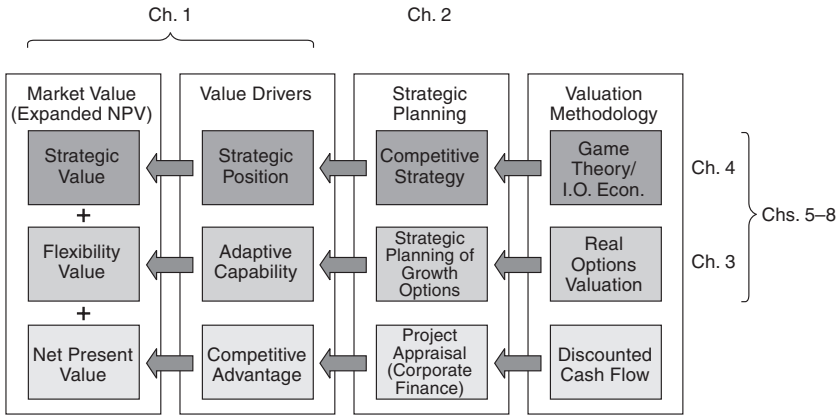# Corporate Finance and Strategic Planning: A Linkage

Life can be understood backward,
but . . . it must be lived forward.
— Søren Kierkegaard (1813–1855)

1.1. Introduction

This chapter takes a first step toward closing the gap between traditional corporate finance theory and strategic planning. To put issues in a broad perspective, figure 1.1 summarizes three approaches to strategic planning and their impact on the market value of the firm. This conceptual framework aligns the design of an investment strategy with the value of the firm. Consider the various sources of economic or market value a firm can create. As shown in the left-hand column, the market value of a firm is not completely captured by the expected cash flow generated by the tangible assets that are currently in place (measured by NPV). Stock market prices partly reflect a firm's strategic growth potential. This value derives from investment opportunities that the firm may undertake in the future under the right circumstances, and is sensitive to competitive moves. The strategic option value of a firm can be vulnerable not just to the actions of incumbents, but also to the unanticipated entry of new rivals with entirely new technologies that can modify the competitive landscape in which the firm operates.

Investment appraisal methods should capture the components of flexibility and strategic value, as they may contribute significantly to the firm's market value in an uncertain competitive environment. The flexibility and strategic considerations of importance to practicing managers can now be brought into a rigorous analysis in a fashion consistent with the tenets of modern finance and the maximization of shareholder value. The right-hand column in figure 1.1 shows the valuation approach based on insights from real options and game theory, which captures additional flexibility and strategic value not measured by cash flow benefits per se. This approach considers growth opportunities to be a package of corporate real options that is actively managed by the firm and may be affected by competitors actions and by new technologies. If a firm's investment decisions are contingent upon and sensitive to competitors' moves, a *game-theoretic*

Figure 1.1 Impact of Corporate Strategic Planning on the Market Value of the Firm

The broader strategy framework recognizes three levels of planning that have an effect on the market value (expanded NPV) of investment opportunities. First (bottom row), project appraisal from corporate finance aims at determining the effect on the net present value of the projected cash flows resulting from establishing a competitive advantage. Second, strategic planning of growth opportunities aims at capturing the flexibility value resulting from the firm's adaptive capabilities through real-options valuation. Third, competitive strategy aims at capturing the strategic value from establishing, enhancing, or defending a strategic position vis-à-vis competitors based on game theory analysis and industrial organization economics.

treatment can be helpful. Competitive strategies should be analyzed using a combination of option valuation and game-theoretic industrial organization principles, as the two may interact.

To link corporate strategy with the value creation of the firm, one should identify the investment opportunity's value drivers. These value drivers provide an interface between the quantitative project valuation methodology and the qualitative strategic thinking process, focusing on the sources of value creation in strategic planning. The second column in figure 1.1 suggests that to understand total strategic value creation, one must examine, not only the traditional value drivers that focus on *why* a particular investment is more valuable for a company than for its competitors, but also the important value drivers for capitalizing on the firm's future growth opportunities, and *how* strategic moves can appropriate the benefits of those growth opportunities, as well as limiting risk if unfavorable developments occur.

This broader framework provides deeper insights for competitive strategic planning. As the strategies of firms in a dynamic, high-tech environment confirm, adaptability is essential in capitalizing on future investment

opportunities and in responding appropriately to competitive moves. Adapting to, or creating, changes in the industry or in technology is crucial for success in dynamic industries.

The rest of this chapter is organized as suggested by the columns of figure 1.1. Starting from the left with shareholders' (market) value, and the components of this value observed from stock prices in financial markets, we reason back to the origins of this value in the real (product) markets and to corporate strategy. The market value components are discussed in section 1.2. Section 1.3 reviews the relevant valuation approaches, and the need for an expanded NPV criterion. Games are used to capture important competitive aspects of the strategy in a competitive environment. The value drivers of NPV, flexibility value, and strategic value, are discussed in section 1.4, relating the qualitative nature of competitive advantage and corporate strategy with quantifiable value creation measures for the firm. Section 1.5 discusses the options and games approach to capturing value creation in corporate strategy.

1.2. The Market Value of Growth Opportunities

In a dynamic environment, strategic adaptability is essential in capitalizing on favorable future investment opportunities or responding appropriately to competitive moves. A firm's growth opportunities and its strategic position in the industry are eventually reflected in stock market prices. Of course, not all stocks generate the same earnings stream or have the same growth potential. Growth stocks (e.g., in biotech, pharmaceuticals, or information technology) typically yield high price-earnings and market-to-book ratios. In fact, it is precisely the intangible and strategic value of their growth opportunities that determines most of the market value of high-tech firms in a continuously changing environment. As box 1.1 suggests, a proper analysis of this strategic growth option value is more difficult than price-earnings ratios or other multiples might imply. An underlying theory that can explain this market valuation is now available if we consider the strategic option characteristics of a firm's growth opportunities. There is indeed a clear appreciation in the market for a firm's bundle of corporate real options (present value of growth opportunities, or PVGO).[1]

Table 1.1 shows that industries with higher volatility and (market, firm-specific, or total) risk (and as we will see, more option value) — such as information technology, pharmaceuticals, and consumer electronics — tend to have more valuable growth opportunities and a higher proportion of

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[1]See for instance Smit (1999b) for an empirical study on the prevalance of PVGO in share value.

TABLE 1.1

Industry (average) Volatility (Market and Firm-Specific Uncertainty)
and Proportion of PVGO to Price for a Number of Representative
Industries, as of June 30, 1998

Industry	Uncertainty			Average PVGO/P	
	Total = (σ_T^2)	Firm + (σ_S^2)	Market (σ_M^2)	Market Model	$r + 6\%$
Pharmaceuticals	14	12	2	92	83
Information technology	23	20	3	84	83
Consumer electronics	26	21	5	83	70
Food	6	5	1	81	72
Banking	6	4	2	81	55
Transportation	9	7	2	62	38
Electric power	4	3	1	60	48
Chemicals	6	4	2	46	47

Note: Numbers are percentages. Averages per industry are equally weighted (to
avoid excessive influence of large firms), based on monthly returns over the period
1988–98. Total risk (volatility), σ_T^2, is estimated as the variance of monthly returns;
market (or systematic) risk, $\sigma_{M,i,t}^2$, is estimated from $\sigma_{M,i,t}^2 = \beta_{i,t}^2 \sigma_{m,t}^2$, where $\sigma_{m,t}^2$ is the
volatility of the S&P 500 market index at time t, and $\beta_{i,t}$ is the beta or sensitivity of
monthly returns of firm i to monthly market returns of the S&P 500 index estimated
over a period of 10 years. The present value of growth opportunities (PVGO) for
firm i is estimated by subtracting the discounted value (with the discount rate esti-
mated from the market model or the risk-free rate (r) plus a 6% risk premium) of its
perpetual stream of earnings (under a no-growth policy) from its market price.

PVGO to price on average (above 80%) than other industries—such as
transportation, chemicals, and electric power (below 60%). The former
industries involve more unexpected technological changes and competi-
tive moves; as the firm's (or the industry's) dynamic path unfolds, manage-
ment must be better prepared to learn, adapt, and revise future investment
decisions. The market appropriately rewards with higher market valua-
tions those firms better able to cope with change, capitalizing on the up-
side potential while mitigating downside risk.

Growth firms (e.g., leading firms in information technology, pharma-
ceuticals, and consumer electronics) tend to have a higher option value
component (PVGO) than income stocks, for two reasons. First, they tend
to operate in more volatile industries (characterized by more frequent
technological innovations and a more intensely competitive environment),

BOX 1.1 REAL OPTIONS, GROWTH OPPORTUNITIES, AND MARKET VALUATION

Companies have all kinds of options: to raise production, to buy rivals, to move into related fields. Studying a company's portfolio of options provides insight into its growth prospects and thus its market value.

"It's an important way of thinking about businesses and their potential," says Michael J. Mauboussin, a strategist at Credit Suisse First Boston (CSFB). "The thought process itself is very valuable."

