A clear corporate strategy communication can be a signal to financial analysts and public investors at the time of an initial public offering (IPO). This study examines IPO prospectuses of 57 biotechnology firms listed on the NASDAQ between 1997 and 2002. Using regression analysis, this article shows that the clarity, intensity, and consistency of the corporate strategy signal are not strong enough to affect the 1st-day initial returns. However, consistent communication of a prospector strategy negatively impacts 30-day initial returns, whereas consistent communication of a defender strategy positively impacts 30-day initial returns.

Keywords: corporate strategy; communication; IPO; market signal

Uncertainty characterizes the time surrounding an initial public offering (IPO). It is difficult to predict how the market will perform following the IPO date (Ibbotson, 1975). Similarly, determining a fair market value of the firm is complex because of the newness of the firm to the market (Certo, 2003) and the entrepreneurial nature of some IPO firms (Certo,
Daily, & Dalton, 2001; Daily, Certo, Dalton, & Roengpitya, 2003). Researchers attribute this uncertainty to information asymmetry or knowledge gaps between informed and uninformed investors (Ibbotson, 1975; Ibbotson, Sindelar, & Ritter, 1988; Rock, 1986). Although some debate exists about which investors are more informed, this article takes the positions that (a) IPO issuers are more informed than public investors and (b) institutional investors are more informed than small investors (Daily et al., 2003; Ritter & Welch, 2002).

Extant research has applied signaling theory widely to address this information asymmetry dilemma (Daily et al., 2003). Signaling theory suggests that certain indicators provide signals to potential investors about the capabilities of the IPO firm and therefore the likely future value of the firm (Deeds, DeCarolis, & Coombs, 1997). Research reports that credible communication outlining important information at the time of an IPO can reduce the information asymmetry between IPO issuers and investors. So far, the types of information included in research are (a) the composition of the board; (b) the reputation of the underwriter; (c) the source and amount of venture capital; (d) the nature of the firm’s intellectual capital; and (e) the ability of those within the firm to manage knowledge. Credible communication also helps IPO issuers reduce the information asymmetry between informed and uninformed investors and maximize the value of going public (Azarmi, 2002; Bukh, Nielsen, Gormsen, & Mouritsen, 2002; Carter, Dark, & Singh, 1998; Certo et al., 2001; Megginson & Weiss, 1991; Neck, Welbourne, & Certo, 2000; Rosenstein & Wyatt, 1997). One possible explanation for the link between credible communication and the value of an IPO is that shareholders increasingly seek strategic information (such as the information described above) in order to explain an investment opportunity (Brown, 1997; Desai, 2000; Higgins & Diffenbach, 1989; Neck et al., 2000).

A group of studies reports that communication on corporate strategy received by the stock market has a significant impact on the value of shares in the market (Day & Fahey, 1990; Higgins & Bannister, 1992; Higgins & Diffenbach, 1985; Parnell & Wright, 1993). However, we are not aware of any published studies that empirically examine the relationship between corporate strategy communication and returns to IPO investors on both the 1st day and in the short-term after-IPO market (e.g., 30-day returns). This oversight is surprising because the communication of corporate strategy has been extensively argued to affect the market price and shareholder value in the long after-IPO market (e.g., a year or more after the event; Day & Fahey, 1990; Desai, 2000; Higgins & Bannister, 1992; Higgins &
Diffenbach, 1985). This article proposes that the communication of corporate strategy at the time of an IPO provides cues to assist analysts and investors in deciding whether or not to invest in an IPO firm. This view becomes particularly important when the IPO firm first goes public because IPO managers must find a mechanism to communicate their firm’s quality in order to reduce the ex ante uncertainty and thus reduce the need to discount the stock price to attract less-informed investors (Daily et al., 2003). Through the credible communication of corporate strategy, investors and analysts will better understand a firm’s strategic posture, activities, and plans and then be able to assess the fit between internal resources, the firm’s corporate strategy, and the external environment in which the firm operates. Thus, by obtaining strategic information, investors and analysts are in a better position to infer the potential value of the firm (Day & Fahey, 1990). This article proposes a significant advantage for an IPO firm that provides as part of IPO documentation an overview of the firm’s corporate strategy as “information cue” (Miles & Snow, 1978).

