access to profit opportunities in an industry, low levels of profit will be enough to motivate entry, but only high levels of losses will motivate an exit. Accordingly,

Proposition 1: Organizations holding better developed bundles of options will expand more aggressively in growing markets and economic upturns, and they will persist longer in difficult markets and economic downturns, than competitors holding less developed option bundles.

Perceived Environmental Uncertainty

The value of an option increases as the volatility of the underlying asset's value rises, without regard to the direction of the latter's change in

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value (Cox & Rubinstein, 1985: 35). An option may confer several choices (e.g., expansion, divestiture, switching of investment streams). Depending on how the underlying investment opportunity develops (e.g., demand in a market), the best alternative can be chosen to strike the option. Regardless of whether demand rises or falls, the organization can develop an appropriate strategy, provided it keeps the option open. The more volatile the opportunity, the more an organization stands to gain (or the less it risks losing) by holding the option. Conversely, as volatility decreases, the organization stands to gain more by striking.

When managers sense high perceived environmental uncertainty (cf. Duncan, 1972), they will strive to hold options open, reducing potential losses as much as possible. When managers perceive low environmental uncertainty, they will be motivated to strike options, thus earning gains in terms of growth and profits. To the extent that their perceptions and sense making are realistic, they will be successful achieving long-term growth and profits. (Decisions, of course, are subject to perceptual biases [Kahneman & Tversky, 1984].) This phenomenon is controllable in research by comparing managers' reported perceptions with macrolevel indicators of environmental conditions.

Depending on the rate of change in the environment, an organization will be offered greater or fewer opportunities at different points in time. Environments are often viewed as being purely external, but they may also be enacted (Weick, 1979). Environmental volatility is often a function of time for exogenous reasons (e.g., the velocity of changes in opportunities, see Bourgeois & Eisenhardt, 1988) and endogenous reasons related to the speed of organizational learning. Over time, as the organization's capabilities grow, it achieves greater control over the environment, and its managers perceive less uncertainty. The organization progresses from a phase of exploration to a phase of exploitation (March, 1991). This phase will continue until the environment undergoes a major change (through the operation of its stochastic processes), and the organization is compelled to explore the environment once again. The relationship between an organization's investments, the opportunities generated by the environment, and the organization's performance may therefore be categorized in terms of periods of stability and instability. Thus,

Proposition 2: Given realistic perceptions of environmental uncertainty, organizations that hold options during unstable periods and strike options in stable periods will show superior long-term growth and profit performance compared to organizations exhibiting other types of investment behavior.

The Size and Timing of Organizational Investments

The view developed in this article suggests that it is valuable to make small investments in options, followed by large investments in option strikes. Small investments not only limit the downside risk of exploration

for the firm, but they also help experimentation and learning. An organization's smaller investments (which are usually freer of heavy cash flow and return-on-investment responsibilities) are well suited for members to develop new capabilities or to learn new knowledge in manageable installments (Hurry, Miller, & Bowman, 1992).

Small investments, however, cannot generate the large cash flow and profits necessary for growth—these are the rewards earned by large investments. In areas such as new markets, new businesses, and new technologies, organizations are likely to be most effective when they use small investments to develop capabilities; they can build on these investments by linking large investments to deploy those capabilities. There is evidence that large investments such as acquisitions often fail in new areas because of a lack of appropriate management and production operating skills (Porter, 1987). In contrast, several studies show that successful organizations (typically Japanese) progress from "learning" investments to full operations in a manner resembling an option chain (Bettis, Bradley, & Hamel, 1992; Bleeke & Ernst, 1991; Kester, 1991; Ohmae, 1989; Prahalad & Hamel, 1990; Reich & Mankin, 1986). Therefore,

Proposition 3: Organizations that enter new businesses and markets by linking investments—so that small options are followed by large strikes—will perform better than those entering with only discrete small, or large, investments.

