

Voluntary Disclosure of Real Options: When and How

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Abstract

It is fundamental to good governance that corporate decision makers be well informed, have the knowledge-base necessary to use the information effectively, and share the same motivations as the owners. Further, managers must provide owners with accurate, timely, and complete disclosure of the company's positions. Regarding the first part of the problem, value based incentive systems have been under development in order to aid in resolving conflicts of interest between owners who lack the specific information (or the background knowledge to utilize it) and the managers who act as their agents. Such systems often focus exclusively upon cash flows relative to resource investment; yet, share values are often substantially greater than the amount that could be explained by expected cash flows from existing operations. Indeed, in some firms the majority of share value may derive from growth opportunities or other real options that add flexibility or reduce risk. So, value based incentive systems could be improved by explicitly rewarding actions that create or enhance the firm's real options. Further, satisfactory disclosure requires that accounting reports include adequate information about the firm's real options, with market-based mechanisms for defining the necessary information and calling it into the appropriate arena.

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1. Introduction

The accounting profession worldwide has been wrestling with the problem of disclosing information about the value of intangible assets. This problem is particularly evident in the case of young companies in emerging markets; but can appear across a wide spectrum of firms, even utilities struggling through process of deregulation. Professional accounting organizations, in the United States as well as the United Kingdom and several European nations, have identified the real options approach as a promising avenue for resolving the problem. Voluntary disclosure of real options can be made via the Management Discussion and Analysis (MD&A) section of the financial statements.

Voluntary disclosure decisions, in theory, involve balancing conflicting incentives associated with different audiences.¹ By their nature, real options give rise to important trade-offs in managing their disclosure. For instance, value can be added for shareholders because of the presence of an abandonment option that mitigates risk by allowing the firm to abandon an operation if it becomes chronically unprofitable. Disclosing this publicly could bring the benefit of more efficient equity valuation, but the benefit must be balanced with the costs associated with the reaction of employees who also learn about the option and the contingencies under which it would be exercised. Likewise, disclosing information about real options associated with R&D might have the mixed blessing of more efficient equity valuation, offset by loss of competitive advantage due to simultaneous revelation of formerly proprietary information to industry rivals.

In their recent study, Bhojraj, Blacconiere, and D'Souza (2004) present evidence concerning two types of voluntary disclosures by electric power utilities, both of which involve real options. The study includes disclosures about strategies to protect the firm's existing customer base, and plans to exploit emerging opportunities arising from deregulation. The study considers three target audiences: industry regulators, capital market participants, and product market competitors. The study

¹ See Bhojraj, Blacconiere, and D'Souza (2004).

finds a positive association between the extent of disclosure and shareholder value, while product market incentives deter disclosure.

In light of this evidence, one can see a dilemma for management when they make decisions about when, how, and how much to disclose about the firm's real options. Further complicating the problem is that good management incentives should reward managers according to their effectiveness in creating, maintaining, and exercising the firm's real options. The more clearly these management contributions can be captured and recorded, the more pressing the concern about how much to disclose and when.

If managers choose not to disclose, they may still try to signal the presence of hidden value by other means. These efforts may even include attempts to manage the recognition of cash flows in order to stabilize earnings. Such indirect methods for hinting at hidden value can create unintended mischief, and should not be used lightly. So, it is important to find an efficient framework for deciding when, how, and how much to disclose about the firm's real options.

This paper attempts to develop such a framework for making decisions about the voluntary disclosure of information about real options. Section 2 addresses the questions about how to do it. Section 3 addresses management incentives linked with real options (the outcomes of which become the fodder for the report of activities related to the creation, maintenance, and exercise of real options). Section 4 addresses links between real options and shareholder value (which provides the basis for a narrative statement of position).

2. Disclosing Real Options and Related Positions

The purpose of this section is to consider the foundations of accounting standards for disclosing the value of real options a firm possesses. Such standards would help not only with improved market discipline but also with better management incentives. There are at least three major requirements here. First, there must be an audit trail that allows documentation of the value creation process. By extension, it must be possible to establish the provenance of the real options and recognize the various contributions made in their creation, maintenance, and exercise. Third, sources of value associated with real options need to become widely recognized and be reflected in generally accepted accounting standards.

In March 2000, the Institute of Chartered Accountants in England and Wales (ICAEW) published a study on new measures and new markets for intangible assets (see Charles Leadbeater, 2000). After discussing the need for new measures of value (and even new markets) for intangible assets, and the difficulties in developing them, Leadbeater discusses alternative approaches. In describing the most likely path, an incremental approach, Leadbeater postulates that the evolution of accounting procedures would include adoption of “quasi-market valuations yielded by techniques such as real options.” Leadbeater contrasts this incremental approach with a more radical approach that involves devising entirely new balance sheets for companies, such as the intellectual capital report developed by the Swedish insurance company Skandia AFS,² or the intangible asset monitor developed by Swedish management consultant Karl Erik Sweiby. The incremental approach is clearly less tumultuous and more likely to be the path eventually taken.

In April 2001, the Financial Accounting Standards Board (FASB) published a special report on challenges for the new economy. The report identifies the developing literature on real options as “perhaps the most promising area for valuation of intangible assets.”³ Upton goes on to say that real options approaches could be “especially useful in estimating the value of intangible assets that are under development and may not prove to be commercially viable.” Getting to specifics, the report finds that the value of real options would typically be considered in the category of entity-specific value, rather than fair value, because an item needs to be available to any marketplace participant in order to be treated under the category of fair value. When an item is proprietary, its value is entity-specific (which is typically the case with growth options, exit options, flexibility options, learning options, or other real options).

Consider, for example, the disclosure of research and development. Upton (2001) points out that R&D costs are not an asset, but the result of R&D effort is an asset (whether the result is a pharmaceutical, a petrochemical process, or software). The effort in process is also an asset in and of itself. So R&D costs cannot be capitalized; but the goal of transparency would be well served by improved

²For details about the Skandia approach, see Edvinsson and Malone (1997).

³see Wayne S. Upton, Jr.(2001). The quotes are from page 91.

techniques for reporting the value of specific results, or the firm-specific value of broader processes in R&D.

The Financial Accounting Standards Board has recognized the difficulties of reporting derivatives positions even for simple situations involving exchange-traded contracts. Thus FASB established the Derivatives Implementation Group (DIG) in 1998 to develop mechanisms for resolving difficulties in implementing Statement 133, *Accounting for Derivative Instruments and Hedging Activities*. The model for the DIG is the Emerging Issues Task Force, except that the members of the DIG do not vote in order to reach consensus. Apparently there is enough difficulty perceived that the Chair of the group has responsibility for formulating resolutions of the group based upon the debate that occurs during the meetings (individual members are then free to submit formal objections when they so desire).