Underpricing is generally defined as the difference between the price at which the firm’s stock was initially offered and the stock’s closing price on the 1st day of trading (Ibbotson, 1975; Ibbotson et al., 1988; Ritter, 1998). Although a number of theoretical explanations (e.g., risk-averse underwriter, information asymmetry, and bandwagon) exist for IPO underpricing, this article adopts the information asymmetry approach. Therefore, we assert that if IPO communication is credible, then underpricing will be minimized and so the 1st-day returns will be close to expected returns (Certo et al., 2001; Ritter, 1998).

Of the studies that examine the relationship between an IPO event and investor returns, most focus on the returns on the 1st day of an IPO event as an indicator of information asymmetry in the market (Bukh et al., 2002; Certo, 2003; Certo et al., 2001; Durukan, 2002; Megginson & Weiss,
However, we also propose that returns at some stage after an IPO event should be examined because of market instability and opportunistic behavior surrounding the IPO event. By taking a slightly longer term view (in this case, 30 days after an IPO event), this research controls for the effect of opportunistic investors who order stocks before the 1st day and then on-sell these stocks soon after (Finkle & Lamb, 2002; Ritter, 1991, 1998). Accordingly, this research includes both investor returns on the 1st day and 30 days after an IPO event to examine the effect of the strategy signal.

This article is structured as follows: We begin by presenting a theoretical framework, based on market signal and corporate strategy theory, before presenting research hypotheses. Next, the population of biotechnology IPO firms used in the nominated time period is described and an overview of the content analysis method used for data analysis is provided. Finally, we discuss our findings and the implications of these for both research and practice.

LITERATURE REVIEW

Corporate Strategy and Shareholder Value

Corporate strategy can influence the performance of an organization (Mintzberg, Lampel, Quinn, & Ghoshal, 2003). With a sound corporate strategy, a firm can consistently create high value through its integrated business activities; with a weak corporate strategy, the value of a firm’s business activities deteriorates (Goold, Campbell, & Alexander, 1994). Thus, shareholders see corporate strategy as an important proxy for the likely value of the firm (Day & Fahey, 1990).

Corporate strategy provides a navigation map to the investors and analysts (Desai, 2000). The effective communication of corporate strategy is important because it builds relationships with and encourages the involvement of investors and analysts (Bukh et al., 2002; Desai, 2000). Effective communication of corporate strategy can also enhance shareholder satisfaction (Higgins & Bannister, 1992) and build employee morale (Burgi & Roos, 2003). Credible communication further enables managers within the firm to crystallize and clearly articulate corporate strategy to employees and investors alike. This, in turn, helps managers reinforce or redevelop strategic choices (Burgi & Roos, 2003) and increases the confidence stakeholders place upon the strategic ability of management (Mintzberg et al., 2003).
Although those within the firm endeavor to better communicate corporate strategy, evidence suggests that shareholders also seek to better understand the strategic posture of the firm (Day & Fahey, 1990; Rapport, 1981). Possible explanations for this phenomenon are as follows: (a) The environment in which many firms operate is ever more dynamic and competitive (Brown, 1997; Lynch, 2000; Mintzberg et al., 2003; Rapport, 1981); or (b) traditional financial measures are no longer comprehensive indicators of internal management capabilities (Beattie, 1999; Eccles, Hertz, Keegan, & Philips, 2001). This second point is especially relevant with IPO firms, which often lack financial history; furthermore, any history might be distorted by a long R&D stage and negative profit (Cumby & Conrod, 2001).

Corporate Strategy as an IPO Market Signal

Spence (1973, 1974) introduces the concept of a market signal when studying the labor market to explain an observable proxy that can be used to predict unobservable attributes of the issue under examination (Spence, 1973). As an example, Spence (1973) argues that employers could use the education level of a job applicant as a signal of the likely productive capability of that applicant (Spence, 1973). Thus, market signals reduce the amount of information asymmetry between buyers and sellers and, accordingly, improve the effectiveness and efficiency of a market (Engers, 1987). For a market signal to work, the key requirements are that information (a) is observable, (b) is difficult to alter, (c) is costly to produce and change, (d) is difficult to imitate, (e) reduces asymmetry between signal senders and receivers, and (f) is persistent (Riley, 1975; Spence, 1973, 1974).