The timing of option strikes provides further insight into why new entrants may differ widely in performance. Generally speaking, it is optimal to hold a call unexercised until its expiration date, if the underlying asset yields no current income (Merton, 1973: Theorem 2). However, early strikes may be optimal for puts and for calls on income-producing assets (Merton, 1973: Theorem 12; Roll, 1977).

To illustrate the first case, consider an organization with a joint venture that yields no profit but contains an option on a new acquisition. Over time, the organization will learn more about the target company, thus raising the probability of a successful takeover. As long as learning reduces future uncertainty in this way, an incentive exists to defer striking the option.

Organizational options can have infinite lives, but they do in fact expire with the closing of the underlying opportunities (usually through preemptive action by a competitor). The incentive to defer striking will last only until managers perceive closure to be imminent. Thus, the appearance of a rival bidder for the company will force the organization to strike its option.

To illustrate the second situation, consider either (a) a put—a joint venture that a partner has offered to acquire from the organization or (b) a call—a venture that could lead to a majority stake in a company that is about to declare a dividend. Waiting now carries an opportunity cost. For the put, waiting implies losing profits that could be earned by reinvesting

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the sale proceeds. For the call, waiting might imply the loss of dividends. The incentive to defer action is not so strong in this type of situation.

Organizations strike options in response to two types of market *strike signals* (Hurry, 1993; Hurry, Miller, & Bowman, 1992; Kogut, 1991). Two signals are of particular importance. One signal indicates the arrival of the opportunity. Although this signal implies a possible end to the "wait and see" period, the incentive to wait still exists because, if the organization continues to learn, a later decision might be even better. The other signal is the expiration signal (e.g., the threat of preemption by a competitor), indicating the imminent closure of the opportunity. For a firm to wait beyond this point may mean wasting the option. Thus, if the first signal merely "suggests" a practical termination date for the option, the second signal actually "enforces" it.

The opportunity-arrival signal is a necessary condition for a profitable strike, whereas the expiration signal forms a sufficient condition. For example, an organization with a joint venture in a foreign market can consider expansion once the venture has succeeded in gaining product acceptance in the new market (i.e., the opportunity-arrival signal). Waiting may still have a positive value, however, because of continued learning. The utility of waiting may be quickly extinguished by competitive preemption in the new market or by the partner's bid to take over the venture (i.e., the option-expiration signal).

Although managers will differ in their interpretation of signals as the result of their own perceptual biases, they are less likely to miss the expiration signal, because managers tend to perceive threats more accurately than opportunities (Jackson & Dutton, 1988). For an option already being held, this difference in perception may fortuitously prolong learning and, hence, improve the effectiveness of the strike.

Consistent with the theoretical refinements considered in this section, profitable strikes may be made after one or both of these signals. Superior performance appears likely when both conditions are satisfied (Alternative a), that is, when the opportunity has clearly arrived and the value of waiting is at its lowest. Early strikes (that meet only the first condition) will be less profitable because they involve the opportunity cost of waiting (i.e., conditions might improve further). However, puts carry the opportunity cost of investing more profitably elsewhere. This is why puts (Alternative b) may fare better than calls (Alternative c). In competitive situations, organizations may be compelled to strike options despite inadequate knowledge, simply to avoid losing the opportunity (Alternative d). In such cases, performance may be even lower because (a) the opportunity itself may never materialize, (b) the organization may not be prepared to exploit it, if it does arrive, and (c) "fire sale" puts may not be profitable. Finally, premature strikes (Alternative e) are likely to yield the lowest performance because neither the opportunity nor the knowledge (i.e., accumulated learning) may have had a chance to develop. The relationship between strike timing and performance is given in Proposition 4.

Proposition 4: The performance of organizational investment in option strikes is related to investment timing as follows—from (a) = high performance to (e) = low performance: (a) Calls struck after receiving both signals. (b) Puts struck after receiving only the opportunity-arrival signal. (c) Calls struck after receiving only the opportunity-arrival signal. (d) Calls and puts struck after receiving only the expiration signal. (e) Calls and puts struck before receiving either signal.