Real-options analysis is a big step beyond static valuation measures such as price-earnings and price-to-book ratios. Comparing two companies on the basis of their P/E ratios is valid only if they have the same expected earnings growth. They hardly ever do. Real-options analysis zeroes in on what really matters: the earnings growth itself. It values companies by studying the opportunities they have for growth and whether they can cash in on them. Management's skill becomes a major focus. Take America Online Inc., whose P/E is stratospheric. AOI stock would be only about 4% of what it is today if the market expected it to maintain profits at the current level forever.

CSFB cable-TV analyst Laura Martin recently used real-options analysis to conclude that cable stocks are undervalued. Real-options analysis can also conclude that companies are overvalued. Coming up with a target price for a company by evaluating its real options is harder than lining up companies by their P/E's of five-year sales growth. It means understanding the companies, their industries, and managers' ability to take advantage of the options open to them. Then again, who said stock picking was supposed to be easy?
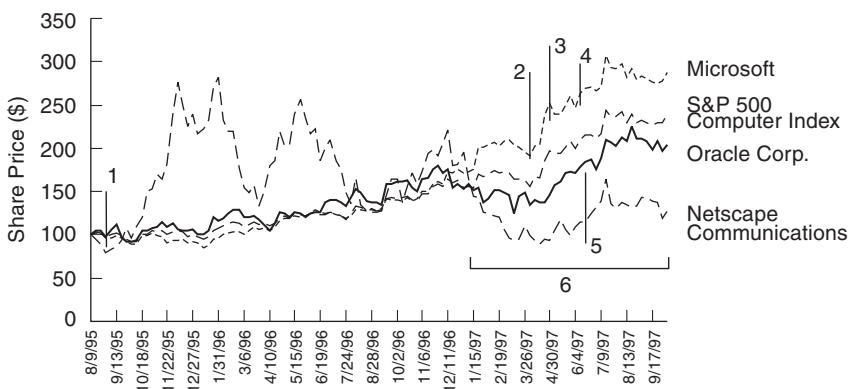
Source: excerpts from Coy 1999b.

with the higher underlying volatility being translated into higher (simple) option value. Second, they tend to have a greater proportion of compound (multistage or growth) options as opposed to simple (cash-generating) options, which amplifies their option value (being options on options). This higher (growth) option value, in turn, is translated into higher market valuations, which may appear excessive from the perspective of standard DCF valuation methods.

Figure 1.2 shows competitive strategies and relative market (price) performance over a two-year period in various high-tech industries. Panel A shows Microsoft's strategic moves and superior market performance in comparison to Netscape and other computer software rivals; panel B shows superior market performance by Intel and Sun Microsystems in

FIGURE 1.2 COMPETITIVE STRATEGIES AND RELATIVE MARKET (PRICE)
PERFORMANCE OF FIRMS IN THREE HIGH-TECH INDUSTRIES OVER A
TWO-YEAR PERIOD.

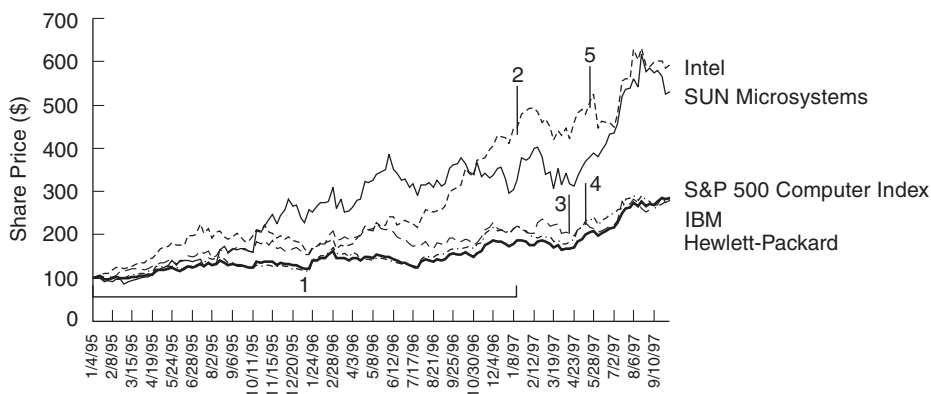**Panel A. Microsoft's strategic moves and superior market performance over rivals**

Notes:

1. In August 1995 Netscape goes public in providing software for the Internet (all firms indexed at 100 on August 9, 1995).
2. In March 1997 Microsoft allies with rival Hewlett-Packard to push its Windows NT program into corporate servers.
3. In April 1997 Microsoft agrees to buy WebTV, a start-up company that delivers Internet information directly to television sets.
4. In May 1997 Microsoft announces an all-out attack into the lucrative heavy-duty corporate computing market.
5. In May 1997 Oracle buys into Navio Communications, established by Netscape to develop Internet software for consumer electronics.
6. Netscape and Microsoft make further strategic moves to gain an advantage in their continuing battle over who will be the Internet standard bearer. Through its superior strategic moves Microsoft gains a clear advantage over Netscape, whose relative position is eroding.

comparison to IBM, Hewlett-Packard, and other computer hardware rivals; panel C shows Texas Instruments and Philips' performance relative to Sony, Time Warner, Matsushita, and other rivals in consumer electronics. We later provide specific examples of intelligent strategic decisions made by some of these leading companies.

1.3. From NPV to an Expanded (Strategic) NPV Criterion

In corporate finance, value creation for the firm's shareholders is the accepted criterion for making investment decisions or selecting business alternatives. A standard assumption is that financial markets are efficient

FIGURE 1.2 *continued*

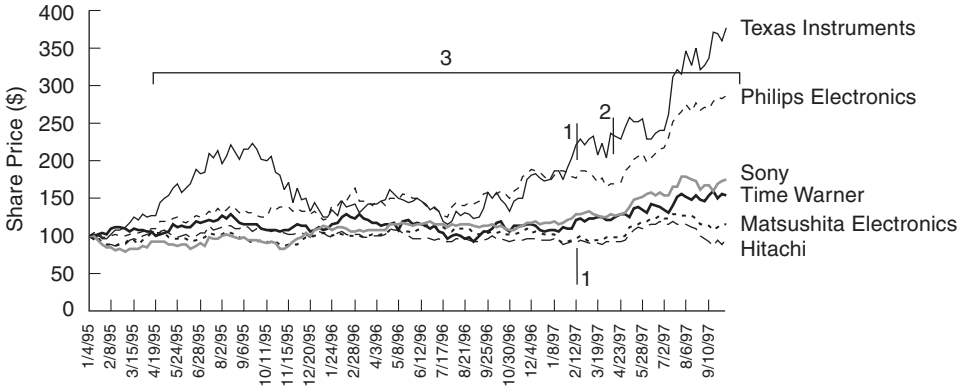**Panel B. Intel's and Sun Microsystems' superior market performance over rivals**

> *Notes:*
> 1. Intel is established as the product standard in the microprocessor market with its Pentium chip.
> 2. In January 1997 Intel moves aggressively in networking products (and in April announces further investment), forcing competitors to reduce their prices (Novell announces 18% cut in its workforce in May).
> 3. In April 1997, Hewlett-Packard agrees to buy Verifone, leading maker of credit card authorization devices, for its potential to dominate the emerging electronic commerce business.
> 4. In May 1997 Microsoft announces an all-out attack into the lucrative heavy-duty corporate computing market, at the expense of IBM, Sun Micosystems, and Oracle. IBM responds aggressively, claiming this to be Microsoft's "Vietnam."
> 5. In May 1997 Intel announces its next-generation microprocessor, the Pentium II. A week later, Digital sues Intel charging remarkable similarities with its Alpha chip.

and that the prices of all traded securities adjust rapidly to reflect relevant new information. When unanticipated information about a firm's investment opportunities or profits comes out in the financial markets, investors bid prices up or down until the expected return equals the return on investments with comparable risk. Under the assumption of a perfectly competitive financial market, all investors will apply the same risk-adjusted required return to discount the expected cash flows in valuing a particular asset.[2] Standard valuation methodologies, such as NPV, aim at selecting investments that, to create value for existing shareholders, yield an expected return in excess of the return required in financial markets from assets of comparable risk.

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[2]This is a capital market with essentially no barriers to entry, minimal trading costs, and costless access to all relevant information.

Figure 1.2 *continued*

Panel C. Texas Instruments' and Philips' superior market performance over rivals

Notes:
1. In February 1997 Texas Instruments, Hitachi and Mitsubishi announce they will jointly develop a 1 gb DRAM.
2. In April 1997 Texas Instruments gambles on Digital TV with its light-processing technology (turning heads in technology circles although currently losing money), as part of a new higher-risk, higher-margin strategy.
3. Philips and Sony's strategy to commercialize the digital video disc faces competitive pressures by Toshiba and Time Warner. In 1995 the alliance of Philips and Sony (which developed the Multi-Media CD) agrees with the alliance of Toshiba and Matsushita (which developed the Super-Density Disk) to set a common industry standard for the new-generation high-density CD (the digital video disc). There follows ongoing fight between these manufacturers in dividing the market pie to maximize the value of their investment in the product standard.

