

# Managing the Future: CEO Attention and Innovation Outcomes

The current literature presents a mixed view of top managers, often characterizing them as an impediment to innovation, irrelevant for innovation, or, at best, having an indirect effect on innovation. In contrast, the authors use an attentional perspective to argue that chief executive officers (CEOs) have a positive, direct, and long-term impact on how firms detect, develop, and deploy new technologies over time. The authors test their arguments on longitudinal data from the U.S. retail banking industry. They show that CEO attention is a critical driver of innovation even (1) when the target of attention is not innovation per se but simply future events and external events in a generic sense; (2) when the innovation outcomes occur far in the future (sometimes several years in the future); (3) when the innovation outcomes are conceptually, empirically, and temporally distinct; and (4) in an empirical context (i.e., banking) that is not traditionally viewed as “high tech” and, thus, innovation centric.

To a lay observer, it may seem logical, even obvious, that the people who lead firms have an important role in driving innovation within them. Chief executive officers (CEOs), such as Steve Jobs at Apple and Andy Grove at Intel, are celebrated for their apparent success at promoting innovation in their firms. Innovation is central to the survival and success of firms, and the primary charge of CEOs is the survival and success of their firms. Thus, it may seem reasonable to conclude that CEOs play a leading role in promoting innovation in their firms. However, the literature is surprisingly mixed on this point.

Some authors argue that CEOs are frequently so steeped in the past or in their day-to-day activities that they fail to recognize that the technological environment has turned on them (see Finkelstein 2005; Khurana 2002; Leonard-Barton 1992; Tripsas and Gavetti 2000). As Hambrick, Finkelstein, and Mooney (2005a) note, top management positions are often accompanied by extremely intense job demands and stress. As such, “To the extent that creativity requires some amount of available time and cognitive resources, extremely high levels of job demands may squeeze out novelty and

fresh thinking” (Hambrick, Finkelstein, and Mooney 2005b, p. 504). In addition, CEOs may be so wedded to existing technologies that they resist or actively fight new ones. Finkelstein (2005, p. 20) quotes An Wang, then-CEO of word processor manufacturer Wang Labs, as saying, “The [personal computer] is the stupidest thing I ever heard of.” Ken Olsen, then-CEO of minicomputer manufacturer Digital Equipment Corporation, expressly forbade his employees from using the phrase “personal computer” while employed at his firm (Rifkin and Harrar 1990, p. 195; Saxenian 1994).

Perhaps a more charitable view of the impact of CEOs on innovation is that they are simply not very relevant in driving innovation in the firm. For example, some authors argue that, in general, the locus of innovation lies in the middle of the firm in the actions taken and procedures used by its middle managers (e.g., Burgelman 1994; Christensen 1997). Even at Intel, led by such technology luminaries as Andy Grove and Gordon Moore, middle managers appear to have played the crucial role in driving technological change at important transition points. Grove (1996, p. 95) describes the firm’s move to the microprocessor business as follows:

Over time, more and more of our production resources were directed to the emerging microprocessor business, not as a result of any specific strategic direction by senior management but as a result of daily decisions by middle managers,... who sat around the table at endless production allocation meetings.... While management was kept from responding by beliefs that were shaped by our earlier successes, our production planners and financial analysts dealt with allocations and numbers in an objective world. For us senior managers, it took the sight of unrelenting red ink before we could summon up the gumption needed to execute a dramatic departure from our past.

Perhaps the most charitable view, common in the new product development literature, is that CEOs have an effect on innovation but that this effect occurs at the project level through their support of individuals and teams working on individual projects (see Hegarty and Hoffman 1990; Montoya-Weiss and Calantone 1994; Rothwell et al. 1974).

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However, CEOs do more than just support individual projects. A primary role of CEOs is to set the general direction of the firm and focus the attention of its members on particular areas of endeavor. Do CEOs influence innovation outcomes in their firms? If so, how?

We examine these vital questions in this research. In doing so, we make three contributions. First, we highlight the important, positive, and corporate-level impact of top managers on innovation outcomes in firms. Several years ago, Van de Ven (1986) observed that issues pertaining to leadership represent a central problem in the management of innovation. His observations remain just as valid today. Corporate-level studies of top managers' impact on innovation are rare. The extant studies tend to ignore the processes by which top managers influence innovation, focusing instead on the demographic characteristics of CEOs and top management teams (Tushman and Rosenkopf 1996; Young, Charns, and Shortell 2001). The dearth of research is partly due to methodological reasons. Top managers are notoriously difficult to get to. In our empirical approach, we attempt to sidestep this problem by using archival data. As Chandy (2003, p. 353) notes,

Filling out a six-page academic survey is rarely high on a CEO's daily to-do list. Survey response rates can be poor. Longitudinal surveys are extraordinarily difficult to conduct. It is hard to make causal inferences from cross-sectional studies, especially in the absence of strong theory. Poor response rates also raise concerns about non-response bias.

Second, we propose an attentional explanation for why some top managers have a greater impact on innovation than others. Following Ocasio (1997, p. 188), we conceptualize attention as "noticing, interpreting, and focusing of time and effort." We examine CEOs' attentional focus along two dimensions—temporal and spatial—and argue that CEOs' choices of what to focus on reflect the discretion they exercise in allocating the scarce resource of attention. We reason that how this discretion is exercised has long-term implications for how firms detect, develop, and deploy new technologies. This nexus between attentional emphases and specific aspects of firm-level innovation outcomes, though significant both substantively and theoretically, remains empirically unexamined. To address this gap in the literature, we investigate the link between CEOs' attentional processes in 176 publicly traded firms from 1990 to 1995 and these firms' innovation outcomes over an approximately eight-year period starting in 1996. We combine archival data from various sources to maintain a temporal separation between attentional measures and subsequent firm-level innovation outcomes. We show that CEO attention is a critical driver of innovation

- Even when the target of attention is not innovation per se but simply future events and external events in a generic sense;
- Even when the innovation outcomes occur far in the future (sometimes several years in the future). The enduring nature of these effects suggests that it is partly through information-processing activities and emphases that CEOs leave a lasting mark on the organizations they lead;
- Even when the innovation outcomes are conceptually, empirically, and temporally distinct. The specificity of these effects

underscores the theoretical significance of CEO attention in helping us understand how firms detect, develop, and deploy new technologies; and

- Even in an empirical context (i.e., banking) that is not traditionally viewed as "high-tech" and, thus, innovation centric.

Third, in light of recent calls to increase marketing's profile at higher levels of the firm (e.g., Webster, Malter, and Ganesan 2005), we present a novel approach for understanding the impact of CEOs on their firms. Our empirical approach, which involves a psycholinguistic analysis of communications by CEOs, provides a fairly unique window into their cognitive processes. Although the psycholinguistic approach has been employed in other research on temporal discretion (see Pennebaker, Mehl, and Niederhoffer 2003), this is the first time it has been used to explore a substantive issue in marketing. We believe that this approach can be fruitfully applied to other marketing contexts that involve CEOs. More generally, by introducing new conceptual and empirical approaches to the study of what leaders in organizations attend to, we hope to spur additional research to address "marketing's declining influence within the firm" (Kumar 2004, p. 3).

## Theory

### *CEO Attention and the Firm*

Chief executive officers are the heads of their firms in more ways than one. Within any organization, the "levers of power are uniquely concentrated in the hands of the CEO" (Nadler and Heilpern 1998, p. 9). Therefore, CEOs have the power, and arguably even the obligation, to set the direction of the firm (see Hambrick and Mason 1984). They influence what information others in the firm attend to and how this information is interpreted, and they use it for strategy formulation (e.g., Daft, Sormunen, and Parks 1988; Lefebvre, Mason, and Lefebvre 1997; Simons 1991). They do so partly through their communications and partly through their substantive and symbolic actions. The communications and actions of CEOs reflect their attentional focus and help drive the culture and activities of the firm. Indeed, a key strategic role of the CEO is to focus the attention of employees across alternative operations (Gifford 1998), eventually driving them toward activities that are vital for the survival and growth of the firm. Thus, "to explain firm behavior is to explain how organizations ... channel and distribute the attention of their decision makers" (Ocasio 1997, p. 203).

Chief executive officers face competing claims on their attention (Hambrick and Abrahamson 1995; Hambrick and Mason 1984; Smith and Tushman 2005). Indeed, the scarce resource for many firms is no longer "information; it is processing capacity to *attend to* information. Attention is the chief bottleneck in organizational activity, and the bottleneck becomes narrower and narrower as we move to the tops of organizations" (Simon 1973, p. 270). How do people focus attention across competing objects? Extensive research argues that they do so through two processes: selection and expectation (James 1890; LaBerge 1990). First, they direct more cognitive resources at particular

objects (see Hoffman and Ocasio 2001). Second, they engage in a heightened state of anticipation in relation to focal objects (Posner and Cohen 1984).