This proposition suggests a way to distinguish between an incremental strategy and an escalation of commitment (Staw, 1976). Alternatives (a), (c), and (d), in which investments are stepped up after an intuitive evaluation of market signals, represent relatively logical incremental strategies, whereas Alternative e includes expansion despite "no news" or even "bad news," in other words, an escalation of commitment.

The following corollary (pertaining chiefly to calls) may be considered:

Corollary: Organizations that enter new areas will achieve superior growth and performance (compared to organizations using other investment strategies) by starting with small investments to hold options open and following with large strike investments upon receiving both strike signals.

The Portfolio of Options

An organization's ability to strike options effectively is also influenced by its structure. Different organization structures influence the extent to which decision makers are left free to strike options. If the organization's structure allows individual options at the business and functional levels of operations to be struck independently, the bundle will approximate a "portfolio of options." If it is possible for a single decision at the top of the hierarchy to summarily dispose of a business (and the several options embedded in its assets), the bundle will be closer to "an option on a portfolio of assets."

An organization holding a single option on a portfolio of 20 businesses, for instance, enjoys only one choice in relation to the portfolio—to expand or contract investment. An organization holding 20 options (one option per business, on the same businesses) is likely to enjoy 20 such choices. Therefore, an organization will usually have greater strategic flexibility (i.e., it has access to more choices to maximize gains and/or minimize losses) by holding options separately.

In general, it is more valuable to hold a portfolio of options than to hold an option on an asset portfolio (cf. Merton, 1973: Theorem 7), assuming that the options being compared have identical terms (strike date, strike price per asset, transaction costs, etc.) and relate to the same basic set of assets. Even though all of these conditions may not always be

satisfied, the basic relationship seems likely to hold either in research involving comparisons within a single organization before and after structural changes or where two structures in the same industry are being compared.

Corporate strategy (i.e., diversification, acquisition, divestiture, and restructuring) centers around the bundle of options (Bicksler & Chen, 1990). Different organizational structures have potentially different impacts on corporate strategy. Accepted theory suggests the superiority of the M-form structure (Williamson, 1975). Although the M-form is superior to the functional structure, it is less effective than the keiretsu (i.e., Japanese corporate group) and network structures in delivering the value of the options of the bundle.

In the M-form structure today, divisions are managed by a corporate office whose value-enhancing choices are mainly taken in the form of portfolio revisions—acquisitions and divestitures made in the light of relatively fixed profitability forecasts (Fichman & Haunschild, 1991; Fligstein, 1990). As a result, rather than allowing division-level managers to strike options to improve profitability, the corporate-level option often overrides other options. Options must be held and struck individually. Because this is no longer possible, managers are forced to separate out options by spin-offs and divestitures (Bicksler & Chen, 1990) to avoid the attention of hostile bidders who are drawn to the firm for its option value (cf. Jensen, 1986).

In effect, the M-form now approximates an option on a portfolio of assets. The deconglomeration of U.S. firms during the 1980s may be a result of the M-form's inability to sustain diversification (Shleifer & Vishny, 1991). German networks (e.g., Deutschebank/Daimler-Benz) and the Japanese keiretsu (e.g., Mitsubishi) operate like a portfolio of options, with minimal corporate-level interference (e.g., Gerlach, 1992; Tsurumi, 1982). If divisions are kept free to strike options, these structures sustain diversification without pressure to divest (in fact, Japanese restructuring involves little divestiture and actually produces greater diversification, Kester, 1991: 170). Accordingly,

Proposition 5: Organizations with structures that are capable of holding a portfolio of options will show wider diversification, with fewer divestitures, than organizations with structures that restrict choices to an option on a portfolio of assets.