Consider an investment opportunity in competitive real (product) markets characterized by costless entry and exit and homogeneous products. Early investment in such a project can produce only a temporary excess return. Competitors will eventually enter the industry and catch up. In the long run, equilibrium rates of return in competitive industries should be driven down to required returns. Most real markets, however, have significant entry barriers and are less competitive. In such imperfect real markets, it is possible for a firm to consistently earn excess returns that exceed the risk-adjusted return or the opportunity cost of capital. Firms can only earn excess returns because of some competitive advantage, such as achieving lower costs (e.g., as a result of absolute cost advantage or economies of scale) or earning a premium in product prices (e.g., as a result of product differentiation or monopoly power; see Porter 1980 and Shapiro 1991). Firms may also achieve higher returns because of more creative management, adaptive strategic planning, or organizational ca-

pabilities that enable it to better adapt to changes in the environment and to competitive moves.

In a DCF valuation, the project's expected cash flows, $E(CF_t)$ over a prespecified life (T) are discounted at a risk-adjusted discount rate k (derived from the prices of a twin traded security in the same risk class, typically from the Captial Asset Pricing Model, or CAPM) to arrive at the project's value V_0, that is,

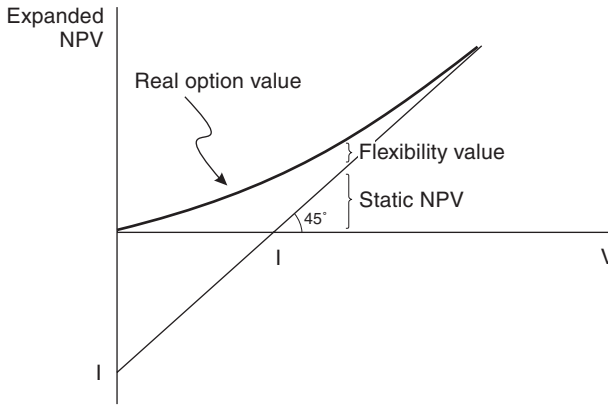$$V_0 = \sum_{t=1}^{T} \frac{E(CF_t)}{(1 + k)^t}. \tag{1.1}$$

The *net* present value (NPV) is the above gross present value of discounted cash flows, V_0, minus the present value of the necessary investment cost outlay, I_0. If positive, it represents the value creation for the shareholders undertaking this project.

With a standard NPV analysis, it is not practical to capture the full value of an investment strategy that involves real options. The NPV method implicitly assumes precommitment to future plans and defines an investment decision as a "now or never" proposition; it does not properly take into account the value of a wait-and-see strategy to make decisions as the value of the project evolves and uncertainty is revealed. Consider, for example, capacity expansion in the steel industry (see Dixit and Pindyck 1994, 8). If steel prices fall and the project turns out to be a bad investment, it may not be possible to recover the investment cost by selling the plant to another steel company (i.e., the investment may be irreversible).[3] Such an irreversible decision should be made with caution, and flexibility in the timing of the investment becomes important. Managers should not invest immediately in such a project if they expect to earn just the opportunity cost of capital. In fact, timing flexibility in an uncertain environment gives management an incentive to wait until the project is more clearly successful, requiring a premium over the zero-NPV cutoff value, equal to the option value of deferment. This option value is analogous to an insurance premium because waiting may avoid the mistake of investing prematurely.

In fact, the opportunity to invest in a project is analogous to having a call option. Figure 1.3 illustrates this analogy. A call option gives its holder the right, by paying a specified cost within a given period, to exercise the option and acquire the underlying asset. If there are no opportunity costs of waiting or dividend-like benefits to holding the asset, the holder will postpone the decision to exercise until the expiration date (t). In the real-option case, the underlying asset is the present value of the cash flows

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[3]Investments in marketing and goodwill are typically irreversible, and many capacity decisions may be partly irreversible.

Figure 1.3 Analogy of a Call Option with the Flexibility to Wait

Project	Variable	Call Option
Present value of expected cash flows	V	Stock price
Present value of investment outlays	I	Exercise price
Length of deferral time	T	Time to maturity
Time value of money	r	Risk-free rate
Volatility of project's returns	σ^2	Variance of stock returns

Expanded NPV = Static NPV + Flexibility Value

from the completed and operating project, V_t, while the exercise price is the necessary investment outlay (at time t), I_t. The ability to defer a project with an uncertain value, V_t, creates valuable managerial flexibility. If, during the later stage, market demand develops favorably and $V_t > I_t$, the firm can make the investment and obtain the project's net present value at that time, $NPV_t = V_t - I_t$. If, however, the project value turns out to be lower than originally expected ($V_t < I_t$), management can decide not to make the investment and its value is truncated at zero. In this case, the firm only loses what it has spent to obtain the option. The curve in figure 1.3 illustrates the current value of the option characterized by this truncated payoff. The value represented by this curve can be divided in two components, the static NPV of cash inflows and the timing flexibility component of value. The latter captures the premium over the zero-NPV threshold, representing the option value of deferment. This premium is generally lower if other options (besides the expected cash flows) may be generated from the project.

Investment decisions should thus be based on an expanded NPV criterion that incorporates, along with the direct NPV of expected cash flows from an immediate investment, the flexibility value of the combined options embedded in the project. That is,

Expanded NPV = passive NPV + flexibility (or option) value. (1.2)

An important next step in bridging the gap between traditional corporate finance theory and strategic planning is combining this real-options approach with game theory, taking into account competitive counteractions. For instance, the commercialization decision of Digital's Alpha chip was in fact greatly influenced by Intel's decisions regarding its Pentium processor; similarly, Philips' and Sony's strategy to commercialize the digital video disc was affected by competitive decisions by Toshiba and Time Warner, and vice versa. These decisions are better seen as *strategic games* against both *nature* and *competition*. Management's investment decisions are made with the explicit recognition that they may influence competitive reaction, which in turn impacts the value of the firm's investment opportunity.

The strategic value of early commitment in influencing competitive behavior must therefore be offset by the flexibility or option value of waiting. In the expanded or strategic NPV framework, investment has two main effects on a firm's value compared to a wait-and-see strategy: (1) *A flexibility or option-value effect*. This reflects management's ability to wait to invest under uncertain conditions. Early investment, although enhancing the commitment value of future growth opportunities, sacrifices flexibility value compared to a wait-and-see strategy. (2) *A strategic commitment effect*. Early investment can signal a credible commitment that can influence competitors' investment decisions. In part II of this book we illustrate how to quantify these value components when determining the expanded NPV for various (R & D) investment strategies. Box 1.2 provides a simple numerical example of an option game.

In the broader context incorporating both flexibility and strategic considerations of competitive interaction, in addition to the value of cash flows from passively committing to future plans, expanded NPV (reflecting total market value) becomes

Expanded (strategic) NPV = (passive) NPV + flexibility (option) value + strategic (game-theoretic) value. (1.3)

This formula combines the three components of value presented in figure 1.1.

1.4. Value Drivers of NPV, Flexibility Value, and Strategic Value

Where do positive expanded NPV's come from? Positive NPV investments are supposed to yield an excess return above the opportunity cost of capital. To understand the value creation of a project's positive expanded NPV, one must first examine the various value drivers to explain *why* a particular project is more valuable for one company than for its competitors.

How firms achieve and sustain competitive advantage and earn a return in excess of the opportunity cost of capital is a fundamental question in the field of strategic management. This literature is complementary for the design and valuation of an investment strategy.