Given the difficulties of implementing Statements 133 and its amendments, it may take some time to implement accounting standards for dealing with real options. The FASB Steering Committee Report (2001) however, offers insights into better use of the Management Discussion And Analysis section as an outlet for voluntary disclosure of information that would help the investment community incorporate real options considerations into the process of evaluating a firm's securities. The method of disclosure is not quantitative, but uses a prose narrative to describe the firm's position with regard the various real options it possesses, supplemented by a discussion of the results of activities associated with creating, maintaining, and exercising its real options.

2.1 Management's Discussion and Analysis of of Financial Conditions and Results of Operations (MD&A)

It is not necessary to wait for the evolution of quantitative accounting practices to catch up with the analysis that already takes place in the capital markets. Right now, management and their advisors can improve the transparency of their financial disclosures by discussing the firm's real options and virtual options in Management's Discussion and Analysis of Financial Conditions and Results of Operations (MD&A). The MD&A is a plain language narrative of the state of the company through the eyes of management. Of course, timely updates also can be provided in press releases or analyst calls (and current disclosure rules require that any material knowledge

provided to analysts or major investors must simultaneously be disclosed to the public).

Familiar financial statements can serve as a model for constructing the narrative. First, the “balance sheet” would offer a narrative description of the growth options, abandonment options, and other real options management chooses to disclose. The nature of each one being considered for inclusion should provide ready insights into the impact disclosure would have on the various audiences who would receive the information (for example, employees might react negatively to the revelation of abandonment options management contemplates exercising). Yet in many cases the benefits from more efficient equity valuation could outweigh the costs associated with full disclosure.

Once the decisions have been made about which real options to disclose, the next step is to report the activities that have surrounded these options during the reporting period (providing answers to questions about how the new real options were created, how existing ones were enhanced, and which real options were exercised). Such information could provide capital market participants with insights into the prospect that beneficial activity might continue in the future.

In its December 2003 interpretation,⁴ the U.S. Securities and Exchange Commission (SEC) identifies MD&A as one of the most important elements necessary for understanding a firm’s performance and future prospects. This SEC guidance says that MD&A should clearly reveal the most important matters of executive focus in the firm—one of the principal objectives of MD&A is to offer a view of the company through the eyes of management. MD&A should focus on the primary drivers of cash flow and value, including such non-financial data as industry-wide metrics and generic value drivers. The SEC guidance urges a balanced view of the underlying dynamics of the business, including discussion of failures as well as successes. So, the MD&A should articulate a high level of understanding about the firm that will be discussed more fully in Section 3 as central for effective incentive systems (top management should first of all understand the firm intimately, then translate that understanding into incentives, and finally articulate that understanding for disclosure to the investors).

⁴ U.S. Securities and Exchange Commission, *Interpretation: Commission Guidance Regarding Management’s Discussion and Analysis of Financial Condition and Results of Operations*, 12/29/2003.

SEC guidance says that disclosure of trends, demands, commitments, events, and uncertainties should involve consideration of all financial, operational, and related information known to the company; in order to identify trends and uncertainties that are likely to have material impact on the company's liquidity, capital resources, or cash flow. This guidance identifies information about the quality and potential variability of cash flows as a principal objective of MD&A. In fact, material forward-looking information about known trends and uncertainties is required to be disclosed as part of the MD&A.⁵ One sees the underpinnings of option analysis at every turn of the page while reading this guidance, in the repeated advice to disclose the sources of uncertainty and the mechanisms that have been applied to hedge adverse impacts that might arise.

The SEC guidance also points to the MD&A as the place to discuss the reasons behind any charges taken for restructuring or impairment, or any decline in performance of a particular facility or business unit. Possible points of discussion suggested in the guidance include inability to realize projected economies of scale, failure to renew or secure key contracts, or difficulties caused by aging equipment. For someone whose ears are tuned to real options, these issues sound like the stuff of a discussion about optimal exercise of abandonment options.

SEC guidance urges that MD&A should identify and discuss key performance indicators, non-financial as well as financial, that management uses to run the business (and that could be material for investors). This explicitly includes disclosure of known trends, events, demands, commitments and uncertainties that are likely to have material effect on financial condition or operating performance. Topics to be addressed include trading activities involving non-exchange-traded contracts accounted for at fair value, and relationships and transactions with persons or entities that derive benefits from their non-independent relationships with the company or its related parties (to the options-minded, this suggests a listing of options arising from collaborative advantage). New rules adopted in January 2003 require disclosure of off-balance-sheet arrangements in a designated section of MD&A with an overview of known contractual obligations in tabular format.

⁵ See 1989 SEC Release, Part III.B.

2.2 What to Disclose and How to Disclose It

In reporting the value of any option—be it an exchange-traded derivative, a real option, or a virtual option—the list must cover first, clear identification of the underlying assets and the stochastic processes that generate their values. Next is a clear description of the relationship among the underlying assets involved in the option (for example, the ratio of the current price of the input relative to the current price of the output in the case of an option to exchange one asset for another). Then, one needs an estimate of the length of time available for the option to be exercised. In the case of real options this may be a matter of physical limitations, but often comes down to estimating how long it will take before the option becomes available to competitors. When hedges are involved, the effectiveness of the hedge must be assessed.

The present difficulty is that accountants are paid by the firms they audit rather than directly by the company's owners (as was once the case many years ago). Perhaps in the future the board of directors might turn over the audit budget to the shareholders and allow them to purchase the information they want. Until such a situation can be reached, perhaps a workable compromise would be to open the company's managerial accounts as much as possible on the worldwide web (with only the proprietary secrets shielded to avoid compromising competitive advantage). Then a "refreshing wind" would blow through the accounting profession just as it has through the profession of journalism, by greatly easing the barriers to entry for new information providers.

3. Incorporating Real Options into Management Incentives

How can investors motivate autonomous, self-interested, self-organizing, somewhat-coordinated, intelligent agents so that they focus their various skills on the common goal of maximizing value?⁶ The reward system needs to be focused on outcomes that are within each individual decision-maker's range of control (a primary criticism of incentives based on the market value of stock is that much of the outcome

⁶ Kohler and Gumerman (2000) provide a robust discussion of the factors involved in organizing a group of people (or related primates) to coordinate their actions efficiently in pursuit of a common goal. Ferber (1999) offers a companion discussion of multi-agent systems utilizing artificial agents in a computer environment.

is beyond the individual's control). In the words of Warren Buffet, "Delivery of carrots should be tied directly to results in the area that a manager controls."⁷

So, building effective incentive systems requires deep insight into the value drivers for the business entity as a whole, combined with thorough understanding of how the critical factors are distributed among the firm's various decision-makers. Besides rewarding positive contributions, there should also be suitable consequences for missed opportunities or other negative actions—lest management leave undone what it should have done, and do what it should not do—all hedged against the vagaries of factors beyond management control.