CONTRIBUTION TO STRATEGY AND ORGANIZATION THEORY

The option lens contributes in many ways to strategic management and organization theory. Its view of unfolding investments integrates four important theoretical themes: resource allocation, sense making, organizational learning, and strategic positioning. The main distinctions between these themes are shown in Figure 2.

FIGURE 2
Strategy Themes Integrated by the Option Lens
Type of Decision Making

		DELIBERATE (Content Themes)	EMERGENT (Process Themes)
<i>Type of Analysis</i>	Relatively Less Future Oriented	<p>Resource Allocation</p> <hr/> <p>Organizations invest to maximize forecasted operating efficiency.</p>	<p>Sense Making</p> <hr/> <p>Organizational investment is the product of sense making, perceptual biases, and intuition.</p>
	Relatively More Future Oriented	<p>Strategic Positioning</p> <hr/> <p>Organizations invest to create new possibilities for future efficiency.</p>	<p>Learning</p> <hr/> <p>Organizational investment proceeds incrementally, as a result of accumulated learning.</p>

The four themes may be distinguished along two dimensions. Resource allocation and strategic "positioning" (i.e., taking actions now to provide future benefits) are themes invoked by economic "content" theories, which typically assume rational decision making. Sense making and learning are themes found in the usually behavioral "process" theories, which assume naturally emergent decision making. Positioning and learning also appear to be more associated with "future oriented" analysis than resource allocation and sense making because the major effect of both positioning and learning is to prepare the organization for possible future opportunities.

Resource allocation is a familiar theme in strategy. It focuses on the firm's efficient use of organizational resources. Efficient resource allocation may mean that the firm will invest to create competitive barriers (Porter, 1980) or it will use acquisitions/divestitures that reduce transactions costs (Williamson, 1975), to cite two traditional (though diverse) examples. The idea that organizations seek to maximize, for instance, the forecast return on investment (ROI) or market share does not adequately describe choices to sacrifice current profits in order to capture future opportunities beyond the forecast period.

The theme of sense making (Gioia & Chittipedi, 1991; Weick, 1979) forms a part of the natural process of organizational action. Its main ideas are that managers interpret events and that their intuitive beliefs influence decisions. Experience shapes managers' cognitive lenses, values, assumptions, and beliefs (Miller, 1993). Although decisions influenced by cognition, intuition, and heuristics challenge the content-based idea of efficiency, they are part of the reality of organizations. This view of sense making, however, does not explain how such decision making allows organizations to maintain a focus on efficiency.

In organizations, learning consists of acquiring knowledge for the future. Learning-by-doing is found in both evolution (Nelson & Winter, 1982) and incrementalism (Mintzberg & Waters, 1985) theories. As a result of learning, strategies proceed through path-dependent, limited-search, exploration, and crafting decisions (e.g., Bowman, 1974; Cyert & March, 1963; Mintzberg, 1990; Quinn, 1980). Although studies of organizational learning show that the organizations learn through trial-and-error experimentation (e.g., Huber, 1991; Sitkin, 1992), they do not make the connection to strategy choices (Levitt & March, 1988).

The main feature of strategic positioning is that organizations attempt to sustain performance across the unforeseeable future. This theme exists as a part of several theories. For example, according to the resource-based view (e.g., Rumelt, 1984) organizations position themselves to gain sustained competitive advantages by owning relatively inimitable resources. Similarly, studies of core competencies suggest that organizations are better positioned for future growth by developing portfolios of skills and capabilities (Prahalad & Hamel, 1990). Strategic positioning is also central to the idea of investment precommitment (Ghemawat, 1991). Although strategic positioning is aimed at the future, it does not show how an organization's strategy emanates from its past investments.