A key step in building a framework that relates corporate finance with strategic planning is to understand the foundations on which can be built the distinctive and difficult-to-imitate competitive advantages that determine NPV, flexibility value, and strategic value. The externally based view of the firm emphasizes imperfections, strategic behavior, and market power, which may create an opportunity to generate returns that exceed the opportunity cost of capital. The resource-based view focuses internally on the exploitation of firm-specific assets and capabilities. These are discussed in detail in chapter 2. These views and sources of competitive advantage provide an interface between the quantitative project valuation employing corporate finance tools and the qualitative process of strategic planning.
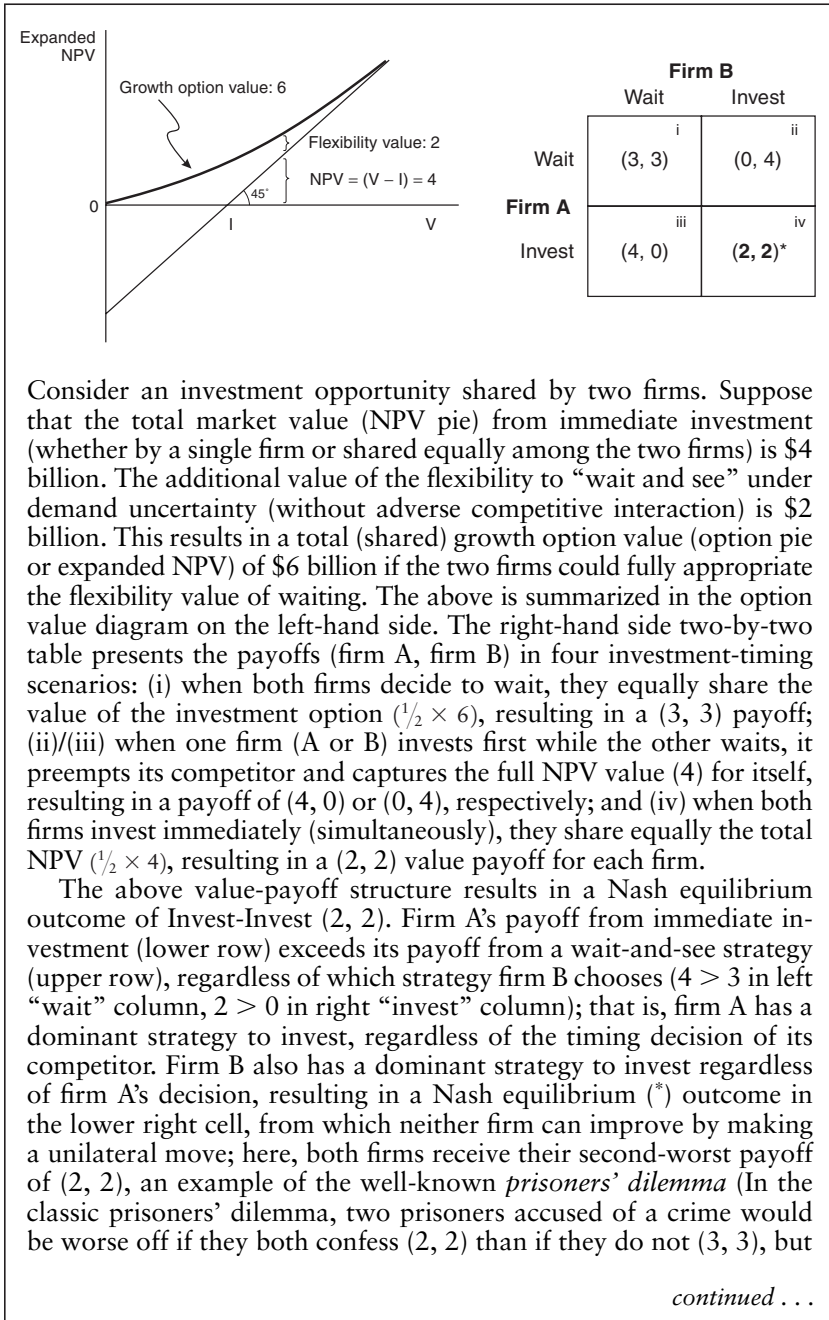
1.4.1. Value Drivers of NPV

Value creation has two underlying sources. First, it depends on the general attractiveness of the industry in which the company operates. Second, it depends on the establishment of a competitive advantage over rivals. One strand of literature generally sees value creation as deriving from economic rents in industries characterized by strategic behavior and market power. The excess returns over the opportunity cost of capital underlying positive NPV projects cannot be sustained without market imperfections.

In a competitive market characterized by costless entry and exit and homogeneous products, early investment can produce only temporary excess profits. Eventually, competitors catch up and enter the industry. In the long run, the increased supply lowers prices such that equilibrium rates of return are driven down to their required returns. Then excess profits and NPVs (determined from the present value of the expected excess profits) are expected to be driven down to zero. Therefore, the "average" firm operating in a highly competitive market will be unable to consistently undertake positive NPV projects.

In a competitive environment, excess profits can exist if the firm can generate a competitive advantage. According to Shapiro (1991, chap. 10), entry barriers and a distinct advantage over existing competitors (e.g., economies of scale and scope, absolute cost advantages, or product differentiation) are the real source of excess profits. Such value drivers may result in a cost advantage, for example, absolute cost advantage, economies of scale or economies of scope. Differentiation can be achieved by creating

Box 1.2 Innovation Race: Example of an Option Game

Consider an investment opportunity shared by two firms. Suppose that the total market value (NPV pie) from immediate investment (whether by a single firm or shared equally among the two firms) is $4 billion. The additional value of the flexibility to "wait and see" under demand uncertainty (without adverse competitive interaction) is $2 billion. This results in a total (shared) growth option value (option pie or expanded NPV) of $6 billion if the two firms could fully appropriate the flexibility value of waiting. The above is summarized in the option value diagram on the left-hand side. The right-hand side two-by-two table presents the payoffs (firm A, firm B) in four investment-timing scenarios: (i) when both firms decide to wait, they equally share the value of the investment option ($1/2 \times 6$), resulting in a (3, 3) payoff; (ii)/(iii) when one firm (A or B) invests first while the other waits, it preempts its competitor and captures the full NPV value (4) for itself, resulting in a payoff of (4, 0) or (0, 4), respectively; and (iv) when both firms invest immediately (simultaneously), they share equally the total NPV ($1/2 \times 4$), resulting in a (2, 2) value payoff for each firm.

The above value-payoff structure results in a Nash equilibrium outcome of Invest-Invest (2, 2). Firm A's payoff from immediate investment (lower row) exceeds its payoff from a wait-and-see strategy (upper row), regardless of which strategy firm B chooses ($4 > 3$ in left "wait" column, $2 > 0$ in right "invest" column); that is, firm A has a dominant strategy to invest, regardless of the timing decision of its competitor. Firm B also has a dominant strategy to invest regardless of firm A's decision, resulting in a Nash equilibrium (*) outcome in the lower right cell, from which neither firm can improve by making a unilateral move; here, both firms receive their second-worst payoff of (2, 2), an example of the well-known *prisoners' dilemma* (In the classic prisoners' dilemma, two prisoners accused of a crime would be worse off if they both confess (2, 2) than if they do not (3, 3), but

Box 1.2 continued

the fear of the other prisoner confessing (0, 4) puts pressure for both to do so even though not confessing would have been preferable for both). Here, both firms would be better off to coordinate and fully appropriate the option value of waiting (3, 3).

The Nash equilibrium depends of course on the payoff in the four investment-timing scenarios. If the flexibility value would be equal or higher than the full NPV if the firm invests first, a *second* Nash equilibrium might arise in the game (Wait, Wait), for example, if this strategy payoff of waiting passes from (3, 3) to (4, 4) or (5, 5) due to a higher specific uncertainty. In short, depending on the parameters, the options strategy (Wait, Wait) can be a Nash equilibrium, but the required option premium (flexibility value) is much higher than it would be in the real-options approach alone.

brand identification and customer loyalty. This is supported by trademark laws, copyrights and patents, and advertising coupled with promotional and R & D activities. The most important project value drivers that lead to differentiation are the following.

Developing and introducing innovative products. Innovation in product development helps firms to differentiate themselves from competitors, particularly if patents can successfully protect new products. For instance, in the pharmaceutical industry firms have earned high returns by developing unique products. In consumer electronics, companies like Philips and Sony did so by introducing the new CD technology. The uncertainty of innovative product introductions is both technological and commercial in nature. The success of a new technology or product introduction depends critically on the value added for customers. Therefore, these innovative products are often accompanied with a real-time marketing program during development.

Reputation buildup. Companies develop track records through large advertising expenditures and marketing skills (for instance, Coca-Cola, Philip Morris, etc.). Company reputation for quality and integrity permits charging a premium price. Reputation becomes a valuable intangible asset and is sometimes referred to as brand-name capital. New competitors are forced to invest heavily in advertising and marketing to overcome existing loyalties. The large advertising outlays necessary can themselves create an entry barrier.

Project value drivers stemming from cost advantages include the following.

Absolute cost advantages over competition. Examples include

• A proprietary product technology. Often, patents or corporate secrecy can restrict competitors' access to a more efficient production technique, and thus allow the firm to produce more cheaply or at a higher quality than its competitors. Process efficiencies may result from the implementation and use of mechanization in product development, generating cost savings due to a more efficient use of materials, labor costs, or design. Cost advantages are rarely permanent. Even with patent protection and licenses, expected economic rents or excess returns can diminish in the long term as competitors catch up and invent similar or better products to satisfy the same consumer needs.

• Control of important inputs or efficient production facilities. This can result when there are locational advantages of specific raw materials, when the firm may exercise bargaining power with suppliers and establish cooperation relationships, or when other unique characteristics can be exploited. A pioneer firm can gain control over an important production factor's more efficient sources of supply, and may therefore be able to earn more than its (potential) competitors. However, a firm can expect to earn excess profits only if it can avoid paying the full value for a certain production factor.[4]

• Early-mover preemption advantages. Pioneer firms often appropriate favorable locations early on. For example, McDonalds has acquired at relatively low cost many of the best fast food restaurant locations.

• Learning and experience curve effects. In some businesses, unit costs can decline as the firm gains more experience. These effects are related to cumulative volume. Learning effects result as the firm accumulates experience and know-how, internalizes its procedures, and increases the level of coordination and organization of its activities. Learning and experience curves are particularly significant if labor is performing intricate tasks or complex assembly operations. For example, in the shipbuilding and airplane-manufacturing industries, unit cost declines up to 70% as cumulative production increases. The market leader accumulates experience the fastest and thus gains a cost advantage. As costs continue to decline, it becomes more difficult for imitators to catch up. Texas Instruments, Sony,

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[4]For instance, the Boeing 757 is a much more efficient plane than older ones. However, an airline company that operates a 757 does not have to expect excess profits in a particular line. Boeing may be overcharging for the greater efficiency provided. An airline company can only expect economic rents from this source if it operates the Boeing 757 more efficiently than its competitors (see Brealey and Myers, 2003, Chapter 11).