The principles of selection and expectation and the important role of the CEO in focusing the attention of the firm suggest that greater CEO attention to certain issues and events can lead to greater awareness, anticipation, and action in firms with respect to these types of issues and events (Bashinski and Bacharach 1980; Bonnel, Possamar, and Schmitt 1987; Downing 1988; Tushman and Rosenkopf 1996). Building on these principles of selection and expectation, we examine the implications of CEO attention on the innovation process in firms.<sup>1</sup>

### **Attention and Innovation: A Process View**

Innovation is often studied as a discrete event. A creative person conjures a solution to a vexing need. A firm patents an idea, or a firm introduces a new product. Although viewing innovation as a discrete event provides for expositional simplicity and empirical convenience (see Damanpour 1991), in recent years, several scholars have cautioned against doing so. They have noted that innovation is a process that unfolds over time (see Pettigrew, Woodman, and Cameron 2001; Van de Ven et al. 1999), and they have criticized the use of “the ubiquitous single-snapshot technique” (Avittal 2000, p. 66) in theory building and testing. Successful innovation requires that firms labor through a series of tasks. Each of these tasks requires attentional resources. Therefore, to capture the richness of innovation fully and accurately, these tasks should be studied explicitly when studying innovation. Three crucial tasks are the detection, development, and deployment of new technologies.<sup>2</sup>

To innovate over time, firms must first detect the arrival of a new technology (Kaplan, Murray, and Henderson 2003). Detection refers to the identification of a new technology and the recognition of some future application for it. Firms must then develop an initial product based on the new technology. Development refers to the process of conversion of an idea for a new product to a product that is actually launched in the market. Finally, firms must deploy the new technology further after launch. Deployment refers to the additions and improvements to existing features that occur to the product after the initial launch (see Slotegraaf,

Moorman, and Inman 2003; Tellis and Golder 2001). The distinction among detection, development, and deployment is useful in studying the process of innovation in a firm and is in line with calls to study innovation as a process that evolves over time (e.g., Van de Ven et al. 1999). This evolutionary perspective is reflected in Srinivasan, Lilien, and Rangaswamy's (2002) sense-and-respond framework for understanding a firm's technological opportunism. The growing body of work on market orientation (Han, Kim, and Srivastava 1998; Jaworski and Kohli 1993) also asserts that the mechanisms firms employ to extract insights from the marketplace have significant implications for firms' innovation outcomes. However, to the best of our knowledge, the literature does not distinguish among detection, development, and deployment.

Detection, development, and deployment require the awareness of external opportunities and the anticipation of future events. Therefore, CEO attention must have a temporal and a spatial component that increases such awareness. Combining these insights, we argue that the discretion CEOs exercise on temporal attention (e.g., emphasis on events that have yet to occur) and spatial attention (e.g., emphasis on events that have a locus outside the company) are predictive of firms' innovation outcomes. When CEOs focus their attention on the future and on external entities, their communications and actions reflect this focus and serve to drive employees' attention to events and opportunities in the future and outside the firm. In turn, this leads to quicker detection by the firm of new technologies and technological opportunities. A greater attention to events in the future and to external objects also leads to greater preparedness for actions in the future, enabling quicker development and more extensive deployment of innovations based on these new technologies. In contrast, greater attention to internal objects leads to slower detection of new technologies, slower development of initial products based on these new technologies, and less extensive deployment of innovations.

### **Hypotheses**

*Future focus and innovation outcomes.* Given their scarce attentional resources, CEOs are forced to allocate time and effort with either less or more emphasis on the future. “Future focus” refers to the amount of attention devoted to events that are yet to occur (see Chandy and Tellis 1998). In this context, events refer to actions to be taken by the firm or some other entity, anticipated outcomes of these actions, or other developments in general. In conceptualizing future focus in this way, we do not impose any a priori restrictions on the specific nature of future events on which CEOs focus. Our view of future focus is content neutral; it simply addresses the temporal discretion exercised by the top management of a firm. Although the issue of *what* specific information garners CEOs' attention may be of interest, it has the potential of creating tautological problems from the perspective of theory development and testing (e.g., thinking about innovation leads to more innovation). Therefore, in this study, we first examine the effects (if any) of *how* CEOs exercise their temporal discretion.

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<sup>1</sup>Our unit of analysis is the firm. A potentially complicating factor in this regard is that, over time, the same firm can have more than one CEO, and successive CEOs can have different attention patterns. If CEOs change frequently, it would be inappropriate to use CEO-level attention patterns to predict firm-level innovation outcomes without properly accounting for this turnover. In our conceptual arguments, we implicitly assume that CEO turnover is not frequent and that there exists substantial continuity in the CEO suite. In the empirical section of this article, we present extensive analyses to show that this assumption is reasonable in our context.

<sup>2</sup>The detection task is particularly relevant for disruptive or radical innovation contexts (Chandy and Tellis 1998) that involve significantly new technologies. However, it must be recognized that the scope of firms' innovation activities also involves continuous, incremental enhancements of existing technologies. The task of detection is less relevant in such innovation contexts.

Although the broad notion of the “future” features prominently in the business press (e.g., Hamel and Prahalad 1994; Handy 1990), there is little directly applicable empirical research on the temporal dimension in managerial decision making (cf. Mowen and Mowen 1991). Some research shows that managers often have divergent expectations about future technological developments and that these expectations shape their actions in the marketplace (see Chandy, Prabhu, and Antia 2003). More generally, research in psychology suggests that people may exhibit varying levels of motivation to focus on the future (for a review, see Karniol and Ross 1996). For example, Norem and Illingworth (1993) show that though some people have a predisposition to develop detailed scenarios about future events and developments, others do not. If similar effects also apply to CEOs, there should be heterogeneity among them in terms of how much attention they devote to actions and other developments that have yet to occur.

We expect that greater CEO attention to the future will have a favorable impact on a firm’s innovation outcomes. Increasing future focus decreases the likelihood that the firm is preoccupied exclusively with the concerns and issues of the past and present. Attending to the needs of today, though essential for maintaining the level of excellence a firm may have achieved, is less likely to serve as a basis for innovation (Chandy and Tellis 1998). Ironically, an exclusive focus on what makes a firm effective today may also sow the seeds of failure in subsequent periods (Christensen 1997). A conscious effort to pull away from current needs and exigencies increases the firm’s awareness of new technologies and technological opportunities and its preparedness for the changes in the technological landscape.

More specifically, a CEO’s greater focus on the future leads to greater awareness and greater anticipation within the firm of events in the future. In turn, this leads to quicker firm detection of new technologies and technological opportunities. Furthermore, the development and deployment of innovations involves considerable planning and preparation. A greater focus on the future also leads to greater preparedness for actions in the future, enabling quicker development and more extensive deployment of innovations. Thus:

H<sub>1</sub>: Firms with CEOs whose attentional patterns exhibit greater future focus are (a) faster at detecting new technological opportunities, (b) faster at developing initial products based on these technological opportunities, and (c) better at deploying these new products than firms with CEOs who exhibit lower future focus.

*External and internal focus and innovation outcomes.* “External focus” refers to the amount of attention devoted to objects whose primary locus is outside the firm, and “internal focus” is when the focus of attention is on objects within the firm. Note that external and internal foci represent independent attentional emphases in that one type of attentional focus does not necessarily determine the level of the other. Research on attention (e.g., Calori, Johnson, and Sarnin 1994; Ocasio 1997) suggests that there can be substantial differences in the attentional predispositions and abilities of individual CEOs. Some pay attention to vast

amounts of information, and others do not. Thus, over a given period, CEOs with a high level of external focus (relative to other CEOs) may exhibit a high or low level of internal focus, and vice versa.

Consistent with a long-standing view in the literature (see Day 1994), the distinction between external and internal focus implies that a firm’s top management can exercise discretion in terms of how much they attend to objects whose primary locus is outside or inside the firm. For example, the different posture of “prospectors” and “defenders” is associated with (among other factors) differences related to attentional activities (see Miles and Snow 1978). Attentional differences between the internal and the external environments also feature implicitly in work on firms as interpretation systems (Daft and Weick 1984). These differences are important because they affect managerial and organizational cognitions, which in turn influence the formulation and implementation of strategic actions (see Walsh 1995). Empirical work based on these ideas provides evidence that the relative emphasis that managers place on the external or internal environment and the nature of their resultant interpretations eventually shape organizational actions and performance (Garg, Walters, and Priem 2003; Rust, Moorman, and Dickson 2002; Smith et al. 1991; Thomas, Clark, and Gioia 1993; Thomas and McDaniel 1990; White, Varadarajan, and Dacin 2002). For example, Rust, Moorman, and Dickson (2002) find that an attentional emphasis on external constituents, such as customers (which they refer to as “revenue emphasis”), leads to superior performance. In contrast, attentional emphasis on efficiency considerations of internal operations (which they refer to as “cost emphasis”) is associated with less favorable performance.