The option lens integrates these four themes in a different way from most existing theories. It begins with the view that organizational investments have two sides (Myers, 1977). Organizational investments provide current returns and cash flow, on the one hand, and they open up options, on the other. A firm is valued as a going concern on the assumption that it will continue to invest. Therefore, its market value includes the value of these options. The value of the firm is thus the sum of earnings generated by investments in place plus the option value of future strategic choices. *The option bundle therefore strengthens the conceptual bridge between strategic action and the value of the firm.*

The option-value component often contributes well over half the firm's total value (Kester, 1984). This component includes options relating to "latent assets" (i.e., opportunities whose values are not easily discerned by the market, Brennan, 1990). However, several options may await recognition as shadow options. If managerial and market perceptions of option value coincide, the firm will be accurately valued. This valuation implies a new criterion for efficient resource allocation—immediate (foreseeable) cost-benefit value plus option value. Resource

investments that maximize both components together are most likely to deliver (or raise) market value. This more comprehensive efficiency criterion is superior to ROI or discounted cash-flow criteria (Myers, 1984).

It can be argued that differences in the investment behavior of firms under identical circumstances (e.g., Japanese firms versus U.S. firms in the same global industry) may be caused not by differences in the cost of capital but because their cost-benefit judgments do or do not implicitly value options. Firms that evaluate option value implicitly (few do so explicitly, at present) might behave in counterintuitive ways that are actually consistent with long-term efficiency. For example, they might invest in risky projects, or they might maintain slack resources without concern for the "efficient" use of free cash flow, if such investments contain high option value.

As mentioned previously, options in the bundle are recognized through the intuitive process of managerial sense making. The organization's routines and the sense-giving role played by its leaders influence which shadow options will be recognized. If managerial intuition and sense making implicitly take account of option value, even apparently unstructured and chaotic decisions can contribute to efficiency (which is not to say that managerial judgment is always accurate). Investment in R&D, for example, is like a bet—it often represents a willingness to back the hunch of a research scientist. Expenditures based on such intuitive reasons are justifiable when couched in option terms—in which the "R" represents the price of the option, and the "D" represents its strike value should the bet turn out favorably. Option analysis of R&D investments is thought to form "the next best thing to a gut feeling" (Naj, 1990: 1). *The economic rationale of option value may therefore capture the heart of managerial intuition regarding organizational investments.*

The organization's accumulated learning not only provides capabilities that give preferential access to opportunities, but it also influences sense making and the recognition of shadow options. Differential learning abilities across organizations will yield different rates of option recognition, and thus they will produce different investment patterns. Organizations with a greater absorptive capacity (Cohen & Levinthal, 1990) for instance, will be more likely to continue an option chain through sequential option strikes in the form of new product innovations. *The recognition of shadow options is therefore the mechanism by which learning continuously translates into strategy choices.*

Options provide strategic positioning. Given initial uncertainty, followed by the reduction of uncertainty by learning, an option chain unfolds as a series of interwoven small and large investments. This view realistically combines the idea of incrementalism (small investments, e.g., Quinn, 1980) with the idea of commitment (large investments, Ghemawat, 1991). As an option chain unfolds over time, the organization's past investments and strengths are extended into the future. Further, because real options reflect the organization's own sense making, they position the firm uniquely (compared to competitors with different sense

making). Options thus actually form the inimitable resources that give an organization its sustained performance and competitive advantage.

A NEW TYPE OF EXPLANATION FOR EMPIRICAL FINDINGS

Several additional insights are available through the option lens. A few of these insights are briefly discussed in the following sections, to illustrate the explanatory power of the lens: the interaction between strategy and environmental selection, the garbage can view of decision making, and the counterintuitive findings of means consensus and the risk-return paradox.

Strategy and Selection

The option lens illuminates the intricate dovetailing that occurs between the organization and its environment. Studies of strategy are apparently in conflict with population ecology studies that emphasize selection by the environment (Astley & Van de Ven, 1983). At best, according to strategy studies, organizations adapt to the environment (Child, 1972; Lawrence & Lorsch, 1967). However, adaptation and selection may be interrelated (Levinthal, 1991). The option lens suggests the mechanism by which growth or decline or, equivalently, selection "in" or "out" of the environmental domain might occur.