This study classifies IPO prospectuses as a market signaling activity because the IPO prospectus attempts to reduce information asymmetry between those buying and selling stocks in the IPO firm. Based on market signaling literature, the following observations are made to support the positioning of corporate strategy communicated from IPO prospectuses as a market signal. First, the corporate strategy of an IPO company is an observable and easy-to-notice piece of information from an IPO prospectus (Marino, Castaldi, & Dollinger, 1989). The IPO prospectus provides greater detail about a company’s strategic planning, products/markets, and management structure than any other form of communication (e.g., press releases, road shows, advertisements) and so has the potential to capture investors’ attention at the time of the IPO event. Prospectuses are widely used by investors and their reference groups (e.g., analysts) to understand
the likely value of the firm (Cumby & Conrod, 2001; Marino et al., 1989; Song, Rhee, & Adams, 2001).

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Second, prior to publication, the strategic information communicated in an IPO prospectus can be altered by managers (Meek, Roberts, & Gray, 1995). Once published, however, managers need to implement those strategies in order to win the ongoing trust from investors and analysts.

Third, the establishment and communication of a firm’s corporate strategy are costly, risky (Porter, 1980), and difficult to imitate. Due to the nature of the corporate strategy in addressing multiple dimensions of a business, its formulation and implementation are a gradual and costly process (Doty, Glick, & Huber, 1993; Miles & Snow, 1978; Parnell & Wright, 1993). A strategy will be seen as credible when there is a perceived fit between the strategy itself and the context within which the firm operates, for example, the product/market environment, technology environment, and management structure (Doty et al., 1993; Miles & Snow, 1978). The requirement for fit makes imitation by competitors difficult. A “hurried” announcement of a corporate strategy may lead to a negative reaction from the market because investors and their reference groups will evaluate the firm’s performance based on the announced strategic plan (Day & Fahey, 1990; Higgins & Bannister, 1992; Higgins & Diffenbach, 1985, 1989).

Fourth, strategic information asymmetry exists between the management team in an IPO firm and outside investors in the IPO market (Beatty & Ritter, 1986; Rock, 1986). This information asymmetry can be reduced when investors accept corporate strategy as a cue. Through the clear identification of corporate strategy, investors and analysts can better understand a firm’s strategic posture, activities, and plans and assess the fit between internal resources and the external environment in which the firm operates. Investors and analysts are therefore in a better position to infer the potential value of the firm, taking into account other financial performance data (Day &
Fahey, 1990). In addition, the information disclosure of a public firm following an IPO is persistent (Baruch, 1992) and either reinforces or diminishes the signal. This article proposes a significant advantage for an IPO issuer that provides an overview of the firm’s corporate strategy as information cue (Miles & Snow, 1978) as part of the IPO documentation.

Miles and Snow Strategy Typology

Having established the importance of corporate strategy as a market signal, this article now considers types of strategy. In this study, the Miles and Snow strategy typology is used to classify the corporate strategy communicated during an IPO event. Compared with other typologies (Ansoff, 1965; Mintzberg, 1987; Porter, 1980), the Miles and Snow typology focuses more on the strategic intentions of the firm rather than actual strategic performance. This typology is particularly useful at predicting the likely future strategic behaviors and performance of the firm (Doty et al., 1993; Segev, 1989; Shortell & Zajac, 1990) and so is appropriate for IPO firms. The Miles and Snow strategy typology also enables an integrated and systematic examination of the strategic patterns of the firm (McDaniel & Kolari, 1987; Zahra, 1987).

The Miles and Snow (1978) typology addresses three problems a firm might confront: entrepreneurial (product/market) problems, technological (engineering) problems, and administrative problems. The classification of firms into one of four strategy types—prospectors, defenders, analyzers, and reactors—depends on how a firm addresses these three basic problems.

Prospectors perceive a dynamic, uncertain environment and maintain flexibility in order to compete in the market (Parnell & Wright, 1993). As such, prospectors usually target broad markets and continually search for new market opportunities. Prospectors are creators of change and uncertainty, to which their competitors must respond (Shoham, Evangelista, & Albaum, 2002). To maintain the advantage of innovation, prospectors tend to possess a loose structure, low division of labor, and low formalization and centralization (Parnell & Wright, 1993).