In the context of our study, we expect that an increased external focus will have a favorable impact on firms’ innovation outcomes. Because potential new opportunities often emerge from outside the firm (see Chandy, Prabhu, and Antia 2003), attending to objects whose loci lie outside the firm increases the likelihood of managers becoming aware of such opportunities. In turn, this awareness enables the firm to formulate a timely and effective response to such opportunities. In contrast, an attentional stance that reflects a heightened internal focus may facilitate innovation using existing options the firm has already mastered, but it is unlikely to help in the realm of innovations that involve new opportunities with which the firm has limited or no prior experience (Tripsas and Gavetti 2000).

This line of reasoning suggests that a greater focus on the external environment leads to a greater awareness and anticipation of new opportunities, which in turn leads to quicker detection of new technologies. Furthermore, developing and deploying new products requires knowledge of new technology and anticipation of market opportunities (Frambach, Prabhu, and Verhallen 2003; Gatignon and Xuereb 1997). A greater focus on the external environment leads to a greater awareness of customer needs and a greater anticipation of market trends and competitive actions. Enhanced awareness and anticipation increases the likelihood of quicker development and more extensive deploy-

ment of innovations (Han, Kim, and Srivastava 1998; Hurley and Hult 1998). Thus:

H<sub>2</sub>: Firms with CEOs whose attentional patterns exhibit greater external focus are (a) faster at detecting new technological opportunities, (b) faster at developing initial products based on these technological opportunities, and (c) better at deploying these new products than firms with CEOs who exhibit lower external focus.

No firm can claim a monopoly over new ideas. Even when the impetus for a new technology emerges from within a firm, its development into a product relies on honing and polishing, which is best accomplished through numerous interactions with customers, competitors, and other external entities (Frambach, Prabhu, and Verhallen 2003; Han, Kim, and Srivastava 1998; Hurley and Hult 1998; Perry-Smith and Shalley 2003). A greater focus on the internal environment reduces a firm's awareness of new technologies and limits its actions with respect to such opportunities. Interactions with external entities often communicate a sense of urgency to the firm, either because they emphasize the prospect of competitive entry or because they reinforce the customer need that is waiting to be filled (Narver, Slater, and MacLachlan 2000). Internally focused managers insulate themselves against such communications, and therefore their firms are slower to respond to new technological opportunities. New technologies also cause disruption within a firm. For this reason, even when firms with internally focused managers introduce innovations, they are worse at deploying them because additions and changes to the innovations are likely to come at the expense of stability inside the firm (Hambrick, Nadler, and Tushman 1998). Overall, therefore, we hypothesize the following effects of internal focus on the detection, development, and deployment phases of innovation:

H<sub>3</sub>: Firms with CEOs whose attentional patterns exhibit a greater internal focus are (a) slower at detecting new technological opportunities, (b) slower at developing initial products based on these technological opportunities, and (c) worse at deploying these new products than firms with CEOs who exhibit lower internal focus.

To summarize, we posit a link between CEOs' attentional stance and firms' innovation outcomes. We argue that increased CEO attention to the future and the external environment results in superior innovation outcomes. In contrast, a heightened internal focus can impede firms' efforts to manage the innovation process.

## Method

### *Empirical Context*

We use the U.S. retail banking industry as the empirical context for this study. The arrival of Internet banking in the mid-1990s provides an ideal opportunity for a longitudinal study that focuses on the evolution of this innovation over several subsequent years (Bank Technologies Group 2001). The presence of several public firms in the banking sector, coupled with the reporting mandated and maintained by several regulatory agencies, gives us access to accurate data

on individual firms over time. Furthermore, Internet banking has been viewed as a strategically significant innovation that was implemented not only by large, multicity banks but also by smaller, regional players (see Chandy, Prabhu, and Antia 2003). This broad participation enables us to study the behavior of a wide range of firms that differ in terms of size.

### *Time Line and Sample*

The process of innovation in Internet banking has evolved over several years. Retail banks first began to detect the new technological opportunity in early 1994, as indicated by the initial wave of domain name registrations for their planned Web sites. The first bank to register a domain name was Citibank in February 1991, but only four banks had registered a name by early 1994. The first incumbent bank to launch transactional banking was Wells Fargo in May 1995 (Frei and Rodriguez-Farrar 2001).<sup>3</sup> By 1996, a few additional incumbents had launched transactional banking services, which allowed customers to conduct various financial transactions on the World Wide Web. Between 1995 and 2000, the number of banks with Internet-based transactional banking services grew rapidly. In our sample, this phenomenon peaked in 2000, though a fairly large number of banks continued to introduce Internet banking thereafter.

Our data collection spans from 1990 to 2004. To understand the rationale behind the data collection approach, recall that our theory posits a link between CEOs' attention patterns and specific innovation outcomes. Therefore, to test this causal link, we ideally need data on attention patterns before the time frame over which innovation outcomes are occurring and can be tracked. Using data provided by the Federal Deposit Insurance Corporation (FDIC), the Online Banking Report, banks' Web sites, and Factiva, we first determined that most banks registered a domain name and that all banks went transactional after 1995. With the cutoff date of 1995 thus established, we used the six-year (1990–1995) time frame to assess CEOs' attention patterns for each bank in our data set (as detailed subsequently, we did this using letters to shareholders that were featured in firms' annual reports). We then tracked innovation outcomes for each bank over the time frame from 1996 to January 2004.

We selected banks for the study in two phases. First, we selected all public U.S. retail banks that offered transactional Internet banking before the end of December 2000 and had at least three annual reports that we could access from the Compact D/SEC database during the 1990–1995 period ( $n = 89$ ). Second, we randomly selected 87 banks that went transactional after 2000. As in the case of the first set of banks, we included only the banks for which we could access at least three annual reports for the 1990–1995 period. We used Dun & Bradstreet's Million Dollar Directory to select this second set of banks. Collectively, this procedure yielded a sample of 176 banks that exhibited sub-

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<sup>3</sup>Transactional banking allows customers to access their accounts and transfer funds between accounts on the Internet.

**TABLE 1**  
**Characteristics of Banks in the Study**

Bank Characteristic	N	%
<b>Employees</b>		
0–100	32	18.2
101–200	42	24.9
201–600	41	23.3
601–1400	17	9.7
>1400	37	21.0
<b>Assets (Millions)</b>		
0–500	82	46.6
501–1000	26	14.8
1001–5000	32	18.2
>5000	30	17.1
<b>Banking Charter Class<sup>a</sup></b>		
1	79	44.9
2	21	11.9
3	59	33.5
4	3	1.7
5	8	4.5
<b>Asset Concentration Hierarchy<sup>b</sup></b>		
1–4	95	53.4
5–9	75	48.3

<sup>a</sup>A classification code assigned by the FDIC on the basis of the institution's charter type (commercial bank or savings institution), charter agent (state or federal), Federal Reserve membership status (member, nonmember), and its primary federal regulator (state-chartered institutions are subjected to both federal and state supervision). There were few savings banks and savings associations in our data set (Classification Codes 4 and 5, respectively).

<sup>b</sup>A classification code assigned by the FDIC to indicate a bank's primary specialization on the basis of its assets.

Notes: N = 176. Percentages may not add up 100 because of missing observations.

stantial variation in terms of innovation outcomes and firm characteristics (see Table 1).

Two attractive features of this data collection approach are worth noting. First, by choosing the 1990–1995 period to assess CEOs' attentional patterns, we ensure that independent variables are based on a temporal window just before the onset of the focal innovation phenomenon we investigate (i.e., starting in January 1996). Thus, unlike cross-sectional research efforts, our method allows for a stronger test of causality. Second, our two-phase data collection approach, which obtains data on banks that did not have transactional Internet banking by the end of 2000 in addition to those that did, allows us to use regression with Heckman's (1979) correction to account for selection bias.

### **Dependent Measures**

In this article, we focus on three dependent measures of importance to the innovation process: speed of detection, speed of development, and breadth of deployment of technology pertaining to Internet banking (see Table 2). We measure speed of detection using the date when a bank registered its primary domain name. This information is based on InterNIC's Whois registry. We measure speed of development using the month a bank went online with a transactional capability (we could obtain only month-level data for

this variable). To obtain and verify the transaction month data, we rely on several sources: Internet Archive's Wayback Machine, press releases, reports in the Factiva database, the Thomson Directory of Internet Banks, the Online Banking Report, and telephone calls to banking managers.