If top management is to make the effort of finding this insight and understanding, investors must learn better ways to motivate them toward the goal of shareholder wealth maximization that include not just reward for increase, but suitable consequences for missed opportunities.

In the language of asset pricing models the focus is on unsystematic risk (because the range of management control does not include systematic events). The objective is to motivate managers toward increasing the frequency and size of positive firm-specific events, while decreasing the frequency and size of negative firm-specific events. Moreover, if expectation of this outcome becomes established in the marketplace, there would be an immediate upward price adjustment (accompanied by restoration of randomness in the unique events).⁸

Obviously, asset pricing models depend on information made available to the public. In the language of corporate valuation models, the discussion in Section 2 above argues that material information is currently omitted from financial statements about the value of assets-in-place versus growth opportunities. While publicly available information is being impounded into market prices by investors (semi-strong form efficiency), internal decision processes that include real options components are not providing tailored feedback to the investment community for use in external valuation models that include real options components. The current practice of not reporting information about real options requires substantial investor processing of piecemeal revelations in order to determine simple facts that could readily be

⁷Quoted from: "Rare Advice," *Wall Street Journal*, November 14, 2003, p.A1.

⁸Further then, if an incentive system becomes "proven" then the announcement of its implementation could be a positive event. We are building a database for potential use in a future event study of the

disclosed via accounting statements. Disclosing real options information should improve internal decisions, and may lower the cost of capital (by resolving uncertainty).

At first impression, the task of creating effective incentives seems daunting; but closer examination reveals some straightforward handles that are available from the work that has been done with real options. Additionally, these links between management action and shareholder value offer potentially significant improvements in corporate governance and accounting standards. The authors focus on such incentives in an earlier paper, and important excerpts from it are included in the Appendix of this paper.⁹

4. Real Option Links with Share Value

The focus of value-based management incentive systems is to reward corporate employees for doing things that enhance share value, while discouraging them from overlooking opportunities or doing other things that reduce share value. It is the results of these activities that would be disclosed in the financial statements. The better one can understand what drives the value of a particular stock, the better these systems can be designed. Let us start with the definition of a security given by the U.S. Supreme Court:

[A security is] a contract, transaction, or scheme whereby a person invests his money in a common enterprise and is led to expect profits solely from the efforts of the promoter or third party.¹⁰

This is an interesting perspective, because it shifts the emphasis to function rather than form. Any sort of contractual agreement, transaction, or even an informal arrangement could qualify under this definition. The focus is on the nature of the activity and the expectations of the participants. One of the key points is that the arrangement involves a “common enterprise”—in other words, a team effort that requires cooperation among a group of players. Another key point is that the investors are not directly involved in the team effort, but instead anticipate profits solely from other peoples’ efforts. Indeed, limited liability for stockholders derives from the autonomous nature of corporate management (separation of ownership from

stock price response to announced implementation of incentive systems with substantial real options content.

⁹ See Chen, Conover, and Kensinger (2004).

control). Moreover, individual team members are legally responsible for their own actions, so have some autonomy too. So the autonomous team consists of self-interested, self-organizing, somewhat-coordinated, intelligent agents who are supposed to produce profits for the investors. In order for this to work, they must be able, well-motivated, and accountable.

Thus there are several essential elements of valuation that must be considered in identifying value drivers for a company's stock. First are the physical assets the company owns, and the cash flows derived from them. Value-based management systems may focus exclusively upon cash flows relative to resource value. Yet, share values are often substantially greater than the amount that could be justified by expected cash flows from existing operations. Woolridge (1995) presents evidence that more than half the value of a stock is typically based upon something else besides the next five years' expected earnings. The present value of growth opportunities, other real options, or something such as the hope of receiving a premium price in an acquisition, therefore typically accounts for the majority of share value (these option-based value drivers are summarized in Exhibit 2).

Besides growth opportunities, other real options may enhance value by reducing risk or adding flexibility. For example, abandonment options provide the possibility of recovering capital if a particular venture is not as successful as originally expected. Risk can also be reduced by options to suspend operations when conditions deteriorate and then resume when conditions improve. Real options may also enhance opportunity. For example, options to pick the most lucrative among several different activities enhance potential profitability. Value based incentive systems could be improved if they explicitly reward management actions that create or enhance the real options for the firm.

¹⁰ S.E.C. v. W.J. Howey Co., 328 U.S. 293, 298, 299 (1946).

Exhibit 2: Option-Based Value Drivers

- **Create new opportunities**
 - **Enhance existing opportunities**
 - ◆ **Underlying asset**
 - ◆ **Exercise terms**
 - ◆ **Volatility**
 - ◆ **Time**
 - **Increase Flexibility**
 - ◆ **Options to choose low-cost input mix**
 - ◆ **Options to shift toward highest-valued output mix**
 - ◆ **Timing options**
 - ◆ **Exit options**
 - **Enhance Capabilities**
 - **Enhance Collaborative Advantage**
 - **Virtual options in human resources**
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Since investors depend for their profits upon the efforts of the company team, the firm's human capital is another source of value—the team must have the knowledge and capabilities necessary to succeed, and be willing to share the fruits of success with the investors. Specifically, we must focus upon the organizational capital and the incentive structures. Organizational capital consists of the value derived from human capital that remains with the organization even if key individuals depart (examples are proprietary knowledge recorded in corporate databases, organizational reputation, or group culture).¹¹ The incentive structure is critically important because it influences the likelihood of success and the way the fruits of success are distributed.

Some of the aspects of organizational capital can be analyzed as virtual options. These involve choices in which the underlying assets are information items. For example, gathering data about geological formations provides the option to expend human capital resources in order to create databases of potential oil-bearing strata (and building the databases provides options to formulate drilling strategies).

¹¹ See Tomer (1987), p. 2.

Often the value of human capital is in the options provided for utilizing information as it arrives later.¹²

Finally, value is determined not only by the perception of competitive advantage, but also by the prospect for it to be sustainable. Such an advantage provides economic rents from established operations, plus options to expand into new activities. A strong advantage with a short expected life may be less valuable than a moderate advantage with a long life.