Black and Decker, and aircraft-manufacturing corporations, for example, have developed strategies based on building cumulative volume through aggressive investments in capacity and pricing policies that anticipate future cost declines.

• Managerial organization advantages. Such advantages can be obtained by decreasing agency costs through efficient management compensation systems or by reducing transaction costs along the organization's vertical chain.

Economies of scale. With economies of scale, the unit cost of a product declines as the absolute production volume per period increases. Scale economies can be available in many areas of a business, for example, in production, R & D, and marketing. Economies of scale are an important factor determining the structure of a market. The higher the break-even demand necessary, the larger the need to develop economies of scale, and the more concentrated the sector tends to be. On the other hand, if the minimum efficient scale is small relative to the level of demand, a fragmented market can be exploited by several firms. Significant economies of scale in production can deter entry because they force new competitors to invest heavily in capacity, while risking an aggressive response from established firms. The competitors' alternative is to enter at small scale and accept a cost disadvantage compared to incumbent firms. When economies of scale are present, firms direct their strategy to building volume. For example, Philips' strategy for some of its business units in consumer electronics has been directed towards building large production volume.

Economies of scope. With economies of scope, cost advantages can result from producing and selling multiple products related by a common technology, production facilities, or network. R & D spillovers are sources for achieving economies of scope, as the findings in one area can be applied to another. For instance, modular design, which prevails in electronics and in car and airplane manufacturing, allows firms to make product variations using standard modular parts.

The externally oriented view of the firm deals with issues of limited or imperfect competition that may result from exclusionary behavior, for example, due to entry barriers or a threat of increasing entry costs. Market imperfections make it possible to create a strategic position that enables the firm to earn more than the opportunity cost of capital. Strategic decisions concerning the choice between cost- and differentiation-based advantages, or between a broad and focused market scope, shape the firm's strategic position. However, fundamental to imperfections and strategic position are the resources of the firm. To establish a strategic position based on a cost advantage, for instance, a firm must possess resources such as scale-efficient plants, superior process technology, ownership of
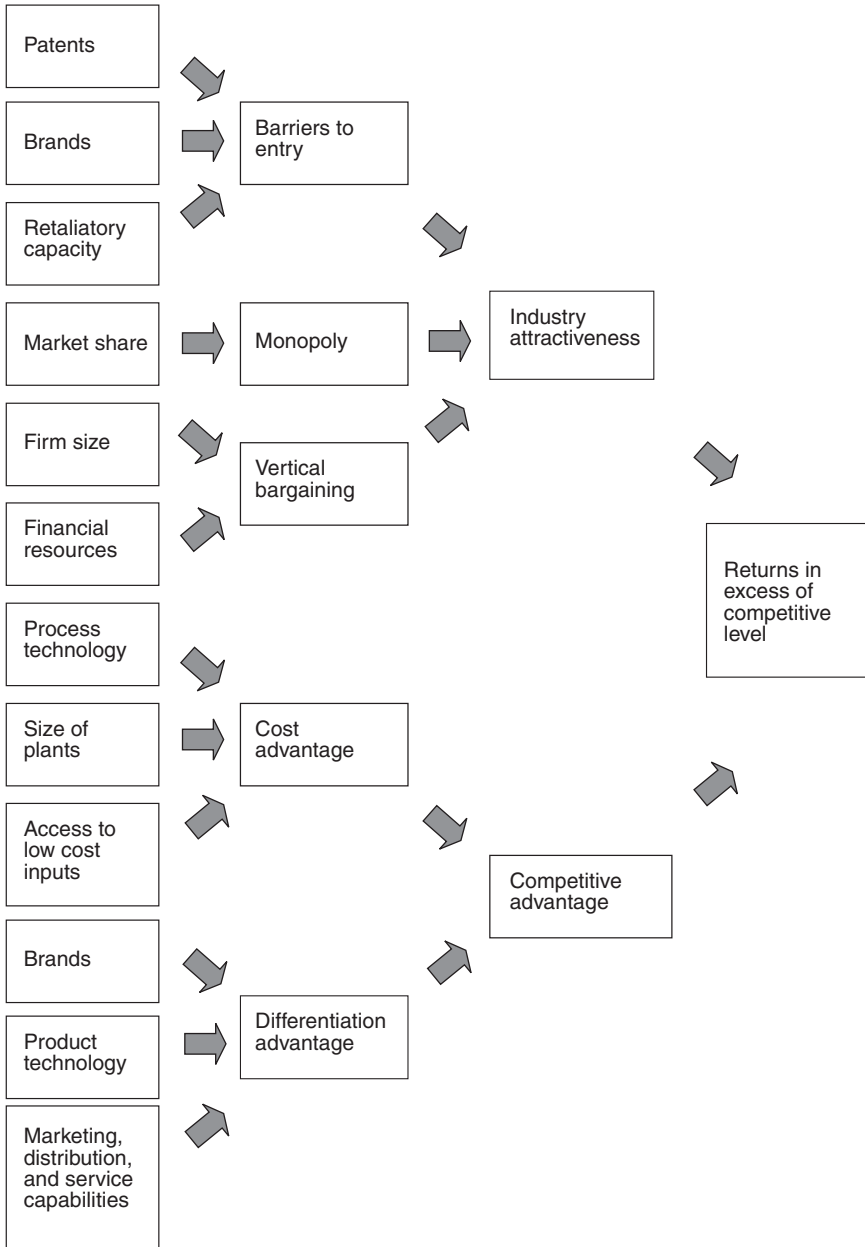
low-cost sources of raw materials, or access to low-wage labor. Similarly, a position based on a differentiation advantage can be built based on brand reputation, proprietary technology, or an extensive sales and service network.

Another view, also discussed at length in chapter 2, emphasizes that building competitive advantage and capturing and sustaining entrepreneurial rents stem from the utilization of firm-specific resources. In this "resource-based" view of the firm, the source of excess profits cannot be found in the external environment; rather, it lies in the exploitation of unique internal resources and capabilities that confer competitive advantage over and above the real costs of these resources. The resource-based view of the firm emphasizes that the use of resources and capabilities that are specific for the organization are the real source for value creation. Mechanisms that "isolate" the specific resources from competitors make it hard to imitate the firm's position and help sustain its competitive advantage. For instance, patents can "isolate" or protect the knowledge position of the firm from its competitors, while early-mover advantages may protect its production position under economies of scale.

To be a source of competitive advantage, external opportunities to exploit the firm's unique resource position must exist. Excess profits that derive from market power may find their source in the unique resources of the firm. For instance, barriers to entry, based on economies of scale, advantages in patents or experience, or brand reputation, are often resources that the incumbent already possesses but which an entrant can acquire only gradually and at a cost. Figure 1.4 portrays various resources of the firm that may lead to competitive advantage and profitability. These resources are inputs into the production process and support the competitive position of the firm.

In a context where valuable growth opportunities derive from control over scarce intangible resources, such as knowledge assets, accumulation of such intangible assets and management of their valuable growth opportunities are fundamental strategic issues. The notion that competitive advantage requires the exploitation of firm-specific capabilities, as well as investing and building new ones, is fundamental for the resource-based view (Wernerfelt 1984). A new strand of literature in strategic management theory, referred to as "dynamic capabilities," offers additional insights into how firms can renew competences to respond flexibly and capitalize on a changing environment (Teece, Pisano, and Shuen 1997). In the corporate finance and real-options literature, investing in intangible assets can generate valuable growth opportunities. This method introduces uncertainty into the valuation equation and is therefore particularly appropriate for analyzing investment in an uncertain and changing environment.

FIGURE 1.4 RESOURCES AS A BASIS FOR PROFITABILITY

1.4.2. Drivers of Flexibility or Growth Option Value

It is well accepted that the intangible value of investments that make up part of the firm's resources does not derive so much from direct cash inflows, as from the options to invest in future growth. Indeed, strategic plans often encompass investments that, if measured by cash flows alone, appear to have a negative net present value (NPV), when in fact they may generate a strategic position to invest in valuable follow-on opportunities. An early investment in research and development, for instance, may seem unattractive if its direct measurable cash flows are considered in isolation. Such a strategic R & D investment should not be seen as a one-time investment at the outset; proper analysis requires explicit consideration of its follow-on commercial options (i.e., to commercialize the end product of the R & D program) and related applications. Of course, it is well understood that firms use strategic investments to enhance their position, and appreciate the value of flexibility to react to an uncertain environment. The option perspective suggests that, as information over the success of R & D is revealed, management has flexibility to proceed to the next stage, terminate, or otherwise alter its future investment plans. An R & D investment, a pilot project, or entry into a new geographical market have an add-on strategic value because they may create future investment opportunities. Viewing strategic investments, such as R & D, through an options perspective can offer several interesting, and sometimes unconventional, insights. As an equivalent to a call option, the value of the growth options of a firm is influenced by uncertainty, time to maturity, and interest rates.