We measure breadth of deployment with an evaluation of the features that transactional Internet banks offered to consumers. Using input from industry experts, we identified the following specific features and services as being indicative of the breadth of deployment: the use of interactive Java applets, Internet brokerage, Internet tax filing, Internet business banking, and mobile banking (i.e., banking by means of a mobile device, such as a personal digital assistant or a cell phone). For each bank, the sum of these features serves as a summary measure of the breadth of deployment. Using Internet Archive's Wayback Machine, we visited the past Web sites of all Internet banks in our sample that were transactional by the end of December 2000 to determine the previously mentioned features that each of these banks offered by December 2001. Assessing deployment breadth in December 2001 allows sufficient time (at least a year) to pass between transactional entry and deployment, thus providing a stable measure of each bank's final innovation offering to its customers.

### **Independent Measures**

We use banks' letters to shareholders to measure three independent variables related to the attentional foci of CEOs: future focus, external focus, and internal focus. Following guidelines in the computer-aided text analysis literature (Kabanoff 1997; Weitzman 2000), we assess total attention directed at theoretically relevant issues by using counts of specific types of sentences (for future focus) and words (for external and internal focus). Historical records of letters to shareholders, written during the period of interest, are consistently available over time and across a wide variety of firms. Moreover, letters to shareholders provide a unique glimpse into the minds of CEOs in a way that is impossible to obtain through other means. A large body of research shows that the letters to shareholders featured in firms' annual reports reflect CEOs' attentional foci and that these foci can be meaningfully assessed (Abrahamson and Hambrick 1997; D'Aveni and MacMillan 1990; Kabanoff 1997). Furthermore, CEOs take an active role in writing these letters (indeed, letters by some CEOs, such as Warren Buffet, have developed a keen following and are closely dissected by the press and the wider investment community for insights into their thinking). Although in practice they are often the output of a top management team that includes more than the CEO alone, CEOs nevertheless have primary fiduciary responsibility for the statements made in the letters.

A criticism of letters to shareholders is that they are a result of efforts aimed at impression management on the part of firms. It is argued that, often, these letters are prepared with the active collaboration of firms' public relations departments. However, if these documents are solely tools designed to impress external audiences, with little correspondence to the actual decision-making process in firms, the use of these letters as proxies for CEO cognition should

**TABLE 2**  
**Summary of Measures and Sources**

Conceptual Variable	Operationalization	Data Source
Detection speed	Date that domain name was registered (January 1996–January 2004)	FDIC InterNIC
Development speed	Date that transactional Internet bank was launched (January 1996–January 2004)	Internet Archive Bank Web sites Factiva Thomson Directory of Internet Banks Online Banking Report Telephone calls to bank managers
Deployment breadth	Number of incremental innovations introduced over time (measured December 2001): Java applets, Internet business banking, Internet tax filing, Internet brokerage, and mobile banking	Internet Archive Bank Web sites Online Banking Report
Future focus	Frequency of the word “will” in annual letters to shareholders, following guidelines in psycholinguistics research (1990–1995)	Compact D/SEC LexisNexis
External focus	Frequency of words (see the Appendix) denoting outward attention to customers and competitors in annual letters to shareholders (1990–1995)	Compact D/SEC LexisNexis
Internal focus	Frequency of words (see the Appendix) denoting inward attention to organization-specific issues and developments in annual letters to shareholders (1990–1995)	Compact D/SEC LexisNexis
Control variables	Total number of text units (sentences) in letters to shareholders	Compact D/SEC LexisNexis
	Bank size: number of employees, assets, and deposits	FDIC
	Bank demographics: bank specialization and rurality of headquarters location	FDIC
	Complexity of Internet bank at initial launch	Internet Archive Online Banking Report
	Bank performance: return on assets and return on equity	FDIC
	Changes in CEO	Corporate Affiliations, Factiva

yield null results. If the motive is purely impression management, firms would all behave either similarly (in a manner designed to create the most positive impressions) or in a random or idiosyncratic manner that is unique to the firms' public relations operations. Metrics of cognition derived from letters to shareholders will not predict actual firm actions in the future. However, we (and many other researchers) show that the cognitions embodied in letters to shareholders have a systematic effect on firm actions, in a manner that is consistent with theoretical expectations (e.g., Barr 1998; Bowman 1978; D'Aveni and MacMillan 1990; Noble, Sinha, and Kumar 2002). Divinney and Kabanoff (1999, p. 61) examine the link between the text of annual reports and firms' past and future investment patterns and conclude that “‘words’ and ‘deeds’ are related.”

Further evidence of the appropriateness of letters to shareholders as sources of data on top management cognition in our context comes from Fiol (1995), who compares the cognitions expressed in letters to shareholders with those in internal planning documents written during the same period by the same firms. On the basis of this comparison, she concludes that nonevaluative statements, such as those on “internal/external orientation ... and past/future orientation,” are likely to be faithfully reported in letters to shareholders (Fiol 1995, p. 534; see also Barr 1998). We provide additional evidence of the validity of this approach in the “Results” section.

We use the Compact D/SEC database to collect all letters available for banks in our sample from 1990 to 1995. We selected this time frame because it covers a sufficiently long period immediately before the window over which we

track innovation outcomes. (We altered this time frame for the few cases in our sample for which a bank detected the new technology before 1995; this ensured a temporal separation between attentional patterns and innovations outcomes.) We were able to locate 3 letters each for 24 banks, 4 letters each for 29 banks, 5 letters each for 59 banks, and 6 letters each for 64 banks in our complete sample of 176 banks. This data effort yields a total of 867 letters to shareholders.

*Future focus.* As we noted previously, future focus refers to attention directed at events that have yet to occur. We base our measure of future focus on psycholinguistic work (see Pennebaker, Mehl, and Niederhoffer 2003), which argues that a writer's temporal attention can be deduced reliably from the type of words he or she uses in a body of text. Specifically, Pennebaker, Francis, and Booth's (2001) Linguistic Inquiry and Word Count approach for text analysis shows that sentences containing the following words are indicative of attention directed at events that have yet to occur: "will," "may," "might," "shall," "be," and "tomorrow" (and related contractions, such as "we'll," "I'll," "they'll," and "you'll"). Using DICTION 5.0 (Digitext Inc.) and N6 (QSR International Ltd.), we performed a preliminary computerized search of the letters to shareholders in our sample and found that contractions are rarely used. Furthermore, sentences with these words, other than those containing "will," tended to be either ambiguous or inappropriate for our purpose. Therefore, on the basis of this analysis, we concluded that sentences containing the word "will" are most indicative of attention being directed at events that have yet to occur.<sup>4</sup>

To verify the validity of this conclusion, we randomly selected ten banks and then assembled all letters for these banks over a six-year period (1990–1995). From these letters, we identified all sentences ( $n = 246$ ) containing the word "will." Two independent coders then coded these sentences as consistent or inconsistent with the working definition of a future-focused sentence (i.e., attention directed at events that have yet to occur; for details, see Yadav, Prabhu, and Chandy 2007). Eighty-three percent of these sentences were coded as future-focused, with an intercoder agreement level of 90%. We concluded that Pennebaker, Francis, and Booth's (2001) psycholinguistic approach was appropriate for initially identifying future-focused sentences in our specific empirical context. On the basis of this analysis, we trained research assistants to (1) read all the sentences containing the word "will" in our letters to shareholders, (2) identify spurious sentences (i.e., sentences containing "will" but not consistent with our working definition of a future-focused sentence), and (3) remove these sentences from our data. Using this method, we identified (and deleted) 128 spurious sentences, leaving 4333 usable future-focused sentences for further analysis.

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<sup>4</sup>Moreover, robustness checks show that our results remain unchanged for an expanded set of sentences that include additional words, such as "may," "might," and "shall."

*External focus and internal focus.* External focus refers to attention directed at objects whose primary locus is outside the firm, and internal focus refers to attention directed at objects whose primary locus is within the firm. From our reading of the letters to shareholders and aided by a computerized examination of word usage by text-analysis software (N6 and DICTION 5.0), we developed a dictionary of words (see the Appendix) that are consistent with our definitions of external and internal focus. We employed an iterative process, with words added or deleted at each stage of the process, until we judged the impact of any further addition or deletion to be minimal. Differences were resolved through discussion. Using this dictionary, we measure external focus as the number of times words denoting attention to customers and competitors are mentioned in a given bank's letters. Similarly, we measure internal focus as the number of times words denoting attention to inward, organization-specific issues are mentioned in each set of letters.