Defenders perceive a stable and certain environment and thus seek stability and control in their operations in order to achieve maximum efficiency (Parnell & Wright, 1993). Defenders have narrow product/market domains (Miles & Snow, 1978) and defend them aggressively (Shoham et al., 2002). New product development primarily relates to existing products and markets (Miles & Snow, 1978). Because of this narrow focus, defenders improve the efficiency of their existing operations with a cost-efficient, single-core
Table 1. Definitions of Index Variables Used in the Content Analysis of Initial Public Offering (IPO) Prospectuses

**Index 1: Strategic Objective (Miles & Snow, 1978)**

(1) Pursue the development of a diverse portfolio of innovative products or services (P).
(2) Pursue the development of innovative products or services based on high quality, cost-effectiveness, and efficient operation (A).
(3) Pursue high quality, cost-effective products or services through efficient operations (D).

**Entrepreneurial (product/market) Dimension**


(1) Always initiate, create new ideas, new products, or new services (P).
(2) Focus on products currently developed and selectively follow pioneers, once the promise of their innovative products or services is demonstrated. Alternatively, pursue product innovation based on proven evidence from the existing product/market space of pioneers (A).
(3) Few new products or services are currently developed or are likely to be developed in the near future. Any new products under consideration are likely to be closely related or complementary to existing products or services (D).

**Index 3: Product/Market Breadth (Conant, Mokwa, & Varadarajan, 1990)**

(1) Continually changing and broader in nature throughout the organization and marketplace (P).
(2) Fairly focused in certain markets, while pursuing innovative opportunities in other markets (A).
(3) Well focused, relatively stable, and consistently defined (D).

**Index 4: Risk Taking (Zahra, 1987)**

(1) Aggressive. Recognizes risks and threats from new product and market development, but still willing to pursue (P).
(2) Moderate. Maintains stability in current business while also moving into new markets but with careful risk analysis, based on proven evidence (A).
(3) Conservative. Little attempt to try risky projects or new areas (D).

**Index 5: Success Posture (Conant, Mokwa, & Varadarajan, 1990)**

(1) A reputation as a first mover, innovator, and change creator (P).
(2) Achieves high quality, cost-effectiveness, and operational efficiency in current products/markets but also pursues an image of innovator in newly developing products/markets (A).
(3) Has an image of offering products or services that are in high quality, cost-effectiveness, or operational efficiency (D).

**Technological Dimension**

**Index 6: R&D Focus (Snow & Hrebiniak, 1980; Weisenfeld-Schenk, 1994)**

(1) R&D focuses on innovative and basic research areas, rather than the application of basic technology (P).
(2) Mainly focuses on applied research with regard to certain basic and proven technology (A).
(3) Intends to pursue the extension of current business by predominantly applying engineering ability (D).
Index 7: Production Capacity (Miles & Snow, 1978)

(1) Enters into an agreement with a third-party manufacturer for the supply and production of products, and intends to outsource the production rather than develop production capacity (P).
(2) Develops own production capacity; will also outsource some production to a third party (A).
(3) Develops own competitive production capacity (D).

Index 8: Technological Adaptation (Conant, Mokwa, & Varadarajan, 1990)

(1) Adoptions prototypical, flexible technologies to adapt to the dynamic environment (P).
(2) Dual focus on technological improvement in currently developed products and technological synergism by using a set of interrelated technologies, or technology alteration (rebuilding) to develop new products (A).
(3) Focuses on technological efficiency, process improvement or product standardization, cost-efficiency, technical performance, in pursuit of applied engineering solution (D).

Index 9: Technological Breadth (Conant, Mokwa, & Varadarajan, 1990)

(1) Diverse, multiple technologies, no obvious focus on single technology (P).
(2) One core technology or technology platform, but also involved in some other innovative technologies (A).
(3) One core technology or technology platform (D).

Administrative Dimension

Index 10: Recruitment of CEO (Thomas & Ramaswamy, 1996)

(1) Recruits the CEO from outside sources (P).
(2) CEO is promoted from within (D).

Index 11: Background of CEO (Hambrick, 1983; Smith, Guthrie, & Chen, 1986; Snow & Hrebiniak, 1980)

(1) Mostly from a marketing or product development background (P).
(2) Mostly from a production or finance background (D).

Index 12: R&D Team (Miles & Snow, 1978; Snow & Hrebiniak, 1980)

(1) A large and fully dedicated R&D team engaging in new product or service development (P).
(2) A large group of applied engineers to modify product innovations (A).
(3) A moderate R&D team is built up for product extension or development closely related to current products or services (D).

Index 13: Structure (Conant, Mokwa, & Varadarajan, 1990)

(1) Product or market oriented. Top management mainly from marketing, R&D, or business development (P).
(2) Balanced structure, with top managements from functional sectors, i.e., engineering, operations, production, financial, as well as output-driven sectors, such as marketing, R&D, or business development (A).
(3) Functional in nature, top management team mainly from operations (engineering or production) or finance (D).