4.1. Find investment opportunities that beat the market

Of the five proven ways to increase share value, only the first is unambiguously enjoyable for managers. This is to expand in areas of competitive advantage. McConnell and Muscarella (1985) first developed evidence on this point. They show that on average, shareholder wealth increases upon announcement of investments such as research & development or new plant and equipment (and vice versa, shareholder wealth tends to decrease with declines in such spending). Jerrel, Lehn & Marr (1985) also show that spending for R&D is associated with increased share value.

Chan, Martin, and Kensinger (1990) refined the evidence concerning R&D spending, showing that announcements of increases in R&D spending from prior levels is associated with share price increases for high-tech companies, while such announcements tended to be neutral or negative for low-tech companies. This suggests that the capital market is discriminating in its response to capital expenditures. Increased R&D spending makes sense in an arena of advancing technology where such spending could add value. Similar spending in mature or declining technologies, however, is not appreciated.

Clearly, incentive plans should provide appropriate rewards for innovation (something often lacking in cash-flow based systems). The value-based incentive system at 3M Corporation provides a positive example of how incentives can be structured to reward innovation. There, business unit heads are rewarded for the proportion of revenues derived from new products (less than five years old). Clearly this encourages innovation, and there is an underlying connection to real options.

¹² For a discussion of virtual options, see Chen, Conover, and Kensinger (2001).

Chen, Conover, and Kensinger (1998) describe how this real option based incentive works in the case where the firm's operation provides the option to convert input commodities into output goods (with the option exercised when the value of output exceeds the cost of input). The more volatile each commodity's price, and the lower the correlation between their prices, the more volatile the ratio of the value of the underlying asset relative to the exercise price. Therefore, the highest NPVs are to be found in the case of systems which can convert one volatile commodity into another volatile one, for commodities whose price changes have a low correlation. If there were a great many companies operating such systems, competition among them would tend to keep the spread from fluctuating widely, and output prices would be highly correlated with the input prices. A low correlation would be associated with a situation in which competition is not intense. Hence an incentive system that rewards innovation provides a "handle" on the variables that affect the value of real options.

Besides creating new real options, management should be encouraged to fully exploit existing real options. Option pricing theory points to a few key variables that drive value. The ones most likely to be affected by management action (or inaction) are these: call option values increase with decreases in the exercise price, increases in the time to option expiration, and increases in the volatility of the ratio of the value of the underlying asset relative to the exercise price. In order for a value based incentive system to encourage the desired action, the system must reflect the nature of growth options present for the firm in order to reward action and discourage inaction. Because a small change in one of these key variables could result in a large change in value for the firm's real options, the incentive system needs to respond in the correct proportion.

When exercise price is variable, for example, volatility is enhanced if management finds ways to reduce the linkage between the cost of exercise and the value of the underlying asset. Consider a simplified illustration involving an operation that converts an input good into an output good. This could be represented as a package of options with different expirations, each providing the choice to convert input into output at a given time. With active management throughout the operation's life, the choice can be made to shut down in any period when there would be a loss because the value of the output is less than the input. With the values of the input and output goods fluctuating at random, the spread between them is free to widen as well as shrink. The existence of discretion allows management to take

whatever profit opportunities arise when the spread is wide, but cut off losses that would occur when the spread becomes negative. The more volatile the spread, the greater are the possible profits (since losses are limited, however, the increased upside potential is not offset on the downside).¹³ Whenever management has power to influence the linkage between the value of input and output goods, or has discretion in choosing the inputs or outputs, there is an opportunity to reward appropriate management behavior.

4.1.1. Find better business unit strategies than anyone expected you would

There are two factors that contribute to the difficulty of this path. First is the problem of gaining sustainable competitive advantage. Second, the efficiency of the capital market makes the problem of gaining exceptional returns for shareholders even more difficult for management. Given efficient capital markets in which all publicly available information is reflected in stock prices, management must do better than expected in order to realize abnormal gains in shareholder wealth.¹⁴

Trigeorgis (1996) and Amram and Kulatilaka (1999) provide detailed discussions of the linkage between strategy and real options. Triantis and Hodder (1990) provide rigorous methodology for measuring the value of flexibility, and their models provide the keys for linking management incentives with strategic options.¹⁵ The emphasis is upon value creation through gaining and enhancing flexibility. Positive NPV results from improved resource allocation through cooperation—or through innovation. There would be no positive NPV if many individuals could accomplish the same actions on their own, however (in order to create positive NPV opportunities, managers must do something that stockholders cannot do by themselves).

Michael Porter (1985) provides the classic translation of economic theory into coherent business strategy. In order to gain positive net present value, management must establish sustainable competitive advantage based upon the ability to produce goods or services at lower cost than their competition, or successfully differentiate their product so customers are willing to pay premium prices. This route involves

¹³ See Chen, Conover, and Kensinger (1998).

¹⁴ See Keane (1990) for a complete discussion of this point.

¹⁵ Here again, the linkages are via volatility, exercise price, and time to expiration (see discussion above).

striving to be the most efficient in the world or the best in the world, obviously challenging tasks.

When any business is able to earn economic rents, competitive threats are sure to develop. Threats may come from new entrants, or enhanced capabilities developed by existing industry rivals. In order to succeed in creating value, management must command the means to counter threats from either of these sources. Yet, threats may also arise from customers who decide to integrate backward and become their own suppliers, or learn to adopt less costly substitutes. Another source of threat against sustainable competitive advantage lies in the company's suppliers. If they have power over the sources of essential inputs, they will demand higher prices (labor unions are an example, with wage and benefit increases demanded whenever profits increase).

Finding opportunities that provide a competitive advantage is difficult enough; but developing means to protect it for sustainability further complicates the challenge. There is another challenge for management, though, in the efficiency of the capital market.

4.1.2. Winning isn't enough; you have to beat the point spread

It is not enough just to expand in the areas of competitive advantage. One must do more than expected. Keane (1990) develops this point in a thorough and entertaining manner. When the capital market is efficient, management must bring surprises to the public in order to gain abnormal returns for shareholders. Just in order to maintain average returns, management must accomplish what is expected of them—not to meet expectations would result in price decline. In order to coax a significant price increase, management must deliver even more than investors have predicted. Only a positive surprise will make the price rise more than the normal drift that is built into security prices.

So, it is not enough to win the game, one must “beat the point spread” and win by a greater margin than the market expected. (Even poor performance on the playing field could result in positive abnormal returns for shareholders, provided the performance wasn't as bad as expected.)