### **Control Variables**

*Length of letters to shareholders.* The length of letters to shareholders can vary across firms. Therefore, we control for the length of letters, measured as a count of the number of sentences in the letters for each bank. We also used the number of words in the letters as an alternative control variable. However, because prior research indicates that sentence counts serve as better proxies for number of thoughts than word counts, we present results that use sentence counts. Controlling for words in the models did not result in any model improvements.

*Bank size.* Larger firms have resources they can leverage to detect, develop, and deploy innovation opportunities more successfully than smaller banks. We control for firm size by using the natural log of the number of employees in 1994 (i.e., the year just before the temporal window over which we track firms' innovation outcomes). We obtain this data from the FDIC. We also examine alternative measures of firm size, such as assets and deposits held. These variables are highly correlated (.98) with the employee-based measure we use.

*Bank specialization.* The FDIC classifies banks by primary specialization. Banks with different specializations face varying competition and have different types of customers, which in turn could have a differential effect on their detection, development, and deployment of technological opportunities. We control for these effects by creating a dummy variable that is 1 for banks that specialize in commercial and industrial loans and 0 for banks that specialize in consumer lending.

*Bank rurality.* Banks also vary in terms of the extent to which they serve urban versus rural markets, which may affect their detection, development, and deployment of technological opportunities. To control for this, we first identify the county in which each bank is headquartered. On the basis of this information, we use the U.S. Department of Agriculture's rural–urban classification (see [www.ers.usda](http://www.ers.usda)).



gov) to assess bank rurality on a seven-point scale (1 = “highly urban,” and 7 = “highly rural”).

*CEO turnover.* It is possible that change in CEOs could affect innovation outcomes in firms. We control for this factor by including in each of our models a measure of CEO changes during the period of our sample ending with the year before the innovation outcome being predicted.

*Cumulative detection and development by other banks.* Institutional theory suggests that firms are embedded in networks and that the normative pressures to conform/imitate within these networks drive important organizational actions, such as innovation (see Scott 1990). To investigate this possibility, we create two measures that capture the cumulative number of other banks in the focal bank’s network (specifically, other banks in the bank’s home state) that had detected and developed Internet banking by the time the focal bank detects and develops online banking, respectively (for a similar approach, see Young, Charns, and Shortell 2001). We model these measures of imitation as time-varying covariates.

*Prior innovation outcomes.* To account for unobserved firm-specific factors in our analysis, we control for speed of detection when estimating Equation 2 and speed of development when estimating Equations 3 and 4 (see the next section).

*Complexity of Web site at initial launch.* Finally, banks differ in the complexity of their online offering when initially launched. Because this initial level of complexity may influence the eventual sophistication of banks’ Internet banking service (i.e., deployment breadth), we control for this variable in our test of the hypotheses pertaining to breadth of deployment. A trained doctoral student with experience in the banking industry coded the initial complexity of a bank’s Web site at launch on a four-point scale, ranging from “information only” (1) to “fully transactional” (4).

## Models

We now describe the models to test the hypotheses formally. We organize our discussion along the three innovation outcomes of interest: detection, development, and deployment.

*Speed of detection.* We measure speed of detection using the date on which a bank first reserves a domain name. We model this time-dependent binary event (whether registration occurs or does not occur at a given point in time) using survival analysis (Cox and Oakes 1984). This approach enables us to model not only the occurrence of the focal event but also the timing of the event.

We use a proportional hazard model with covariates (Cox and Oakes 1984) to test the hypothesized effect of a bank’s future, external, and internal focus on detection. (We also use three alternative base hazard functions—Weibull, log-normal, and log-logistic—to test our hypothesis. The results are broadly robust to the use of these alternative specifications.) Specifically, we estimate

$$(1) \quad h_i(t) = h_0(t) \exp(\alpha_1 \text{Future}_i + \alpha_2 \text{External}_i + \alpha_3 \text{Internal}_i + \Sigma \alpha_j \text{Controls}_j),$$

where  $h_i(t)$  is the instantaneous probability of bank  $i$  registering a domain name at time  $t$ , given that it had not registered until time  $t$ ;  $h_0(t)$  is the baseline hazard function;  $\text{Future}_i$  is the future focus of bank  $i$ ;  $\text{External}_i$  is the external focus of bank  $i$ ;  $\text{Internal}_i$  is the internal focus of bank  $i$ ; and  $\Sigma \text{Controls}_j$  is a set of control variables.

*Speed of development.* We measure speed of development using the month when a bank first offers transactional Internet banking to its customers. We use the following proportional hazard model to test the effect of CEOs’ attentional characteristics on development timing. (As with speed of detection, we also use the Weibull, log-normal, and log-logistic hazard functions to test this hypothesis. Again, the results are broadly robust to the use of these alternative specifications.) Specifically, we use the following proportional hazard model:

$$(2) \quad h_i(t) = h_0(t) \exp(\beta_1 \text{Future}_i + \beta_2 \text{External}_i + \beta_3 \text{Internal}_i + \Sigma \beta_j \text{Controls}_j),$$

where  $h_i(t)$  is the instantaneous probability of bank  $i$  offering transactional Internet banking at time  $t$ , given that it had not offered this service until time  $t$ . Other variables are as defined in Equation 1.

*Deployment breadth.* We measure deployment breadth using a count of the number of innovative features that a bank’s transactional Web site offered at the end of 2001. We hypothesize that whereas future focus and external focus positively influence deployment breadth, internal focus has a negative effect. However, our data on deployment are subject to right censoring. Specifically, 87 of the 176 banks in our sample did not offer Internet banking by the cutoff date. Moreover, the decision to offer Internet banking is endogenous and self-selected; the characteristics that lead banks to deploy well may also drive their choice to develop Internet banking in the first place. Because discarding censored data can lead to biased, false-positive results and because not accounting for endogeneity and self-selection can lead to misspecification, we use regression with Heckman’s (1979) correction to account for selection bias. Specifically, we include the censored data in the analysis and use the following substantive and selection equations, respectively:

$$(3) \quad D_i = \gamma_0 + \gamma_1 \text{Future}_i + \gamma_2 \text{External}_i + \gamma_3 \text{Internal}_i + \Sigma \gamma_j \text{Controls}_j + e_i, \text{ and}$$

$$(4) \quad S_i = \delta_0 + \delta_1 \text{Future}_i + \delta_2 \text{External}_i + \delta_3 \text{Internal}_i + \Sigma \delta_j \text{Controls}_j + u_i,$$

where  $D_i$  is the deployment breadth of bank  $i$ ,  $S_i$  is the censored (0) or uncensored (1) status of bank  $i$ , and  $e_i$  and  $u_i$  are error terms. Other variables are as defined in Equation 1.

## Results

Table 3 presents descriptive statistics for the dependent and independent variables of interest. The table indicates that

**TABLE 3**  
**Descriptive Statistics**

	M	SD	Minimum	Maximum
Speed of detection <sup>a</sup>	2214.75	709.32	0	4937
Speed of development <sup>b</sup>	52.17	17.69	0	115
Deployment breadth <sup>c</sup>	3.26	1.78	0	5
Future focus	24.76	18.55	0	120
External focus	70.80	54.05	3	279
Internal focus	71.52	50.89	3	328
Total text units	268.06	153.58	31	927
Ln(employees)	5.88	1.70	1.38	11.03
Bank specialization	.50	.50	0	1
Bank rurality	2.38	1.58	1	7

<sup>a</sup>Lag in days for the focal bank (after the first bank registered a domain name).

<sup>b</sup>Lag in months for the focal bank (after the first bank offered online banking).

<sup>c</sup>Number of innovations deployed by the focal bank.

our empirical context provides adequate variation in these variables. Tables 4 and 5 present the results of estimating the proportional hazard models in Equations 1 and 2, respectively. We use one-tailed tests to assess statistical significance for all directional hypotheses. The hazard ratios in Tables 4 and 5 reflect the impact on innovation outcomes of a unit increase in the specific type of attentional focus (i.e., future, external, or internal). Table 6 presents the results of the estimation of Equations 3 and 4—namely, the Heckman selection model. In all models, a likelihood ratio test rejects the hypothesis that all parameters equal zero.

Because detection, development, and deployment are inherently sequential in nature, a natural question to pose is whether there are dependencies between the equations—specifically whether (1) the speed of detection influences the speed of development and (2) the speed of development influences the extent of deployment. However, the outcome variables of detection, development, and deployment are separated in time and form a recursive system of equations. Moreover, an analysis of the correlation between the error terms of each of the equations indicates that these errors are uncorrelated. Recursive systems with uncorrelated errors do not require joint estimation of their constituent equations—for example, through seemingly unrelated regression (see Land 1973). Therefore, we estimate Equations 1–4 independently.