Note: D = defender; A = analyzer; P = prospector.
technology (Shoham et al., 2002). Defenders adopt an extensive division of labor, high formalization, and high centralization (Parnell & Wright, 1993).

Analyzers simultaneously highlight stability and flexibility and attempt to take advantage of both the prospector and defender strategy types (Parnell & Wright, 1993). Analyzers operate in two types of product/market domains, one relatively stable and the other changing (Miles & Snow, 1978). They seek efficiency in stable areas with formalized structures and processes. At the same time, analyzers monitor their competitors closely for new ideas in more turbulent areas, preferring to imitate them rapidly. Analyzers characteristically exert tight control over existing operations and loose control over new undertakings. As Parnell and Wright (1993) note, “The strength of the Analyzer is the ability to respond (imitate) to Prospectors while maintaining efficiency in operations” (p. 30).

In stark contrast to the other three strategy types is a reactor, which lacks a consistent strategy-structure relationship and seldom makes adjustments unless forced to do so due to environmental pressures (Miles & Snow, 1978). Some researchers describe a reactor strategy as a residual or unsuccessful strategy type (Hambrick, 1983; Zajac & Shortell, 1989). This study excludes this strategy type because it is unlikely that an IPO firm will deliberately pursue or signal an unsuccessful strategy type.

The Miles and Snow strategy typology provides a functional device that enables firms to be differentiated from one another according to their product/market choices, distinctive adaptive processes, and internal structures. This, in turn, allows the firms to align to the environment in which they operate (Hambrick, 1983; McDaniel & Kolari, 1987; Snow & Hrebiniak, 1980; Woodside, Sullivan, & Trappey, 1999). Table 1 summarizes the characteristics of each strategy type and subdomains used in this study. This study presents an IPO prospectus as a market signaling device that provides accurate insights into the firm’s potential (Daily et al., 2003) and reduces information asymmetry between managers and those buying and selling stocks in the IPO firm. This article claims that IPO prospectuses, as part of the IPO market signaling event, provide an opportunity for analysts and potential investors to capture multiple dimensions of a company’s corporate strategy. Against this backdrop, we suggest the following research proposition: An IPO prospectus provides a tool to signal a firm strategy type.

Signal Quality

So far, we have established an IPO event as an opportunity to signal the IPO firm’s corporate strategy to the market. We now propose three indices
that can be used to understand the quality of the strategy signal, namely, clarity, intensity, and consistency.

Signal clarity. Extant research finds that an effective signal should be observable and clear (Certo et al., 2001) so that market participants can easily capture the signal (Eliashberg & Robertson, 1988; Spence, 1973, 1974). This article proposes that IPO prospectuses allow IPO firms to present a corporate strategy type by stating their intention to favor one strategy type over another. If the IPO prospectus clearly states the firm’s corporate strategy, the prospectus reader will quickly grasp and understand the intended corporate strategy (Heil & Robertson, 1991). Clear understanding of the firm’s strategy will then encourage the investors or analysts to assess other strategic information, such as the structure of the firm and its adaptive processes (Baruch, 1992).

Signal intensity. Scholars suggest that frequently communicated signals are likely to capture the audience’s attention (Riley, 1975; Spence, 1974, 2002). The audience will grasp the signals and subsequently use them to infer the firm’s intended strategy type.

Signal consistency. Signal effectiveness also depends on signal consistency (Riley, 1975), which means that firms need to consistently communicate multiple signals from different dimensions and show little contradiction across dimensions. However, past IPO communication research has not investigated this aspect of signal quality; signals under investigation are typically simple, unidimensional, and focused (Certo et al., 2001; Megginson & Weiss, 1991; Neck et al., 2000). A clear and intense articulation of the firm’s strategy type alone will not enhance strategy credibility; a firm also needs to show consistent evidence of a fit between strategy dimensions in order to establish strategy credibility (Miles & Snow, 1978). Therefore, this article further employs signal consistency across the dimensions of corporate strategy to examine the overall quality of corporate strategy signals—something not done in other IPO studies.