Project uncertainty or risk measures the variability, or dispersion, of future values of the underlying asset and can exert substantial influence on the value of real growth options. On one hand, high systematic risk results in a high required return by the capital market and a low market value of the project from immediate investment. On the other hand, high (total) risk has a positive influence on the value of a real option. When business is good, extreme values are more likely, making options more valuable. If two R & D projects, for example, have the same expected payoffs and the same costs, but uncertainty over the value of the projects' commercialization differs (with different ranges of possible outcomes), a perceptive R & D manager would choose the riskier one (Kolbe, Morris, and Teisberg 1991) because it would have a higher payoff if the R & D turns out successful. This insight, which may be surprising at first glance, hinges on the fact that if the R & D phase fails, the enormous follow-on investment expenditure for production and commercialization need not be made. In other words, if research fails, then only the relatively small R & D investment is lost and the two projects give the same payoff of zero. On

the other hand, more can be gained from the riskier project because of its better chance of exceptionally high returns in the commercial stage. The option to invest in the commercialization of a project involves an asymmetry. As a result, the growth option value today of the high-risk project will be larger. Downside losses are limited when management decides to default on planned investment installments, while at the same time the full upside potential of the project is preserved.

The *length of time* that project outlays can be deferred makes a real growth option more valuable. A strategic investment, such as a pilot plant or R & D project, often provides an interval before investing in the follow-on project during which the decision maker can safely wait to examine the course of future events. More time to option maturity increases option value since it gives management a wider choice with respect to timing. Consider, for example, a new product introduction. Management may invest first in a pilot project to test the market before it invests large irreversible outlays in commercial exploitation. If competitive pressure is low, management may postpone projects in new markets and decide to invest large irreversible outlays only when the project appears to be clearly profitable. The dispersion of the underlying commercial value is likely to increase as the length of time increases, while at the same time the present value of the investment cost is lower. Sometimes it may be preferable to continue with the wait-and-see strategy, even though this may require ongoing expenses in market research or further product development.

The level of *interest rates* also may influence the value of a real growth option. For any given project, higher interest rates generally translate into higher required return and a lower market value on immediate investment. But high interest rates also influence the value of a real option if management believes that large investment outlays of the follow-on investment may be postponed. When interest rates increase, this tends to decrease the present value of the follow-on investment outlay. A strategy that encompasses low immediate investments and large growth opportunities will have a higher value as interest rates increase.
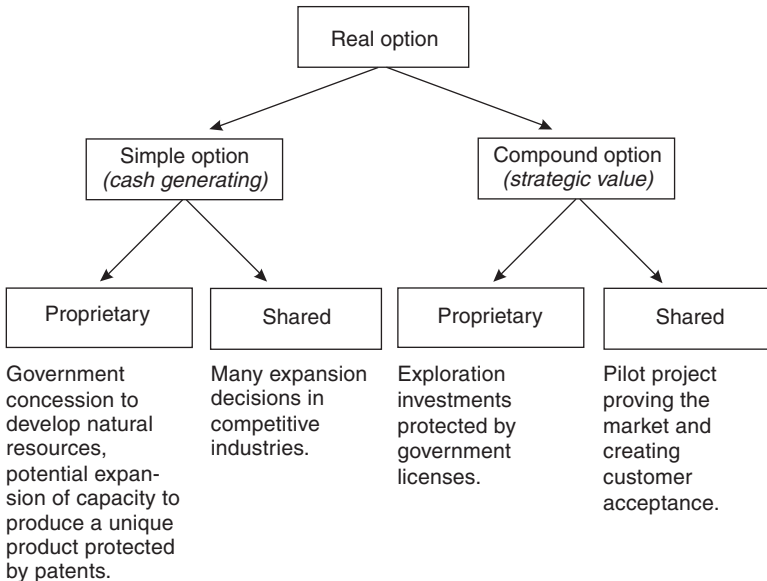
Kester (1984) and Trigeorgis (1988) propose a real-options classification scheme that is motivated by similarities and differences with financial options. Figure 1.5 illustrates a version of this real-options classification that distinguishes between simple and compound options, and proprietary and shared options. To appreciate this, let us distinguish the basic problems managers may face. The first strategic question concerns the value characteristics of the project: Does this business alternative realize its value primarily through direct measurable cash inflows, or does it have a strategic value? Commercial one-stage projects that derive their value from expected cash flows would be classified as simple options. Other projects do not derive their value primarily from cash inflows, but

from strategic value. For instance, a pilot project that might create a new market, R & D, or exploration investments in natural resources may derive their value from future multistage commercial opportunities and are classified as compound options.

The second question that is important to the evaluation process considers the firm's ability to fully appropriate the value of the option for itself. Some investment opportunities provide an exclusive right of when to invest. These options, which are unaffected by competitive initiatives, are classified as proprietary options. A concession to develop natural resources, a patent for developing a product that has no close substitutes, the unique know-how of a technological process, or market conditions that competitors are unable to duplicate for at least some time are just a few examples of such proprietary real options. If, however, competition can influence the timing and value of investment, then the investment opportunity is shared. Shared real options are opportunities that are jointly held by a number of competing firms, or even by an entire industry, and can be exercised by any one of the collective owners.

Figure 1.5 provides some examples of the preceeding option-based classification scheme.

FIGURE 1.5 A CLASSIFICATION FOR REAL GROWTH OPTIONS

Source: Based on Trigeorgis 1988.

1. A production license that gives the right for a specified period to invest in production facilities and produce proven reserves can be classified as a *simple proprietary* option.

2. An exploration license that allows an oil company to invest in exploration wells can be viewed as a *compound proprietary* option. The investment in test and appraisal wells in a petroleum development program, while typically yielding a low return, actually creates an option to invest in subsequent production facilities.

3. Many expansion decisions in competitive industries can be seen as *simple shared* options. Examples of such options include the opportunity to introduce a new product impacted by introduction of close substitutes or to penetrate a new market without barriers to competitive entry. For instance, the introduction of the multimedia compact disk developed by Sony (and Philips) in 1995 faced exogenous competitive erosion from companies like Toshiba, Time Warner, and Matsushita (with the Super-Density Disk). Similarly, Texas Instruments' entry into the digital TV with its digital light-processing technology for high-quality big-screen television, developed over a decade for over $500 million, faced anticipated competitive erosion with substitute products by Sony, Fujitsu, and Sharp.

4. Investment in R & D for the production of a new product with close substitutes can be classified as a *compound shared* option. Research success may lead to commercialization, and potentially follow-on generations of the product (a compound option), all of which may be impacted by introduction of competing products. In consumer electronics, firms like Philips and Sony competed (and cooperated) in the development of technologically innovative products, such as video and CD technology. The development of the CD technology resulted in various new product introductions.

Box 1.3 shows the development of the shared growth options of Amazon.com vis-à-viz competitor Barnes & Noble, and the difficulties observed in financial markets to appropriately value such growth firms.

1.4.3. Drivers of Strategic Value and Strategic Moves

Game theory, also referred to as strategic conflict in the strategic management literature, analyzes the nature of competitive interaction between rival firms. The main focus of game theory is to reveal under which circumstances a firm can influence the behavior and actions of rival firms and thus the market environment. Such moves may include investment in capacity, R & D, and advertising. Players make strategic decisions with an explicit recognition that their actions affect each other, and each indi-

vidual player takes this into account. It is the interaction between firms that makes strategic decisions different from other types of decisions.

Game theory can help structure complex competitive situations and formalize various types of competitive business behavior. The relevance of game theory for strategic management as a tool to analyze strategic decisions depends on the strategic context and in particular on the positions of the rivals. Game theory is most applicable when management can readily ascertain the strategic alternatives in an environment with few rivals that are not too dissimilar.

A game represents a strategic context in which decisions of firms are interdependent. This can be a zero-sum game, or a game for the division of a given economic pie, as well as cooperation or mutual benefit decisions that enhance total value. In the first case, the gain of one firm is the other firm's loss. For instance, in electronics and pharmaceuticals firms enter into patent races to improve their competitive position and their ability to capture the growth opportunities in the industry. Patents and proprietary use of information can prevent the creation of valuable opportunities for competition. Whereas opportunities of common interest or cooperation may increase the total value (positive-sum games), threats of conflict or competition may reduce the total economic pie (negative-sum games). The benefits of firms simultaneously pursuing competition and cooperation, or "co-opetition," are described by Brandenburger and Nalebuff (1995, 1996).

Consider, for instance, the battle over a technology standard in the video recorder market. In the late seventies, the introduction of three types of video recorders resulted in intense rivalry. Philips launched the V2000 system to compete with Sony's Betamax and JVC's VHS system. The war of attrition in video systems resulted in a destruction of value for Philips and Sony. By contrast, in the subsequent development of the CD technology, Philips recognized that the CD player would be a success only if other firms produced compatible or standard CDs and CD players. Philips and Sony's joint agreement on the CD player turned out to be a success, resulting in a range of subsequent growth opportunities.

A strategic move alters a rival's belief or action in a way that is favorable to the pioneer firm and can enhance its value. With a strategic move, such as an early irreversible investment, a threat of a price war or lawsuit, a promise to cooperate, or an announcement of a pathbreaking discovery, a firm may influence the investment behavior of a rival. To be effective, such strategic moves require irreversible or costly commitments. The moves in question will have no effect or credibility if they can be costlessly undone. Contrary to option theory, game theory shows that it is not always preferable to keep options open. A distinguishing feature is that a strategic move may purposefully limit the options of the firm.