Finally, for the analyses in Tables 4 and 5, which are based on the Cox proportional hazard model, we assess the validity of the assumption of proportionality as follows: First, we include our independent variables as time-varying covariates in each model (i.e., as interactions with time). In these interactions, we use both log(time) and analysis time. We find that none of these time-varying covariates are significant in either model, thus providing a test against violation of the proportionality assumption. Second, we also test the proportional hazard assumption using Schoenfeld residuals and plots of the scaled Schoenfeld residuals. Again, we find no evidence that the proportionality assumption is violated. We now present specific tests of  $H_{1a}$ – $H_{3c}$ .

### **Future Focus and Innovation Outcomes**

$H_1$  predicts that firms whose CEOs have a greater future focus are (1) faster at detecting new technological opportunities, (2) faster at developing initial products based on these technologies, and (3) better at deploying these initial products than other firms. In support of  $H_{1a}$  (see Table 4), future focus increases the hazard rate for detection (hazard ratio = 1.016,  $p < .10$ ). Thus, a greater focus on the future facilitates banks' detection of new technological opportunities. In support of  $H_{1b}$  (see Table 5), future focus increases the hazard rate for development (hazard ratio = 1.018,  $p < .10$ ). Thus, a greater focus on the future facilitates the development of initial products based on new technologies. Finally, in support of  $H_{1c}$  (see Table 6), future focus has a significant, positive effect on the deployment breadth of innovations ( $\gamma = .03$ ,  $p < .01$ ). Thus, a greater focus on the future enhances banks' ability to deploy initial products based on new technologies.

### **External Focus and Innovation Outcomes**

$H_2$  predicts that firms whose CEOs have a greater external focus are (1) faster at detecting new technological opportunities, (2) faster at developing initial products based on these technologies, and (3) better at deploying these initial products than other firms. In support of  $H_{2a}$  (see Table 4), external focus increases the hazard rate for detection (hazard ratio = 1.005,  $p < .10$ ). Thus, a greater focus on the external environment facilitates banks' detection of potentially new technologies. In support of  $H_{2b}$  (see Table 5), external focus increases the hazard rate for development speed (hazard ratio = 1.009,  $p < .05$ ). Thus, a greater focus on the external environment hastens firms' development of initial products based on new technologies. Finally, external focus has no effect on the breadth of deployment (see Table 6). Thus, contrary to  $H_{2c}$ , a greater focus on the external environment is not predictive of how effectively a firm deploys initial products based on new technologies. This implies that the effects of an external focus on innovation may not be as important in the long run, especially compared with the effects of a focus on the future.

### Internal Focus and Innovation Outcomes

H<sub>3</sub> predicts that firms whose CEOs have a greater internal focus are (1) slower at detecting technological opportunities, (2) slower at developing initial products based on these technologies, and (3) worse at deploying these initial products than other firms. In support of H<sub>3a</sub> (see Table 4), internal focus decreases the hazard rate for detection (hazard ratio = .99,  $p < .05$ ). Thus, a greater focus on the internal environment reduces the speed with which firms detect new technologies. In contrast to H<sub>3b</sub>, however, internal focus increases the hazard rate for development (hazard ratio = 1.01,  $p < .05$ ). Thus, a greater focus on the internal environment has a positive effect on the speed with which firms develop initial products based on new technologies. This suggests that product development requires a certain element of internal capability, which an internal focus facili-

**TABLE 4**  
Effect of Attentional Focus on Speed of Detection

Independent Variable	Hazard Ratio (SE)
Future focus	1.016* (.01)
External focus	1.005* (.4 × 10 <sup>-2</sup> )
Internal focus	.99** (.2 × 10 <sup>-2</sup> )
Total text units	.99 (.1 × 10 <sup>-2</sup> )
Ln(employees)	1.16*** (.07)
Bank specialization	.94 (.15)
Bank rurality	1.04 (.06)
CEO changes until detection	.79 (.14)
Cumulative detection	1.01*** (.2 × 10 <sup>-2</sup> )
Log-likelihood	-607.61
Likelihood ratio $\chi^2$	55.46***
Akaike information criterion	1233.21

\* $p < .10$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

**TABLE 5**  
Effect of Attentional Focus on Speed of Development

Independent Variable	Hazard Ratio (SE)
Future focus	1.018* (.01)
External focus	1.009** (.4 × 10 <sup>-2</sup> )
Internal focus	1.01** (.5 × 10 <sup>-2</sup> )
Total text units	.992*** (.2 × 10 <sup>-2</sup> )
Ln(employees)	1.09 (.09)
Bank specialization	1.05 (.27)
Bank rurality	1.03 (.08)
CEO changes until detection	1.18 (.31)
Cumulative detection	1.00 (.9 × 10 <sup>-3</sup> )
Time since detection	.99*** (.3 × 10 <sup>-3</sup> )
Log-likelihood	-274.53
Likelihood ratio $\chi^2$	16.99**
Akaike information criterion	569.06

\* $p < .10$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

tates. Finally, internal focus also has no effect on the breadth of deployment (see Table 6). Thus, contrary to H<sub>3c</sub>, a greater focus on the internal environment is not predictive of how effectively a firm deploys initial products based on new technologies. Again, this implies that the effects of an internal focus on innovation may not be as important in the long run, especially compared with the effects of a focus on the future.

### Control Variables and Innovation Outcomes

Among the control variables, only bank size has a somewhat consistent effect across all innovation outcomes. Specifically, bank size increases the hazard rate for detection (hazard rate = 1.16,  $p < .01$ ). Thus, larger banks can leverage their more substantial organizational resources to detect innovation opportunities more quickly than smaller banks, which are likely to have a smaller resource base. Bank size also has a positive influence on the deployment breadth of innovations ( $\gamma = .47$ ,  $p < .01$ ). Thus, the greater resources of larger banks also enhance their ability to deploy initial products based on new technologies.

### Robustness Checks and Additional Analyses

*Do letters to shareholders actually reflect the topics to which CEOs pay attention?* In addition to the evidence (from the literature and from our banking data) that we noted in the "Method" section, we present additional evidence for the appropriateness of letters to shareholders in assessing how CEOs allocate their attention. Specifically, we compare the boardroom agendas of two *Fortune* 500 companies with their letters to shareholders. We first code the detailed agendas of the board of directors' meetings to estimate the percentage of time allocated to discussions that are consistent with our working definition of future focus. These agendas provided details about (1) specific topics scheduled for discussion and (2) time allocated for each topic. We find that each meeting lasted approximately four hours (Firm 1:  $M = 4.08$  hours for 27 meetings; Firm 2:  $M = 4.44$  hours for 13 meetings). Because the agendas contained confidential and proprietary details, only one of the authors was allowed access to them. If clarification was needed on a specific agenda item, this author could consult with a board member. Following our definition of future-focused attention, we first code each agenda item as future focused if it pertained primarily to events that had yet to occur; we then measure the time allocated during that meeting to that agenda item. If a specific item was shown on the agenda as part of a broader topic (usually with bullet points), we assume that equal time was devoted to each subtopic. Following this procedure, we compute the proportion of total meeting time allocated for future-focused discussions. We find that Firm 1 has a mean of 28.5% for 27 meetings from 2000 to 2005 and that Firm 2 has a mean of 11.87% for 13 meetings from 2002 to 2005.

Next, we analyze the CEOs' letters to shareholders of both companies over the same period and compute a measure of future focus using our text-based approach. We find that the extent of future focus measured on the basis of the text analysis of the CEO's letters for Firm 1 (7.9%) is

**TABLE 6**  
**Effect of Attentional Focus on Deployment Breadth**

Independent Variable	Substantive Model Coefficient (SE)		Selection Model Coefficient (SE)	
Future focus	.03***	(.01)	$-2.49 \times 10^{-3}$	$(1.3 \times 10^{-2})$
External focus	$-4.55 \times 10^{-3}$	$(5.05 \times 10^{-3})$	$5.3 \times 10^{-3}$	$(5.09 \times 10^{-3})$
Internal focus	$-6.02 \times 10^{-3}$	$(4.95 \times 10^{-3})$	$-5.30 \times 10^{-3}$	$(4.52 \times 10^{-3})$
Total text units	$7.24 \times 10^{-4}$	$(2.25 \times 10^{-3})$	$1.16 \times 10^{-3}$	$(2.34 \times 10^{-3})$
Ln(employees)	.47***	(.08)	.15**	(.08)
Bank specialization	-.64***	(.27)	-.25	(.24)
Bank rurality	.04	(.10)	-.01	(.08)
CEO changes until deployment	.87**	(.28)	.09	(.25)
Complexity at launch	-.27	(.22)		
Time since development	.01	(.01)	-.04***	$(8.63 \times 10^{-3})$
Intercept	-.01	(1.10)	1.03*	(.77)
N: total	144			
N: uncensored	75			
Log-likelihood	-192.52			
Wald $\chi^2$	83.39***			
Akaike information criterion	418.83			

\* $p < .10$ .