Having identified the characteristics of a credible market signal, how can a firm determine whether it has been successful in signaling corporate strategy from an IPO event? To date, a small number of studies apply signaling perspective to understand an IPO event and its performance (e.g., Carter et al., 1998; Certo et al., 2001; Megginson & Weiss, 1991; Neck et al., 2000; Rosenstein & Wyatt, 1997). Most of these studies examine the effect of IPO signals on the 1st day of initial returns (i.e., underpricing) as
an indicator of whether or not market signaling has reduced information asymmetry between informed and uninformed investors (Carter et al., 1998; Certo et al., 2001; Megginson & Weiss, 1991). These studies justify the 1st-day returns based upon market efficiency theory, which suggests that the market responds immediately to information.

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In this study, we work with both the 1st-day and 30-day market returns. We propose that the credible communication of corporate strategy will result in a very small gap between the offer and 1st-day price and, therefore, very little underpricing. We also propose that the three components we have identified as indicating a credible market strategy signal (clarity, intensity, and consistency) will have a negative impact on underpricing because they work to reduce information asymmetry between informed and uninformed investors. Accordingly, this study suggests the following research hypotheses:

Hypothesis 1a: The clarity of the firm’s communication of its corporate strategy relates negatively to IPO underpricing on the 1st day of the IPO.
Hypothesis 1b: The intensity of the firm’s communication of its corporate strategy relates negatively to IPO underpricing on the 1st day of the IPO.
Hypothesis 1c: The consistency of the firm’s communication of its corporate strategy relates negatively to IPO underpricing on the 1st day of the IPO.

As previously mentioned, this study also includes the signaling effects of corporate strategy communication on returns 30 days after an IPO event for two reasons. First, opportunistic investors, who are more attracted by the potential for underpricing, might not be affected by the corporate strategy communicated in the IPO prospectus. This is especially the case for biotechnology IPOs where faddish purchasing behavior, due to overoptimism of the likely “abnormal return” from IPOs, is frequently present (Finkle & Lamb, 2002; Ritter, 1991, 1998). Second, analysts and investors...
may need time to read, understand, and evaluate the corporate strategy communicated in IPO prospectuses (Baruch, 1992; Bukh et al., 2002), so they will have a better understanding of the IPO value after a period of time. Therefore, the effective communication of corporate strategy might reduce 30-day initial returns by taking a slightly longer term view of underpricing. This article also investigates 30-day returns after the IPO event. This backdrop informs the following hypotheses:

**Hypothesis 2a:** The clarity of the firm’s communication of its corporate strategy relates negatively to 30-day IPO returns.

**Hypothesis 2b:** The intensity of the firm’s communication of its corporate strategy relates negatively to 30-day IPO returns.

**Hypothesis 2c:** The consistency of the firm’s communication of its corporate strategy relates negatively to 30-day IPO returns.

Figure 1 shows the conceptual framework that the hypotheses suggest.
METHOD

This article reports the findings of a single industry study: the biotechnology industry. The biotechnology industry is characterized by emerging, diverse, fast-moving, and hard-to-value products (Ranchhod, Gurau, & Lace, 2002; Weisenfeld-Schenk, 1994). Accordingly, these characteristics are likely to drive biotechnology IPO firms to employ signals in order to reduce uncertainty for investors. This research analyzes the prospectuses of 57 biotechnology IPOs, representing the entire population of biotechnology IPOs listed on the NASDAQ between 1997 and 2002.

Bhabra and Pettway (2003) find that prospectus information is more useful for predicting survival/failure compared with subsequent information. Thus, the vast majority of IPO signal studies rely on information available from prospectuses (Cohen & Dean, 2001; Daily et al., 2003; Neck et al., 2000).

The analysis includes two stages. The first stage applies content analysis, which allows us to test our research proposition that an IPO prospectus can be used to identify corporate strategy communication signals. The study applies a three-phase approach to content analysis. Phase 1 establishes 13 index variables using the Miles and Snow (1978) typology of strategy and develops operational definitions for these variables (see Table 1). This phase also includes the construction of a coding scheme (i.e., coding book, coding category table, and coding sheet). We provided a separate column in the coding sheet that allowed recording of a fourth, ambiguous signal class besides D (defender), A (analyzer), and P (prospector) for the three signal characteristics of clarity, intensity, and consistency. This coding allows for the three levels of class variables for each of the three characteristic types to be explicitly specified and tested for significance in a regression model. The fourth class, ambiguous, is appropriately conflated with the intercept, thereby eliminating unwanted linear dependence among the variables of interest.