Box 1.3 Observed Firm Behavior: Amazon.com vs. Barnes & Noble

The book retail market via the Internet is an example of oligopolistic competition. Amazon.com is by far the pioneer Internet book retailer. Amazon introduced its services on the Internet in 1995. In May 1997 Amazon went public, with a stock price of $18, which rose to over $100 in the summer of 1999. By the spring of 2000, it became (finally) clear to investors that the new economy could not meet the high expectations embedded in their stock prices, and Amazon's stock price made a free fall. The figure at the end of this box shows Amazon's stock price behavior, as well as its Internet competitor BN.com and the traditional Barnes & Noble bookstores until March 2001 (adjusted for stock splits).

The creation of value for Amazon.com results from its strategic position to provide a selection of online products and services (books, music CDs, software). Will Amazon.com be able to preempt growth in this industry and sustain its position as leader in the online book market? Successful strategies attract imitators, and growth opportunities in these markets are likely to be shared with competitors down the road. In May 1997 the leading bookstore chain in the United States, Barnes & Noble, launched an online book service, Barnes & Noble.com (BN.com). The services of BN.com are nearly identical to those of Amazon.com, and its web site closely resembles Amazon's. Barnes & Noble entered the online business with heavy upfront advertising expenditures, and it initiated a high-profile lawsuit against Amazon.com. It also discounted the books it sells online 30% below its bookstore prices.
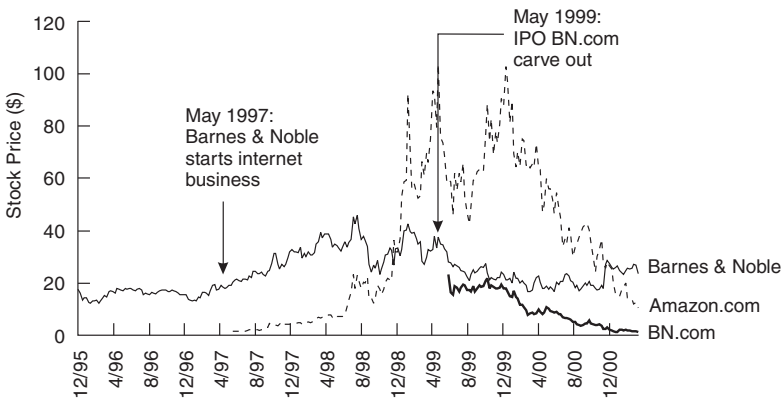
The growth period for e-commerce that lasted until the spring of 2000 is characterized by the increasing value for firms operating in the new economy. The stock price behavior of Amazon.com relative to the traditional Barnes & Noble confirms the high expectation of the Internet firms. However, earnings per share and the value of assets in place were much lower for Internet book retailers such as Amazon.com than for traditional book retailers such as Barnes & Noble. The stock price derived more from its embedded growth options. These firms were competitively priced using relative pricing (multiples); however, their stocks turned out to be overpriced compared to their future growth prospects. The high volatility exhibited by Amazon.com is partly explained by the implicit leverage of its embedded growth options. The prospective nature of growth opportunities (amplified by leverage) makes these stocks highly sensitive to the prospects of the overall economy or to factors that are idiosyncratic to the firm. Amazon.com stock price declined heavily with the rest of the new economy in 2000 as losses increased and the U.S.

continued . . .

Box 1.3 continued

economy slowed down. The same happened to BN.com, while the
traditional Barnes & Noble remained more stable.

After the adjustment of the growth expectations in financial mar-
kets, e-commerce is still a rapidly evolving industry, and the playing
field is changing. Thousands of companies are developing capabilities
in this area. One may wonder whether Amazon.com will be able to
sustain its position as leading Internet book provider. Depending on the
development of this market via the Internet, there probably is room for
more than one competitor. Amazon.com was still about eight times
larger than BN.com. The gross turnover of Amazon.com was $148
million in 1997 and increased to $1,640 million in 1999. However, this
growth was accompanied by increasing losses from $31 million in
1997 to $720 million in 1999. BN.com turnover was $62 million in
1998 and $203 million in 1999 with a loss of $17 million and $21 mil-
lion respectively. Increased competition may trigger a war of attrition,
and firms may have to fight to gain a position in this growth market.

Source: Based partly on Besanko, Dranove and Shanley 2000.

Commitment to a certain action has strategic value that can sometimes
be turned into an advantage. If rivals know you do not have the freedom
to capitulate, you may prevent a war.

The order of the play or of strategic moves determines the interactions
of the decisions. To seize the advantage in a game, one can take initiative by
being the first mover, or alternatively use a response rule. Opponents who
fail to cooperate may be threatened, or promises can be made in order to
alter their investment strategy. In effect, a response rule can also change the

order of the play. Dixit and Nalebuff (1991) distinguish between unconditional strategic moves and conditional moves (see figure 1.6 for a classification of strategic moves). An unconditional move is a response rule in which the firm moves first and the action is predetermined. For instance, preemptive development of a technology protected by patents is an unconditional strategic move. With a conditional move, a firm potentially limits or conditions its own actions by specifying a rule for how to react under different circumstances, for instance, a threat to respond with a price war if a rival should lower its prices. Both strategic moves are described below.
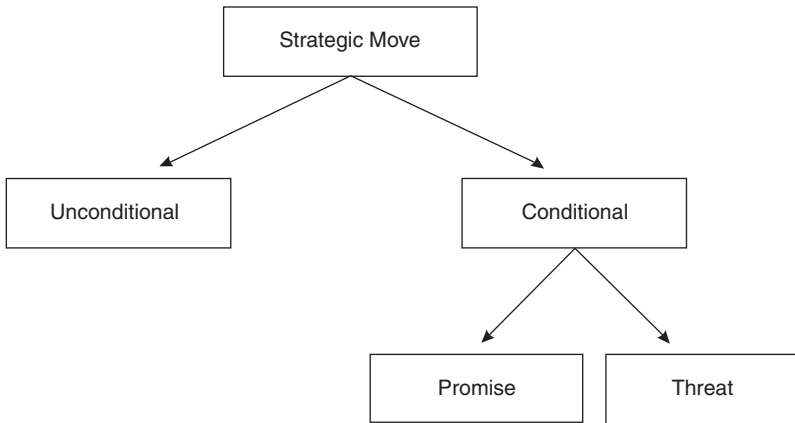
Unconditional investment moves. Precommitment to invest may provide an opportunity to advantageously influence competitive behavior. Investment commitment can be viewed as an unconditional move with a credible intent to alter the rival's response. Consider a pioneer firm that moves first with an early large-scale investment in a new geographic market. Competitors may view this strategic investment as a threat to their future profit base in this market, and may choose to stay out altogether or enter later at a reduced scale to avoid a battle over market share. By reducing the likelihood of competitive intrusion, this strategic investment can lead to higher long-term profits for the pioneer firm. This type of investment entails "commitment value" for the pioneer by virtue of influencing the investment decisions of competitors (e.g., see Dixit 1979, 1980).

Although early commitment kills the option value to invest later, it can make the firm better off strategically. The inability to retreat from the market alters the beliefs about the intensity of potential competition and future profitability in the market. As noted, for a credible commitment, a competitive move must be costly or impossible to reverse. An important aspect of credibility in strategic moves is the irreversible nature of investment. Investment projects are often irreversible or "sunk," that is, once the investment is made, the project cannot be undone and the expenditures cannot be recovered. This inflexibility signals commitment to pursue the chosen strategy to the very end. If a competitor is forced to react in a favorable way for the firm, then this inflexibility can have significant commitment value.

Conditional investment moves. Alternatively, a firm can adopt a conditional response rule to influence competitive behavior. With a conditional response rule, the firm moves second, following the rule. Firms can use threats or promises to influence a rival's strategy.

A *threat* is a response rule by which a firm threatens to punish rivals if they take actions that work against its interest. When Microsoft announced its entry into mainframes in 1997, incumbents such as IBM threatened a battle over market share. Both sides may suffer if a threat is carried out.

FIGURE 1.6 A CLASSIFICATION OF STRATEGIC MOVES

Source: Based on Dixit and Nalebuff 1991.

A *promise* is a response rule by which a firm rewards others if they take actions that work in its interest. For instance, in the development of CD technology, Philips recognized that its player would be a success only if other firms produced CDs and CD players. Philips and Sony exchanged licenses to acquire a product standard for the CD player and promised to coordinate in future product developments.

Since anyone can make threats or promises, they are not always credible. Response rules have no effect if they can be undone without cost. Establishing credibility means that you cannot readily reverse your move, and that you keep your promises and execute your threats. Several authors have emphasized that reputation may establish credibility (e.g., Ghemawat 1991; Dixit and Nalebuff 1991). Confrontation between rivals is properly seen as a repeated game, and firms establish a reputation by being consistent in their actions over time. Procter and Gamble has built a reputation for responding aggressively through its hard-fought battles in disposable diapers, household detergents, and toothpaste. This reputation may deter competitors that want to enter the market with similar products.