4.2. Be acquired by another company

Sellers generally do better than buyers in mergers and acquisitions. Franks, Harris, and Titman (1991) studied 399 acquisitions by large U.S. firms in the 1970s

and 1980s, finding that the shareholders of acquired firms received an average post-announcement premium of 28% above market value prior to the announcement. Indeed, Petty, Martin, and Kensinger (1999) find that venture capitalists consider being acquired as the most favored method of harvesting portfolio companies. The “strategic” premiums available through being acquired provide a far superior payoff than initial public offerings or other methods of harvest.

The flip side is that managers should avoid buying other firms. Franks, Harris, and Titman (1991) report an average decline of 1% for shareholders of acquiring firms associated with the announcement of intended acquisition.

What is good for shareholders, though, can be distasteful to management. Being acquired can lead to loss of position, income, and prestige.¹⁶ Even worse for the founder of a business, Petty, Martin, and Kensinger (1999) report that the acquisition can lead to loss of something that was previously the center of existence. Thus it is not enough to reward managers for creating the opportunities to be acquired. Incentives must encourage optimal exercise as well.

4.3. Spin off any divisions that can stand alone

Several researchers have independently verified that spinning off divisions enhances shareholder wealth, and that spin-offs enhance value much better than sell-offs in which corporate management retains control of the cash from the sale.¹⁷ There are several financial considerations involved. First, in the U.S. spin-offs are not taxed when shareholders in the parent company receive at least 80 percent of the shares in the new company. Additionally, the spin-off provides a wider array of choices from which investors can pick (that is, the spin-off makes the capital market more complete). Spin-offs also allow managers of the parent company to focus better on the firm’s primary activities, with incentives clearly focused on the performance of the core business. Finally, spin-offs assure investors that profits from a strong part of the company will not be siphoned to support an ailing part.

The benefits are not confined to financial considerations. The parts tend to work better separately than they did together. Cusatis, Miles, and Woolridge (1994)

¹⁶ Martin and McConnell (1991) find that the chief executive officer is four times more likely to be replaced in the year after a takeover than during earlier years.

¹⁷ See Hite and Owers (1983), Miles and Rosenfeld (1983), Schipper and Smith (1983), and Linn and Roseff (1985).

report improved operating performance for companies that have been spun off. One important reason is that managers of the spun-off company can be given options or other incentives based upon the stock of their company, thus improving the alignment of management goals with shareholders' goals.

Accomplishing a spinoff requires advance preparation that involves option-like characteristics and could be rewarded in the context of creating real options. Of course, the firm must first possess the nugget for a spinoff, and this represents an unrefined real option. Then resources must be invested in preparing a record of independent accounting data that can support the issue of new stock. Organizational interconnections must also be revised in advance in order to make a smooth separation of organizations. Actions can be taken to enhance the potential value of the new "child" to be created from the parent company. Via this refinement process the value of the real option is enhanced. Since it can be a long process involving the cumulative product of several years' efforts, properly aimed incentives could greatly assist in achieving success. Business unit managers should be rewarded for steps that lead eventually to independence. Key variables include increases in the value of the underlying asset (the business unit as an independent entity), increased volatility (improved prospects for future value gains), and decreases in the exercise price (the cost to the parent for replacing lost services).

4.4. Stop non-competitive activities

An obvious extension of this lesson is to stop doing things that are not competitive, and release the resources to migrate toward higher-valued uses. For example, when Texas Instruments announced plans to close an inefficient plant, the news was greeted with an immediate and substantial stock price increase. This is not an isolated phenomenon. Scientific evidence is available demonstrating that cessation of non-competitive activities tends to be associated with gains in shareholder wealth. McConnell and Muscarella (1985) first noted this, in the case of exploration efforts by major oil companies. They find in their sample that increases in spending for exploration are associated with decreases in share value, and vice versa.

The problem is that admitting defeat is not pleasant for management, and the resulting dislocations are not pleasant for former employees or their communities. In order to overcome these impediments, the wisdom to recognize when a game is no longer worth playing should be rewarded appropriately. Also, it could be

advantageous to provide compensation for the short-term costs of dislocation, as is often done in severance packages.

In the language of real options, ceasing operations involves optimal exercise of abandonment options. The literature on real options tends to assume that managers will exercise abandonment options whenever it is profitable to do so, yet conflicts of interest may impede exercise. Incentive plans should reward management for creating abandonment options, and also assess a penalty for allowing them to expire unused when they should be exercised.

Shutdown need not be permanent. The core source of value for timing options is that operations can be halted when the value of output falls short of the cost of production, and then restarted when market conditions again become favorable. Impediments to exercise cause decrease in the value of the option, so it can be worthwhile to pay the price for reducing such impediments.

4.5. Sell assets and pay out cash (making promises about future dividends doesn't count)

Another proven way to tap value is paying cash to investors via extra dividends or share repurchases. Dann (1981) provides an early source of evidence for this phenomenon. The sense of it is simply that investors appreciate getting their money back when management lacks opportunities to invest it at a higher return than investors can earn on their own at the same level of risk. Dann emphasizes that the positive effects of repurchase announcements go beyond the amount of money involved in the immediate transaction, but reflect real changes that accompany the event (such as shifts in capital structure, reduced taxes, or signaling of management intentions for the future). If the benefit is attributable to signaling, moreover, it follows that management cannot later alter course toward a return to spending in uncompetitive areas without risking substantial damage to stock value.

This is another form of the abandonment or timing option that does not involve immediate cessation of operation. The action involved here is to remove resources from the firm while contracting for replacements under terms that have shorter time horizons. For example, owning a piece of equipment may represent a package of options to use the equipment for a conversion process (converting input items into output items). This portfolio would include options with expiration dates ranging from the short term all the way to the end of the asset's life. If the values of

the longer-term real options in this package have declined, it could be advantageous to sell the equipment and replace it via lease arrangement (such decline occurs as an activity becomes more competitive and the market values of input and output items move in a more synchronized pattern). The lease arrangement would then represent a subset of the original package of real options, with expiration dates ranging only to the end of the lease contract. So, the only real options given up would be the longer-term options in the original package (whose values have declined). Selling would be advantageous if the value received for selling the equipment, plus the value of the options package accompanying the lease, exceeds the value of the options package given up.

4.5.1. Sell equipment, real estate, or whole divisions

Firms generally can enhance share value by selling readily marketable assets such as real estate. Brueggemann, Fisher, and Porter (1990) conclude that the stock value generally tends not to fully reflect the value of corporate real estate holdings. Their conclusion: companies should sell such assets and use leasing arrangements to provide the use of necessary real estate assets.