Phase 2 includes a pilot study with two independent coders working on a subsample of IPO prospectuses to test the validity and reliability of the coding scheme developed in Phase 1. The first author of the article and an independent coder participated in the pilot coding process. The independent coder was experienced in the method of content analysis and familiar with the Miles and Snow strategy typology. The coders placed “+” on the coding sheet and entered this as “1” in the database when the coders identified an index variable from a case; otherwise, they used “–” and entered “0.” Our research used the Perreault and Leigh (1989) index of
reliability to test for intercoder reliability. In the first pretest, the reliability indices for the coding of two prospectuses were 62% and 73%, respectively. By comparing the coding notes, the disagreements were mainly attributed to ambiguous descriptions of operational definitions of index variables. Subsequently, the coding scheme was revised to improve the clarity of the definitions. A second pretest was then conducted to confirm the improvement in coder reliability. The reliability index was increased to 80%, which met recommended norms (Neuendorf, 2002; Perreault & Leigh, 1989). After establishing an acceptable reliability index, the coders worked independently (Perreault & Leigh, 1989).

Phase 3 applies the final coding scheme against the full sample of IPO firms. During the coding process, we focused on examining the communication of strategy in terms of quality of the content of strategic information. The coders gave particular attention to the standardized section of the IPO prospectus “business strategy” but also considered other parts of the prospectus related to strategic information. The coders searched for all relevant information associated with the Miles and Snow typology types throughout the prospectuses and filled out the coding sheet, referring to the coding book for guidance.

The second stage applies multiple regression analysis to examine the relationship between the quality of signals—clarity (CLA), intensity (IN), and consistency (CON)—and initial returns (IR) of the 1st day (IR₁) and 30 days (IR₃₀) after the IPO event. The initial regression model and description of measures follows:

\[
IR_t = \alpha + \beta_1 \text{CLA}_D + \beta_2 \text{CLA}_A + \beta_3 \text{CLA}_P + \beta_4 \text{IN}_D + \beta_5 \text{IN}_A + \beta_6 \text{IN}_P + \beta_7 \text{CON}_D + \beta_8 \text{CON}_A + \beta_9 \text{CON}_P + \varepsilon
\]

where \(IR_t\) stands for initial returns from Day 1 (IR₁) or on Day 30 (IR₃₀)

\[
IR_1 = (P_1 - P_0) / P_0
\]

\[
IR_{30} = (P_{30} - P_0) / P_0
\]

\(P_0\) represents the offer price

\(P_1\) represents the closing price at the 1st day

\(P_{30}\) represents the closing price at the 30th day

\(\text{CLA}_j\): 1 if the firm’s statement of “strategic objective” otherwise 0

\(\text{IN}_j\) stands for the degree of intensity for signaling strategy \(j\) from IPO prospectuses, measured by the number of index variables for strategy \(j\).

\(\text{CON}_j\) stands for the degree of consistency for signaling strategy \(j\) from IPO prospectuses, measured\(^1\) by “\(\frac{\sum (\text{IN}_{kj})}{3} - \frac{(\sum \text{IN}_j)^2}{3}\)”

\(j \in (D, A, P)\) where \(D\) = defender; \(A\) = analyzer; \(P\) = prospector.
This study also added control variables to the above models: firm size (FS), firm age (FA), venture capital back up (VC), and underwriter reputation (UV), where the fixed variables were significant. Firm size and age have served as surrogates for uncertainty for potential investors because large firms are perceived as having access to a greater pool of resources required for survival and growth; more established firms have provided more published data from which investors can base expectations on (Daily et al., 2003). Therefore, we proposed that the size of the firm, as measured by the market value of equity, and the age of the firm, as measured by the number of years, be used as control variables. We expected that larger firms and more established firms would have a negative impact on underpricing.

Because of the active role of venture capital in financing and advising an IPO firm’s strategy and management, and providing access to other key stakeholders such as customers and suppliers, the presence of venture capital might signal the stronger performance prospects of the IPO firm (Daily et al., 2003; Megginson & Weiss, 1991). In this study, we used a binary variable to indicate whether or not venture capital was present. We proposed that the presence of venture capital would have a negative impact on underpricing.

Prestigious underwriters with reputations for effectively taking firms public and protecting them can also signal less uncertainty for potential investors (Carter et al., 1998; Daily et al., 2003). We proposed that a strong underwriter reputation will have a negative impact on underpricing.