As the organization invests, environmental diffusion processes either offer opportunities or do not offer opportunities at different points in time. If its options have positioned the organization favorably to exploit the available opportunities, its strike investments will produce growth, a condition equivalent to successful adaptation and "selection in" by the environment. If the organization has been positioned unfavorably, current investment will produce decline, and the firm will be "selected out."

The interaction between an organization and its environment takes place across successive time periods. Investments made in period ($t - 1$) will interact with environmental opportunities in period (t) to yield growth or selection at (t). This conceptualization is in keeping with the fact that environmental selection must necessarily operate after organizations generate variation (i.e., begin to invest in new explorations). Organizations seeking to adapt to the environment in period (t) in reality only position themselves for opportunities that may or may not be forthcoming in period ($t + 1$). Deterministic descriptions of selection, or the proaction and adaption approaches of strategy, do not highlight the perpetually tentative and exploratory nature of investments, and thus they miss the possibility that performance is the quasi-fortuitous by-product of their lagged interaction with the environment.

The Garbage Can

One of the more counterintuitive elements in the garbage can view is that solutions exist in advance of problems (March & Olsen, 1976). This

view may be explained in terms of shadow options ("solutions") that, when recognized, allow decision makers to strike them as and when opportunities (or "problems") arrive. Problems with no prior options in place tend to be treated by "flight and oversight" until options are recognized retrospectively and activated. The garbage can description is thus consistent with the view that prior resource investments create future strategic choices.

Means Consensus

Organizations whose managers agree on the means of their strategies have been found to outperform organizations that show consensus on their goals (Bourgeois, 1980). Because of uncertainty, goals may change as opportunities change and, therefore, may not be helpful in their own right. Means consensus implies agreement on the distinct investment streams to be followed (consensus on the options to be held), and it will ensure option strikes as opportunities arrive. Means consensus is thus both necessary and sufficient for a company's performance, whereas agreement on goals is relatively less important.

The Risk-Return Paradox

This paradox arose from the observations that a negative correlation was shown between firms' profitability and the variability of profits (Bowman, 1980, 1982). Managers will generally be motivated to hold options under conditions of high uncertainty, and they will be motivated to strike options under low uncertainty. Thus, managers will tend to retain less profitable investments for their option value in times marked by high variability of profits, and they will make more profitable investments (or option strikes) when external conditions and learning (Levinthal, 1991) reduce performance variability. Alternatively, risk seeking implies that managers may strike options earlier, and with less information. This type of behavior is a common feature of leveraged operations, and it arises out of a deeply embedded option that allows the firm's owners to shift risk to the firm's debtors (Myers, 1977). In this case, because they are protected by limited liability, owners gain from the upside potential of the firm's investments, leaving debtors to carry the full downside risk of bankruptcy. In this situation, managers have an incentive to take more risks in maximizing shareholder wealth.

Future Research

This article indicates the potential for future research using the option lens. Studies of market exploration, innovation, comparative global strategy, and organization structure and decentralization form a few immediate applications. More valuation studies and more studies that identify different options and their related strategies are needed.

For example, it should be possible to study the extent to which firms' performances vary according to their entry strategies into a new product

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or market. Entry strategies can be divided into two categories: (a) one-shot, full-scale acquisition or greenfield entry and (b) incremental, stage-wise entry through trial investments that are later stepped up to full-scale investments (i.e., by striking the options made available through the trial investments). Similarly, innovation strategies and strategies for internal new product development can be compared in terms of the relationship between investment size and timing. (For example, are new products developed through large-scale projects, such as GM's Saturn project, or are they developed through option-type strategies, such as Toyota's strategy of first making small, continuous improvements for a long period and then striking the options embedded in these improvements to make large design changes?) The timing of option strikes is another area that requires empirical investigation. Given different configurations of size and timing of investments, do optimal option strategies exist for each situation? The behavioral side of option investment is another fruitful area for investigation—for instance, under what circumstances do managers perceive option value? These are but a few possibilities that merit further study. No doubt, the range of applications will widen along with the development of scholarly interest in the area.