In several cases real estate assets have been transferred into master limited partnerships, with consistent increases in shareholder wealth that are inversely proportional to the fraction of partnership units retained by the parent company.¹⁸ Natural resources such as oil and gas production assets also produce enhanced value for shareholders when they are established as separate asset pools. Again, value for shareholders is greater the smaller the fraction of ownership retained by the parent company.¹⁹

Whole divisions can be sold. One way to get rid of “poor fits” is to sell them to another company. Bhagat, Shleifer, and Vishny (1990) find that 30 percent of assets acquired in hostile takeovers were subsequently re-sold (the sample included the period 1984 to 1986).

4.5.2. This leads to gradual liquidation

Cash disbursement may seem like an admission that management can't find competitive investment opportunities. Ultimately, too, it may lead to gradual

¹⁸ See Khanna and McConnell (1998) for an excellent review.

liquidation of the business. The dislocations that may be involved for employees and their communities in such reductions are more gradual than those associated with abrupt plant closures, but the loss of opportunity for growth “at home” is still a source of pain in societies that place high value upon ties to family and home.

Corporate hollowing could be positive, though. Indeed, it can accompany improved focus upon the core capabilities of the firm.²⁰ The additional duties associated with corporate ownership of assets could actually divert valuable management attention away from the areas in which the firm possesses unique advantage. Disencumbering from unnecessary distractions could substantially enhance future opportunities for the firm. Comment and Jarrell (1995) and John and Ofek (1995) show that increased corporate focus, or reverse-diversification, leads to positive shareholder wealth effects.

4.5.3. Improved governance

Another positive feature of asset sales is improved governance. The ideal governance structure may be very different for a pool of assets such as real estate, compared with the ideal governance structure for a business unit. In the traditional corporate venture, the investor’s fate is in the hands of someone else. When a business’ environment is rapidly changing, investors may willingly make this concession in order to enable quick response by management. Yet caretaker functions in the management of real estate may require much less responsiveness than management of a business unit in a changing environment such as pharmaceuticals research. With another governance structure, though, the investors can provide safeguards to protect their interests—so that an investor has more than a vote at the annual meeting as a means of directly influencing management action.

Williamson (1988) distinguishes three categories of governance structure: debt, equity, and dequity. With debt financing, governance is by rules that are negotiated prior to the financing, and cannot readily be altered without undergoing refinancing. Equity governance, in contrast, involves few if any unchangeable rules. With equity financing, management has broad flexibility and can thus react quickly to a changing environment. Dequity governance involves rules negotiated prior to

¹⁹ See Kensinger and Martin (1990).

²⁰ See Stalk, Evans, and Shulman (1992).

financing, but provides mechanisms for changing the rules if circumstances change. Thus debt is the ideal governance structure in very stable environments, equity is the ideal governance structure in rapidly changing environments, and debt provides a compromise in the middle ground. Selling assets enhances value when it allows custom tailoring of governance structures for different parts of the corporate entity. Hybrid financial structures that provide debt governance structures also tend to give better treatment to investors in event of financial difficulties.²¹

4.5.4. Possible Complications

We also must ask whether a firm's financing decisions affect its ability to produce economic rents. There may be situations in which the competitive environment of the enterprise requires corporate control over certain assets or business units. In such rare and transitory situations, selling them would be delayed. The technological environment of the enterprise also might for a time call for corporate ownership of certain assets necessary to maintaining proprietary capabilities. The general economic environment of the enterprise also may require management flexibility that accompanies corporate ownership of critical assets or capabilities. In the absence of any of these requirements for corporate ownership of assets, we can conclude that selling assets is generally a good bet because it might help (by reducing synergies that occur when the parts interfere with each other) and probably won't hurt (except in the rare event that there were actually synergies arising from corporate ownership of assets).

Still, there is a possible complication due to the value of control. If the sale of assets is a defense against possible takeover threats (by removing the things that make it attractive to acquire the company) there may be a negative aspect that could outweigh the positive factors. The restructuring of Sears Roebuck, Inc. offers a case in point, as reported by Gillan, Kensinger, and Martin (2000). On October 31, 1988 Sears announced a new business strategy. This included the sale of the Sears Tower, divestiture of the Commercial Division of Coldwell Banker Real Estate Group, redirection of the Allstate Business Insurance Division, strengthening of Dean Witter's commitment to consumer-driven activities, repurchase of up to 40 million shares of Sears' common stock, and a refocusing of retail on the issues of costs and

²¹ See Franks and Torous (1994).

pricing. Although this list includes some things that are generally positive influences on value, the market response was negative (-4.4%). Apparently investors saw this as a defensive move by Sears to ward off a prospective takeover.

5. The value of control

This leads to the sixth “bonus” path to enhanced value. In general, value is inversely proportional to the level of protection against challenges to management control. Jarrell and Poulsen (1987) show that creation of poison pills in order to discourage takeover attempts is associated with decreased share value. Jensen and Ruback (1983) provide an extensive review of the empirical evidence, concluding that corporate takeovers generate positive gains while defensive measures aimed at preventing takeovers are detrimental for shareholder value. Changes in the corporate charter or the composition of the board of directors, therefore, can be value-enhancing if the changes make it more likely that non-competitive activities will be reduced, divisions spun off, assets sold (with proceeds paid to shareholders), or the company acquired. The problem, according to Michael Jensen (1986, p. 323) “is how to motivate managers to disgorge the cash rather than investing it below the cost of capital or wasting it in organizational inefficiencies.”

Traditional incentives too often motivate managers to increase the number of subordinates reporting to them, or otherwise continually expand the scope of operations under their supervision. This can be counter to value, except in the unlikely case that profitability and competitive advantage can be maintained throughout the expansion. Instead, managers need to be motivated to behave like owners, continually concerned with efficient use of capital.

Since efficient use of capital often results from efficient management of the firm’s portfolio of real options, it is important (for the accounting profession as well as the incentive system) to comprehend the value drivers, and recognize the information that shareholders need in order to understand the positions the company has taken. In a purely market-driven system shareholders would pay more for information the more useful it is to them, and the desire for profit would lead information providers to improve their products and services.

6. Concluding remarks

The problems of appropriately motivating management could be substantially resolved via incentive systems that reward the creation of real options and encourage optimal exercise once they are established. After two decades of “reading the tracks” in stock prices there is now substantial evidence showing what it takes to manage a company for shareholder value. Although there are inevitable frustrations resulting from market-wide factors beyond the control of management, there are a handful of proven ways that are associated with gains in shareholder wealth. The route that is associated with expansion of the organization is also associated with innovation, improved inter-company cooperation, or the ability to maintain market power. None of these is easy, and too much market power may even lead to difficulties with regulators. The remaining routes are associated with reduction in the size and scope of the management empire. So, the inherent conflict of interest between owners and managers must be overcome by incentive systems that motivate all of the proven paths to increased value for shareholders.