\*\* $p < .05$ .

\*\*\* $p < .01$ .

greater than that for Firm 2 (6.6%). We also find that the CEO's letters for Firm 1 use the word "future" almost twice as frequently (5.2% of all sentences) as those for Firm 2 (2.6% of all sentences). Therefore, although we acknowledge the subjectivity inherent in any text-based approach, we assert that letters to shareholders reliably reflect how senior managers in firms allocate their attention.

*Does CEO turnover affect our results?* High turnover in CEOs would make it difficult to attribute the attention patterns of a particular CEO to innovation outcomes that occur under other CEOs. To address this issue, we collected data on all CEOs in all the firms in the sample during the study period and conducted several additional analyses. We first examined the tenure of the longest serving CEO in each firm during 1990–2002. We find that the median tenure is 11 years ( $M = 10.32$  years) over this 13-year period, suggesting that a single CEO tends to dominate the period for most firms. Next, we examined the extent to which the same CEO supplied the information in the letters to shareholders in the first period (1990–1995). Specifically, we calculated the percentage of firms for which the letters to shareholders during this 6-year period were written by the same CEO. We find that in 77% of the firms, the same CEO wrote all the letters to shareholders in the first period.

We then examined the extent to which the CEOs who wrote the letters to shareholders remained CEOs of the firm in the second (implementation) period. For the 77% of firms in which the same CEO wrote all the letters to shareholders during 1990–1995, these CEOs remained CEOs in 92% of the years from 1996 to the year the banks implemented transactional Internet banking and in 76% of all the years from 1996 to 2002. For the 23% of firms in which the CEO changed at least once in the first period, we find that the CEOs who wrote the letter to shareholders in 1995 remained CEOs in 94% of the years from 1996 to the year

the banks implemented transactional Internet banking and in 82% of the years from 1996 to 2002. Overall, these results suggest that in most cases, the CEO who supplied the information in the first period is indeed the CEO who implemented the programs in the second period. Contrary to descriptions in the popular press about the precarious nature of the CEO's position, CEOs in our empirical context enjoy considerable longevity and thus have the opportunity to exert a long-lasting influence on the firm.

In addition, we collected information on continuity in the top management team in all cases in which there was a change in CEO. Specifically, in all cases of CEO change, we obtained information on (1) whether the individuals who succeeded the CEO were insiders (i.e., current members of the previous CEO's top management team) or outsiders to the firm and (2) whether the outgoing CEO continued on the top management team (in general, as chairman of the board) after stepping down as CEO. Prior research indicates that both these factors—selection of an insider as successor and the continued presence by the prior CEO on the top management team—are indicators of the continued influence of the outgoing CEO on the firm's actions (Shen and Cannella 2002; Zhang and Rajagopalan 2004). Our analysis indicates that firms in which there were changes in CEOs almost invariably chose insiders as successors. Specifically, we find that 92.5% of all new CEOs were insiders. Moreover, 75% of the departing CEOs continued on the top management team even after they left the CEO position. These results provide additional evidence that the CEOs' influence continues even after departure.

Finally, we conducted two additional analyses. First, we reestimated Equations 1–4 by also controlling for whether CEOs were insiders and whether departing CEOs continued as chairman. We find that our results are robust to this analysis and that these variables are not significantly different from zero in all our analyses. Second, we examined

whether the frequency of CEO changes is a significant predictor of the firm's attentional focus (i.e., its future, internal, and external focus). We find that CEO changes are not significantly correlated with any of the measures of attentional focus (in all cases,  $p > .40$ ).

All these results indicate that there is substantial continuity between the CEO who supplied the information in the first period and the CEO who implemented the program in the second period. Furthermore, CEO changes that occur do not affect the results from our analysis.

*Do organizational culture and norms rather than CEO attention drive our results?* A possible counterargument to our thesis and findings is that rather than CEO attention, other variables that remain unobserved in our research, such as organizational culture and norms, drive firms to innovate. We address this conceptually in the "Theory" section by describing a process by which CEOs' future foci drive innovation outcomes. We also address this empirically by using an approach similar to the use of a "lagged" dependent variable to control for unobserved firm-specific heterogeneity (Jacobson and Aaker 1985; Prabhu, Chandy, and Ellis 2005).

Recall that we examine three dimensions of innovation in this research—detection, development, and deployment—and these dimensions serve as the dependent variables in our empirical models. Our analysis capitalizes on the richness of our data as follows: First, our three dependent variables are temporally sequenced, in that detection occurs before development and development occurs before deployment. Second, if unobserved factors, such as culture and norms, affect innovation, they should affect all three dimensions of innovation. Therefore, by controlling for speed of detection in our development equation, we also control for culture and norms (and other unobserved drivers of innovation). In other words, speed of detection serves as a proxy for unobserved firm-specific factors in the equation that predicts speed of development. Similarly, speed of development serves as a proxy for unobserved firm-specific factors in the equation that predicts breadth of deployment.

The results regarding development and deployment indicate that future focus has a strong effect on these dimensions of innovation, even after we control for "prior" innovation (and, thus, unobserved firm-specific factors, such as culture and norms). Therefore, these results show that CEO attention affects innovation even after we account for the effects of other potential factors, such as organizational culture and norms.

*Does firm performance provide an alternative explanation for our results?* A possible alternative explanation for our findings is that high-performing banks in the 1990–1995 period, as a consequence of their good performance, were more likely to focus on issues in the future and external to the organization. Furthermore, their good performance might have enabled them to pursue Internet banking more quickly and broadly. To examine this alternative explanation, we present two analyses. First, we test whether performance (return on assets [ROA] and return on equity [ROE] in the years before 1995) is correlated with CEOs'

temporal and spatial attention. We find no evidence of this. The correlation between ROA in 1994 and future, external, and internal focus is  $-.04$  ( $p = .61$ ),  $.03$  ( $p = .64$ ), and  $-.02$  ( $p = .78$ ), respectively. Similar results hold for ROA in 1992 and 1993 and for alternative measures of performance, such as ROE, in these years. Second, we reestimate Equations 1–4 with an additional control for banks' performance (ROA and ROE) in 1994 (we also do the analysis for 1993 and previous years). We find that the results remain robust to this additional analysis. The ROA and ROE variables are mostly nonsignificant, and the direction and significance for our hypothesized variables are largely as in Tables 4, 5, and 6. Thus, it appears unlikely that firm performance offers an alternative explanation for our findings.

## Discussion

### *Insights and Limitations*

In this article, we argue that CEOs have a direct, positive, and long-term impact on innovation outcomes in firms. Specifically, we show that the manner in which CEOs exercise their discretion to allocate scarce attentional resources has significant implications for the innovation outcomes of the firm over a long period. Our view is different from much existing research, which often views CEOs as (1) impediments to innovation, (2) irrelevant for innovation, or (3) having an indirect effect on innovation. The attentional perspective we advocate also contrasts with existing literature that tends to view the effects of leadership through the lens of observable characteristics, such as personality, demographics, or leadership style (e.g., Kitchell 1997). Little is actually known about the link between how leaders think and the specific innovation outcomes that occur in the marketplace. This research effort, which focuses on CEO cognition, represents a first step toward fully understanding the nature of this link.

Using longitudinal data from the U.S. retail banking industry, we find support for the hypothesized link between CEOs' attentional focus and innovation outcomes. Specifically, we find that firms with CEOs who attend to the future more are (1) faster at detecting new technological opportunities, (2) faster at developing initial products based on these technologies, and (3) better at deploying these initial products.

The results are mixed for CEOs' attention to the external and internal environment. We find that firms whose CEOs attend more to the external environment are (1) faster at detecting new technological opportunities and (2) faster at developing initial products based on these technologies than are firms whose CEOs attend less to the external environment. However, we find no link between CEOs' external focus and breadth of deployment.

Finally, we find that firms whose CEOs direct more attention to the internal environment are (1) slower at detecting but (2) faster at developing new technological opportunities than firms whose CEOs attend less to the internal environment. However, we find no link between CEOs' internal focus and breadth of deployment. Thus, overall, we find support for six of our nine attention-based

hypotheses. These findings are particularly noteworthy because even with fairly coarse text-based measures of attention, we find a strong link between what CEOs attend to and what their firms achieve in specific innovation outcomes in subsequent periods. Taken together, this underscores the importance of the primary substantive issue that motivated this research effort—namely, that innovation research in marketing and related disciplines can make significant progress by more closely examining CEOs' attentional foci.