The option lens thus offers a distinctive view of organizational strategy. Moving in the opposite direction to the earlier "psychologizing" of firms (March & Simon, 1958; Simon, 1955), it offers an "economizing" of organizational intuition to draw it closer to the realm of falsifiability, thus bringing to light the common thread that runs through the economic and behavioral approaches to strategy.

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APPENDIX

ECONOMIC OPTION THEORY AND EXTENSION TO STRATEGY

Economic options valuation methods were developed before organized option trading markets were established in Chicago and other international financial centers (Cox & Rubinstein, 1985: vii-viii). Useful reviews of financial option pricing are found in Cox and Rubinstein (1985), Geske and Shastri (1985), and Smith (1976), whereas Kulatilaka and Marcus (1988) and Sick (1989) review real option valuation.

The objectives of economic valuation are to determine the fair price of an option and to derive an optimal investment policy. Valuation techniques assume that the value of the underlying asset diffuses over time (often, but not always, by geometric Brownian motion). The correct option price is its "general equilibrium" value. If the option is correctly valued, investors who hold the option and/or its underlying asset should find no opportunities for profitable riskless arbitrage (e.g., by striking an option to buy the asset at a price lower than its current value while simultaneously contracting to sell the asset at the higher price). An equivalent portfolio of the underlying asset (whose value is knowable) is constructed, given this argument, and the value of the option is determined by comparison with this portfolio. The capital market is assumed to be made up of risk-neutral investors (i.e., no risk-averse or risk-seeking behavior is presumed).

Option-valuation methods are robust under variations of the above assumptions, however. Different diffusion-process assumptions may be entertained without difficulty (cf. Cox & Rubinstein, 1985: 368-369; Merton, 1977). Similarly, the existence of a perfect and complete capital market is not a necessary condition for accurate valuation (Myers, 1977). Thus, the investment behavior insights that stem from option valuation studies and option theorems are not affected by periods of market inefficiency (e.g., Shleifer & Vishny, 1991) and imperfect capital markets.

Real options exist in conditions of economic necessity, not as contractual obligations between firms, but in terms of economic opportunities for which prior capital commitment forms a necessary condition (Kogut, 1991). Options are thus implicit contracts (Weick, 1979: 100; Wolff, 1950: 317-319) between firms and their environments. Although real options are not traded in financial markets, option-pricing methods remain valid because the firm's actions do not alter the investment opportunities available to market investors (Majd & Pindyck, 1987; Merton, 1977).

The option insights in this article do not cover the full range of option theory, but relate to only such findings as have a bearing on organizational investments. Rather than emphasizing the valuation aspect, this article concentrates on the basic intuition underlying options and its implications for strategic management. Accordingly, it avoids relatively eso-

teric considerations (e.g., uncertainty in real interest rates, Ingersoll & Ross, 1992) that appear unlikely to enter decision making. This pragmatic approach is in keeping with empirical studies of firms' option strategies (e.g., Hurry, Miller, & Bowman, 1992; Kogut, 1991). These studies extend the behavioral insights of option theory to strategy by identifying the options that underlie firms' strategies.

Several authors state that economic options accurately describe strategic investments (e.g., Kester, 1984; Myers, 1984; Sharp, 1991). Dixit (1992) states that qualitative option insights are widely generalizable to both organizational and individual behavior. In light of these studies, it appears that extension to strategic management is relatively free of the hazard of violated assumptions (Montgomery, Wernerfelt, & Balakrishnan, 1989; Wernerfelt, 1985). The development of option-based theory in strategic management is thus likely to be conceptually sound and empirically verifiable.

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