All of the proven ways to increase share value are linked with real options or virtual options, and in turn these linkages provide “handles” that could be used to encourage desired actions via value-based management incentive systems. Some of these links have already been forged in actual practice. For example, 3-M corporation rewards business unit leaders based upon the proportion of revenues received from new products—thus explicitly rewarding innovation.

Since efficient use of capital often results from efficient management of the firm’s portfolio of real options, it is also important for the accounting profession to comprehend the value drivers and recognize the information that shareholders need in order to understand the positions the company has taken. In an ideal market-driven arrangement, owners would buy the information they want from information service providers, with the price mechanism driving the processing and delivery of timely, appropriate information. Lacking that, a workable compromise would be to open the managerial accounts as much as possible on the worldwide web. (Of course, owners would likely agree that it is in their interest to protect competitive advantage by keeping information private when its disclosure to competitors would compromise competitive advantage.) Such transparency would enhance accountability and improve performance.

Direction for Future Revisions

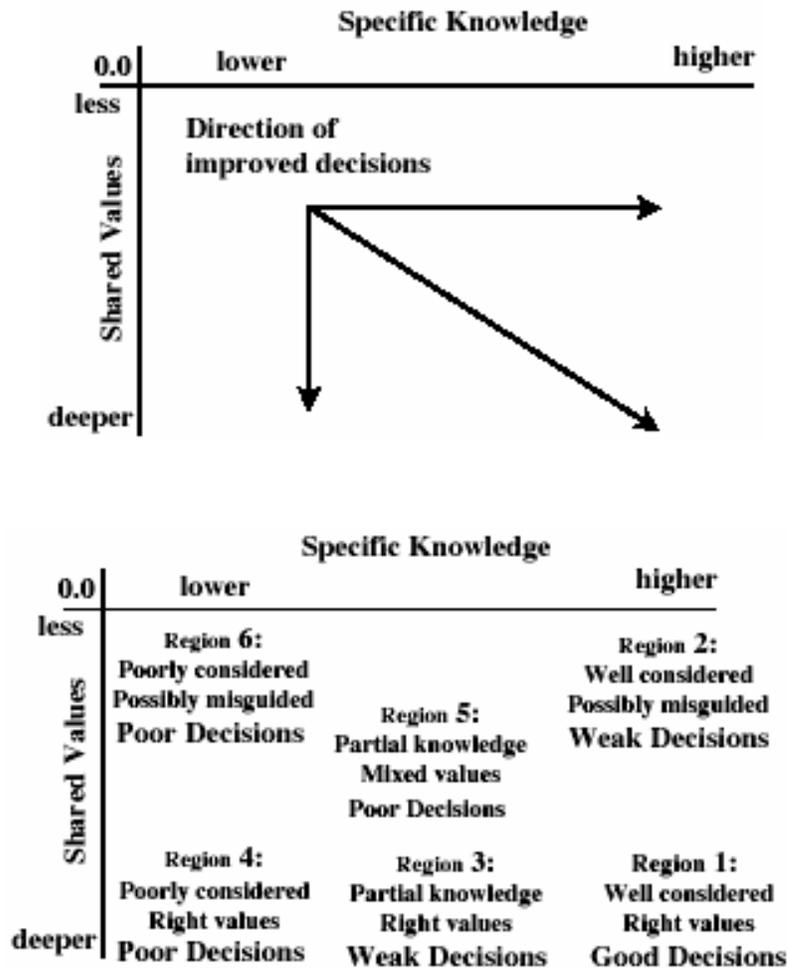
In future revisions and related papers we have four main goals:

- Forge links with the literature about intelligent agents that is growing in the information science field. This literature has useful insights to offer for someone trying to accomplish tasks via autonomous teams of self-organizing intelligent agents.
- Build a database from which to conduct event studies of the stock price impact from implementing incentive systems with substantial real options linkage.
- Continue to identify foundations for accounting standards concerning the value of real options a firm possesses. This would help not only with improved market discipline but also with better management incentives. There are at least three major requirements here. First, there must be an audit trail that allows documentation of the value creation process. By extension, it must be possible to establish the provenance of the real options and recognize the various contributions made in their creation. Third, sources of value associated with real options need to become widely recognized and be reflected in generally accepted accounting standards.
- Finally, we continue to identify links between real options and the value added by management.

Appendix: Incorporating Real Options into Management Incentives

The fundamental problem of corporate governance is that good decisions require first of all adequate information, plus decision-makers who possess the necessary specific knowledge to use the information effectively; while at the same time the decision-makers must apply the same fundamental goals and values as the owners. Exhibit 1 illustrates the problem, in the top panel. The vertical axis represents the depth or shallowness of shared values between owners and decision-makers. Greater depth of shared values is associated with improved decisions. The other dimension is specific knowledge (horizontal axis). Improved decisions are associated with greater knowledge combined with deeper levels of shared values.

Exhibit 1: Tour of Decision Space



Specific knowledge refers to the education, training and experience necessary to make effective decisions in a given environment (for example, a knowledge base of training and experience as an engineer). Jensen and Meckling (1991) distinguish categories of knowledge differentiated by the cost of transmitting it from one person to another. *Specific knowledge* is costly to transfer among agents, while *general knowledge* can be transmitted inexpensively. This distinction derives from prior training and experience (knowledge base) as well as human physical or cultural limitations on each individual's ability to store, process, and communicate information. When the costs of information transfer are great, it is necessary to place

decision-making in the hands of agents with specific knowledge, and find ways to align the incentives of an agent with those of an owner (it is fundamental for good governance that the board of directors arrange well structured and effective incentive systems).

A.1. How to Get Consistently Good Decisions

The bottom panel of Exhibit 1 illustrates that decisions are better the more specific knowledge the decision-maker has, and the deeper the level of shared values between principal and agent. Let's begin with the worst case and move progressively in the direction of improved decisions.

A.1.1. Poor Decisions

The worst decisions (region 6 in the bottom panel) occur when the decision-maker has little specific knowledge and a shallow level of shared values (for example; decision-making has been delegated to a salaried employee who has no stock ownership or incentive plan, and lacks the appropriate knowledge base). Decisions would be poorly considered, and also possibly misguided. Modest training and partial incentives would not improve matters significantly (region 5 in the second panel).