Regarding our longitudinal data set and method, we establish a clear temporal separation between the measurement of our independent variables (i.e., attention patterns of a firm's CEO) and innovation outcomes (i.e., detection, development, and deployment of new technology related to Internet banking). Thus, our approach addresses an often-mentioned criticism of cross-sectional survey-based research that investigates such issues. Furthermore, our text-based method represents an innovative approach to assess attentional patterns of CEOs, who are often difficult to reach through surveys.

Nevertheless, as with other studies that use text-based methods, this study has some limitations as well (see Kabanoff 1997). Our measures of attention patterns are based on letters to shareholders, which may not exclusively reflect CEOs' thought processes. A fruitful avenue for further research would be to assess CEO attention more directly, instead of relying on indicators of CEO attention. Finer-grained longitudinal data on individual firms are necessary to explore more fully the actual causal sequence of events (see Mintzberg and Waters 1985) that leads to innovation outcomes.

In general, this research examines a fairly simple set of drivers of innovation. Although simplicity can be powerful and desirable, more complex explanations of innovation can yield additional insights. First, it is possible to think of all three components of innovation (detection, development, and deployment) in terms of level and speed. Because we do not have reliable data on both these dimensions for all three components, we do not examine them here. Second, we do not distinguish between innovations that were developed internally in a firm and those that were developed by external entities. Third, we hypothesize (and find in our empirical context) that an external focus promotes innovation within firms. Further research could examine the boundary conditions of this phenomenon. Fourth, more detailed information on general organizational culture, incentives, research-and-development expenditures, and CEOs' functional backgrounds can address whether these variables play a more important role in driving innovation than the attentional variables we discuss in this research. Fifth, given the presence of directional hypotheses, we use one-tailed tests of statistical significance. Greater data availability and finer-grained measures would permit the use of more conservative tests of significance. Finally, given our focus on the drivers of innovation, we do not examine the stock market or performance outcomes of innovation (see Sorescu, Chandy, and Prabhu 2003).

## ***Implications for Practice***

*Manage the future.* This article argues and shows that CEOs are the heads of firms in more ways than one. They lead the firm by directing the attention of others in the organization toward thoughts and actions that ensure the survival and growth of the firm, and they think for it by focusing their attention on the future and the environment. We show that firms can particularly benefit from CEOs who focus on the future and not merely on the spatial environment as prior research suggests. Our findings suggest that CEOs who do not focus on the future do poorly at innovation and might be doomed to sink and take their firms with them.

It may be tempting to think that the CEOs of most firms, recognizing the significance of the issues we highlighted, must already be making a concerted effort to emphasize forward thinking. Although detailed data on how CEOs actually allocate their attention are difficult to obtain because of the obvious reasons of confidentiality and lack of access, Hamel and Prahalad (1994, p. 4) estimate that "senior management is devoting less than 3% ... of its energy to building a corporate perspective of the future." In our data set of 867 letters to shareholders from 176 public firms, only 9.21% of all thoughts (sentences) were categorized as future focused. Moreover, we find considerable variance in the extent to which CEOs focus on the future; the percentage of future-focused thoughts among CEOs in our data varies from 0% to 20%. A significant implication of these findings is that CEOs can influence the process of innovation in their firms simply by spending more time attending to the future.

*Focus on the big picture.* Our findings emphasize the importance to firms of CEOs who cultivate and exhibit a generic focus on the future rather than a focus on specific events or opportunities in the future. Specifically, our findings suggest that CEOs need not (and perhaps should not) involve themselves with the details of specific innovation activities, such as detection, development, and deployment, not because these details are unimportant but because, by focusing on the generic rather than the specific, CEOs can be effective leaders (in this way, they can lead their firms to successful innovation) while striving for efficient management of their scarce attentional resources. Thus, to lead innovation activities effectively and efficiently, the key challenge for CEOs is to create, maintain, and exhibit a broad, forward-looking attentional stance. We believe that our findings offer a useful means for CEOs to free up scarce attentional resources while being effective leaders.

*Remember the internal audience.* Letters to shareholders are often viewed as a means to communicate with external audiences, such as regulators and shareholders (e.g., Abrahamson and Amir 1996); they are rarely considered an internal marketing device. A key implication of this study is that letters to shareholders have a crucial internal purpose as well. They can be a powerful tool to galvanize employees within firms into committing resources to activities that are vital to the firm's long-term survival and growth. As with advertising (Gilly and Wolfinbarger 1998), letters to share-

holders might motivate employees by making them proud to belong to the organization. More important, they can help charge employees with a vision that aligns their goals with those of the firm and drives them to perform actions that benefit the firm. Firms may benefit from a better understanding and use of this important tool to motivate and manage employees.

*Prepare for the innovation journey.* A final managerial implication of this study stems from its emphasis on innovation as a process rather than as a discrete event. We show that innovation is more than product development alone; firms must first detect technological opportunities and then refine and extend products to deploy them well. Firms and CEOs that understand this will succeed at the Herculean task of detecting, developing, and deploying new technologies over a long period and then repeating the cycle again at the next sign of change.

### **Implications for Research**

*Put the head back on.* Despite calls to raise the profile of marketing in the upper echelons of the firm (Kumar 2004; Webster, Malter, and Ganesan 2005), the links between top management and marketing activities are still relatively unexplored in the marketing literature in general and the innovation literature in particular. Indeed, much work in marketing (on innovation) regards the firm as a sort of headless machine that goes about its work without any particular direction from the top. Outside marketing, the literature that examines the role of the CEO in innovation often emphasizes his or her negative or indirect influence. We correct for these views by “putting the head back on the firm” and emphasizing the direct, positive role of the CEO in innovation. Specifically, we show that CEO attention matters and that its effects on specific innovation outcomes persist and are evident over a long period. We also find that not all types of CEO attention are equal. A focus on the future appears to be more crucial than a focus on the external environment. In some ways, a focus on the internal environment can be a drawback. Whereas prior research has examined the influence of a firm’s external and internal focus on innovation (Day 1994; Hurley and Hult 1998; Jaworski and Kohli 1993; Miles and Snow 1978), less research has emphasized the importance of a focus on the future. This article suggests that further research should

more closely examine CEO attention in general and its temporal dimension in particular.

*Leverage letters to shareholders and text analysis.* This research demonstrates the importance of a relatively underused tool to research questions pertaining to CEO cognition and innovation—namely, firms’ letters to shareholders. Using these letters and techniques that employ text analysis enables us to circumvent many of the problems related to surveys. Among the many benefits of letters to shareholders are that they enable us to study the managerial cognition, they are public documents that require and involve some objectivity and accountability, and they are easily available with regularity over multiple periods. This article suggests that further research has much to gain from their use, along with the more general application of text analysis to other sources of textual data on the managerial cognition, such as press releases, archival material within firms, and interviews with top managers. Indeed, finer-grained measures of attentional foci would allow for stronger tests of our underlying conceptual arguments.

*Look beyond product development.* This article argues and shows that innovation is a process that unfolds over a long period. In contrast to much of the literature that views innovation as a discrete event or, at best, a process that involves the development and launch of new products, we show that innovation also involves the prior stage of detection and the subsequent stage of deployment. Moreover, the impact of CEO attention on these three outcomes is not straightforward; rather, its impact is strongest on detection, followed by development and then deployment. Thus, our research shows that a focus on any one aspect of innovation alone can mask the full effects of the drivers of innovation. This is in contrast to previous research that has acknowledged the impact of CEOs on product development indirectly through their role in supporting product champions. In general, however, the research is silent on the role of the CEO on other aspects of innovation. Further research could shed more light on these issues by studying how attentional patterns translate into specific actions pertaining to innovation. Such research could help enrich the attentional perspective we present and could begin to address the issue of leadership that Van de Ven (1986) identifies as a central problem in the management of innovation.

**APPENDIX**  
**Dictionaries for Automated Coding**

External Focus		Internal Focus	
Customers	Competitors	Organizational	
Customer	Competitive	Organization	CEO
Customers	Competitiveness	Organizational	President
Consumer	Competitor	Reorganization	Vice-president
Consumers	Competitors	Management	Vice-presidents
Buyer	Compete	Retire	Director
Buyers	Competition	Retired	Directors
Market	Peer	Retirement	Officer
Markets	Peers	Employee	Officers
Market-place	Companies	Employees	Subsidiary
Marketplace	Banks	Staff	Subsidiaries
Communities	Firms	Stakeholder	Diversification
	Position	Stakeholders	Diversify
	Positioning	Board	Diversified
	Positioned	Manager	
		Managers	

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