An alternative approach is via contracts. Firms may agree to cooperate with standardization agreements. Philips made cooperative standardization contracts with Sony in CD technology, and later with Time Warner in the development of the DVD, over the design of a single common standard. These contracts helped establish the credibility of the promise that both firms would cooperate in technology and produce the same standard, avoiding a war of attrition with different technologies.

Table 1.2
Value Determinants, Strategies, and Real Options

Value Driver	Strategy
Differentiation with unique, innovative products	*Aim:* The value creation is based on achieving proprietary knowledge, coupled with a marketing program for customer acceptance. *Important in:* Industries involving innovative or unique products, e.g., pharmaceutical industry, information technology, and electronics.
Leverage of reputation	*Aim:* Strategy aimed at creating a leading position in quality or service, differentiating the product from competitors. *Important in:* Industries with large brand-name capital, e.g., soft drinks or cigarette industry. The platform company should be a respected company to beome a successful foothold for future growth opportunities.
Cost advantage based on economies of scope	*Aim:* Expansion is aimed at gaining cost advantages associated with producing and selling multiple products related by a common technology, product facilities or network. *Important in:* Industries where a cost advantage exists when the same investment can support multiple profitable activities at different locations.
Building up of scale	*Aim:* The key toward competitive advantage here is building size in a fragmented market. The strategy is aimed at market leadership with an investment and pricing policy that fully exploits economies of scale in the firm's functions. *Important in:* Fragmented industries with large fixed investments in R & D or production, banking, automobiles, oil.
Absolute cost advantage	*Aim:* Expansion is aimed at achieving the lowest delivered cost position in the industry, especially if cost reduction can be made proprietary to the firm. *Important in:* Industries where proprietary knowledge, a learning cost effect, efficient supply, or favorable locations result in a cost advantage, e.g., natural resource industries.

Option Game Interactions	
Portfolio of Options	**Strategic Moves**
The strategy encompasses a portfolio mix of compound options, e.g., R & D followed by prototyping pilot projects in new markets. High technical uncertainty over success of R & D, due to implicit leverage, coupled with high commercial uncertainty and strategic uncertainty over product acceptance. Adaptive capabilities enhance the value of flexibility.	Commitment effect of first-mover advantages due to, e.g., patents, buyer switching costs, and network externalities. When the product has a network externality, an early mover that made more sales than its competitors in early periods develops a larger installed base. However, increased technological intensity coupled with shorter life cycles makes preventing early imitation increasingly difficult. In many cases the costs of imitation have become lower than the cost of innovation.
Strategic/ goodwill investments in advertising and marketing generate future expansion options. Low technological and commercial uncertainty.	Commitment effect may depend on position of the firm and competitive reaction. Reputation and buyer choice under uncertainty may also be isolating mechanisms for the early mover. If buyers have imperfect information regarding product quality, they may hold on to the first brand that performs satisfactorily. Threat of reciprocating reactions: advertising may result in more advertising and price competition may make everybody worse off.
Options that allow switching between different technologies or products and leverage of competences onto a broad geographical or financial base. For instance, R & D generating compound options resulting from critical technologies that cut across businesses. Various simple, commercial options over a broad product line.	An advantaged strategic position results from resources that can be used in several products. As a result, a given resource position will often have consequences for several products, each yielding part of the resulting return.
Infrastructure investments that generate options to expand more quickly than competitors. This resource position enables the firm to preempt expansion opportunities in the market.	Value of early commitment is present when the minimum efficient scale is large relative to the market size and a limited number of firms can fit in the market without creating overcapacity. Capacity games often involve contrarian reactions. Late movers would be reluctant to pay for the resource since they would be faced with higher cost or might face the threat of price competition due to excess capacity.
Early exercise of options may generate a cost advantage or experience curve effects. For instance, acquisition of favorable locations or exploration investments in the petroleum industry to acquire favorable areas at low cost.	Early commitment of capital (exercise of real option) to acquire a cost advantage or experience effect. Capitalizing on expansion opportunities in case of experience effects depends on the ability of the firm to keep experience effects proprietary. When experience effects are proprietary, later resource producers will face an uphill battle with earlier producers who have lower costs. Later acquirers would thus face less valuable expansion opportunities.

1.5. Value Creation in Strategic Planning

Value creation suggests that the investment strategy should be focused explicitly on the relevant value drivers. Table 1.2 provides a summary of the value drivers, resources, and real options that can help build a strategic position. The two columns on the left show that a value-creating strategy depends on opportunities or market imperfections in the external environment. For instance, in one market a market-leader strategy may be successful because economies of scale are present, while in another market an innovative strategy may be successful if differentiation and technological innovation are critical to success. Each strategy encompasses a set of specific operational decisions in addition to investment decisions in resources. The cost-leader strategy, for example, would accompany a low product-price policy to enable a firm to quickly expand its market share, the construction of facilities of efficient scale, and investment in cost-reducing production (Shapiro 1991, chap. 10).

The resource position of the firm is essential not only for supporting competitive advantage underlying the net present value component, but also for creating valuable growth options (table 1.2, third column), and helping win the competitive game to appropriate these opportunities via strategic moves (fourth column). For example, if a firm wants to build a learning cost advantage, it must enlarge cumulative production volume more rapidly than its competitors. When it executes first the experience curve strategy, later resource producers will be in a disadvantaged position in exercising their expansion options. Such entry should be assessed on the basis of its ability to create proprietary future opportunities and to rapidly expand production. The strategic aspects of early commitment are critical in the valuation of growth options, particularly if the learning effects can be made proprietary to the firm. Competitors may view such investment as an erosion of their potential profit base in the market and stay out or enter later at reduced scale.

Firms scan the environment for resources that fit well with the assets they have in place and for which they are likely to face only a few competitors. Proper strategy design requires careful consideration of strategic investments that will build competitive advantage and successful commercial projects. Multistage (compound) options have strategic value in that they create or enhance the value of subsequent commercial options. The benefits of later commercialization that may be made possible by a strategic investment must be properly captured by determining the value of the overall strategy. Each project in a strategic investment program can be viewed as a necessary link in creating future commercial opportunities, and should therefore be analyzed with option valuation techniques. Compound options, such as R & D, pilot projects in a new market, or an

up-front goodwill investment, create a resource barrier and a competitive advantage that builds a defense against potential entrants. Patents, proprietary technologies, reputation, and brand-name capital are resources that enhance the value of commercialization options. In general, the more proprietary the strategic benefits of the growth option, the more the option enlarges competitive advantage when investing in a subsequent simple option, and the more valuable the strategy will be.

In designing and valuing a strategic investment program, we must be careful to recognize competitive interactions. When the benefits of the pioneer's growth options are proprietary, later entrants would expect lower value for their expansion opportunities. But when the benefits are shared, the effect is to reduce the costs for later entrants, as in the case of an unpatented innovation for which no sustainable first-mover advantage exists. This is the case with many production systems and procedures. Innovative investments are critically dependent on the ability of the innovative firm to appropriate the resulting benefits. When these benefits are proprietary, a technological lead enables the firm to capitalize on valuable follow-on options later. It also enables the firm to retain better people in a more stimulating setting so that the organization can cultivate more advanced ideas than its followers. But when the results are shared or can be easily replicated by followers, imitation may be easier than the original invention.

1.6. Conclusions

The valuation tools from corporate finance need to be integrated with the ideas and principles from the fields of strategic management and industrial organization to develop strategic investment tools that can better capture the full value creation observed in financial markets. This chapter takes a first step toward bridging the gap between traditional corporate finance and strategic planning. The focal point here is the value creation of the firm in financial markets. Total value is made up of a static NPV component that derives from assets that are already in place, and a dynamic component consisting of flexibility and strategic value. For many stocks, a significant proportion of firm value is generated by the expectation of future opportunities and exploitation of future competencies. Strategic decisions must be made and adjusted throughout the process of creating business value. The embedded growth option value depends on the capability of management to identify and flexibly exploit available options. Flexibility in decision making is necessary for successfully responding to technological and competitive challenges. Project value drivers can be viewed as an interface between the quantitative project valuation obtained via corporate finance evaluation tools and the qualitative process of strategic planning.

The investment decision should thus be based on an *expanded* or *strategic* NPV criterion that incorporates not only the direct NPV of measurable cash flows but also the flexibility and the strategic commitment value components. The dynamic risk characteristics of growth opportunities may be more difficult to capture than the standard valuation methodology (NPV) would have us believe. The growth option component reflects the value of possible future investment (or divestment) opportunities and differs, by nature, from standard DCF value. The entrepreneurial side of strategy — how opportunities are created and protected — is largely ignored by standard analysis. We need to build a more dynamic view of the business enterprise and develop an acceptable descriptive theory of strategic planning that can assist practitioners in the development of long-run competitive advantage and strategic adaptability. The combined options and games perspective proposed herein is particularly relevant for innovative oligopolistic industries (e.g., pharmaceuticals or consumer electronics) facing high innovation costs in multiple stages in a technologically uncertain and competitive setting.

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