Suppose then that a major shareholder with the "right values" takes charge; but this person lacks the necessary specific knowledge (region 4 in the second panel). Then despite being guided by the right values, the decision would be poorly considered.

A.1.2. Weak Decisions

Suppose then that this stockholding chief executive sends a stock-owning relative (also with the "right values") to university for training, who then comes into the firm as a newly-graduated decision-maker (region 3). Decisions would be somewhat better than before, but still weak because despite the right values being applied, decisions would be made with a partial knowledge base due to lack of experience.

So then suppose the company hires an expert, but does not provide good incentives (region 2). Then decisions would be well considered, but possibly misguided. So what can be done?

A.1.3. Good Decisions

If the company could hire an expert and provide correct incentives (region 1) decisions would be well considered and based on the right values. So, let us focus now on the incentives necessary to properly motivate hired specialists.²²

Growing concern about value for shareholders has led to development of incentive plans aimed at encouraging management to stimulate the “value drivers” for their companies.²³ Value-based management systems tend to focus upon cash flows relative to resource value. Yet, share values often are substantially greater than the amount that could be justified based upon expected cash flows from existing operations. Woolridge (1995) presents evidence that more than half the value of a stock is typically based upon something else besides the next five years’ expected earnings. So the present value of growth opportunities, or other things such as the hope of receiving a premium price in an acquisition, typically account for the majority of share value.

The value drivers are not necessarily mysterious—just difficult or unpleasant to implement. Since Brown and Warner (1980) developed the event study methodology, there has been a wealth of research that “reads the tracks” in the stock data to discover what events tend to change share value in consistent fashion. The evidence simplifies to five proven ways to increase shareholders’ wealth, which include real options in several respects. Only one of these proven paths is enjoyable, and it is quite difficult. The others are painful to implement and so are not chosen happily. In order to be complete, incentive plans should embrace all of these proven paths to share value in ways that provide reward for success in the face of difficult challenges; and offer compensation where implementation would otherwise be too painful.²⁴

A.2. How to Deconflict the Value Drivers—An Overview

Of course the incentive system must reward decision-makers for taking positive action. It must also discourage decisions that bypass opportunities because they appear too dangerous from the undiversified point of view of the firm, yet are

²² The tour of decision space illustrated in Exhibit 1 is inspired by Timothy Luehrman’s (1998) tour of option space.

²³ See G. Bennett Stewart III (1993) and Alfred Rappaport (1997).

²⁴ See Chen, Conover, and Kensinger (2002).

attractive for diversified investors. Additionally, the incentive system must discourage decisions that continue the firm in activities that are no longer competitive. This section offers a brief overview, that will be expanded in Section 3.

A.2.1. Encourage the Positive

The first proven way to increase shareholders' wealth is to find investment opportunities that beat the market (opportunities that provide more return relative to risk than investors can find on their own in the world's capital markets)—often via real options. Executives should be rewarded whenever they create new opportunities or enhance the value of existing real options (possible paths include reducing the cost of exercise, increasing the time span remaining until option expiration, or limiting the downside for highly volatile undertakings).

A.2.2. Be Informative

This alone is hard work, but the difficulty is further amplified by the need to do better than expected. (Doing well is not enough to win extraordinary returns for shareholders; one must do better than could reasonably be anticipated based upon publicly available information.)²⁵ Because of this, executives may be tempted to try to manage expectations by restricting the flow of information. Whether the information being “managed” is good or bad news, the effect is harmful for share value. Reward systems should encourage full and timely disclosure of information, while giving appropriate consequences when executives try to withhold information.

A.2.3. Groom the Company

We are accustomed to thinking of positive NPV being associated with individual products or technologies, but the firm itself may be the product. So, another proven way to increase shareholders' wealth is to be acquired by another company (which often involves real options). There is strong evidence that shareholders of acquired firms receive substantial abnormal positive returns. This does not work in reverse, however—the stockholders of firms that buy other companies are lucky to break even, and may experience losses. Yet being acquired may mean loss of power and prestige for executives, or complete job loss. Too, the acquisition may be followed by sale of assets or cessation of operations.

When there is a valuable part of the firm that is capable of functioning independently, it may be sold or transferred directly to stockholders. So a third proven way to increase shareholders' wealth is to spin off any business units or asset pools that can stand alone (preparing for the possibility of a spin-off involves creating real options). Spin-offs that place stock in the hands of shareholders generally work better than sell-offs that put money into the corporate coffers for management to spend. Yet this, too, leads to reduced power and prestige for management, and fewer opportunities to use cash flows from strong activities for supporting weak activities within the firm. Without such support, cessation of weak activities is accelerated, along with the accompanying dislocations that are painful (at least in the short term).

A.2.4. Avoid the Negative

The flip side of the positive NPV lesson is that value can be enhanced by reducing the resources committed in activities that lack competitive advantage (that is, exercising abandonment options). The problem with exiting non-competitive activities is that admitting defeat is not pleasant for management, and the resulting dislocations are not pleasant for former employees or their communities. In order to overcome these impediments, incentive plans need to reward management for showing wisdom in recognizing when a game is no longer worth playing. Also, it could be advantageous to provide compensation for the short-term costs of dislocation.

Paying out cash is another (fifth) proven way to increase shareholders' wealth. This is also about recognizing the lack of competitive advantage (when investors have opportunities available to them that are as good or better than those available to the firm). Vague promises don't count; there must be concrete commitment. Of course, this involves an admission that management can't find competitive investment opportunities, and may reduce the means available for exercising real options that do exist. Ultimately, too, this leads to gradual liquidation of the business. The dislocations that are involved for employees and their communities are more gradual than those associated with plant closures, but the loss of opportunity "at home" can still be a source of pain. So rewards would help to encourage doing the right thing,

²⁵ See Keane (1990) for a complete discussion of this point.

and appropriate consequences would help discourage attempts to prolong the status quo.

A.2.5. Be Accountable

One could also identify a sixth proven way to increase shareholders' wealth, but it is not really a unique path. Several studies have shown that changes in corporate governance are value enhancing. In the end, the issue is corporate control. Lease, McConnell, and Mikkelson (1983) provide evidence that controlling blocks of stock are worth more per share than non-controlling blocks. Why does control have value? The reason is that increases in accountability to shareholders enhance the likelihood that management will follow one or more of the painful steps just listed. Thus it is absolutely necessary for good governance that general knowledge (readily transmittable to the average person) about the condition and positions of the firm be provided through timely, accurate, and complete disclosure. We will consider the necessary disclosure more deeply later in the article, but now let us consider how the value drivers could be better linked with managers' incentives.

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