Past research has examined the negative impacts of FS, FA, VC, and UV on the initial returns on the 1st day. We are not aware of any study that examines these factors on initial returns after 30 days (Carter et al., 1998; Certo et al., 2001; Daily et al., 2003; Megginson & Weiss, 1991; Neck et al., 2000; Ritter, 1998). Thus, the extended model specifications with the above four control variables included are stated as follows:

\[
IR_t = \alpha + \beta_1 CLAD + \beta_2 CLA_A + \beta_3 CLAp + \beta_4 IN_D + \beta_5 IN_A + \beta_6 INp + \beta_7 CON_D + \beta_8 CON_A + \beta_9 CONp + \beta_{10} FS + \beta_{11} FA + \beta_{12} VC + \beta_{13} UV + \varepsilon \quad (2)
\]

Due to the very small sample sizes, 49 and 41, respectively, for the 1-day and 30-day responses, and relatively high multicollinearity, additional data reduction measures were employed to simultaneously reduce the risk of Type II, or false positive, errors in the inferences and the risk of both Type I and Type II errors due to model bias and multicollinearity and heteroscedasticity (Hair, Anderson, Tatham, & Black, 1998). Therefore, tables of correlation between the response variable and all predictor variables were inspected, and only the predictor variables with the highest
correlations were included directly in the final models. All other variables were dimensionally reduced using principal components analysis and varimax rotation. The number of principal components included in the rotated solution was determined by both unit communality and scree plot slope considerations. This simultaneously reduced the number of predictor variables in the models to a maximum of five per observation, minimized the number of sequential model inferences and the associated cumulative Type II error, decreased the heteroscedasticity from 20:1 to an acceptable variance ratio of 3:1, and reduced the multicollinearity of the final models from Condition Index values of much greater than 30 to acceptable levels of less than 5 (Hair et al., 1998). Because there is no closed form solution for estimating the cumulative Type II errors associated with sequential model $F$ tests and parameter $t$ tests over multiple models and datasets, the cumulative Type II error of all final inferences was estimated using a bootstrap resampling technique (Efron, 1982). Only sequential sets of models and inferences that constrained the Type II error rate to below 0.5 were considered reliable enough to report here.

The final models selected were as follows:

$$
\begin{align*}
IR_1 &= \alpha + \beta_1 \text{FIX}_1 + \beta_2 \text{FIX}_2 + \beta_3 \text{FIX}_3 + \beta_4 \text{FIX}_4 + \epsilon \\
IR_{30} &= \alpha + \beta_1 \text{ALLBUT}_1 + \beta_2 \text{ALLBUT}_2 + \beta_3 \text{ALLBUT}_3 + \beta_4 \text{ALLBUT}_4 + \beta_5 \text{ALLBUT}_5 + \epsilon \\
\text{and} \\
IR_{30} &= \alpha + \beta_1 \text{COND} + \beta_2 \text{CONP} + \epsilon
\end{align*}
$$

where $\text{FIX}_i$ stands for the $i$th principal component formed from all the fixed effects specified in Model Specification (1) above for the 1-day response $IR_1$; $\text{ALLBUT}_k$ stands for the $k$th. Principal components formed from all of the fixed (hypothesis) and random (control) effects in Model Specification (2) above but for the two fixed effects specified separately in Model Specification (5) above.

**RESULTS AND CONCLUSIONS**

To help the readers understand how we interpreted signal clarity and consistency in our coding process, we now present some examples taken from this study. An example of a clearly communicated prospector strategy follows:

Our principal objective is to build a leading biopharmaceutical company that discovers, develops, and commercializes new and superior drug products.
By contrast, an ambiguous presentation of the intended strategy adds a level of difficulty for the investors or analysts who endeavor to interpret the firm’s strategic reasons for movements and plans. For example,

Our principal objective is to commercialize products and technologies in the field of human health care as we establish a leadership position in proteomics and functional genomics.

This statement of strategic objective does not clearly specify whether the leadership position is in R&D (prospector), technology application (analyzer), or manufacturing (defender). Therefore, we consider this an ambiguous presentation of the intended strategy.

The following examples present consistent communication of a firm’s prospector strategy on the product/market dimension.

We are a pioneer in the new field of industrial genomics.
We currently have six product development programs targeted at a wide range of diseases.

However, further on in the prospectus,

By providing research tools, we participate in the revolutions in genomics, the study of genes, and proteomics, the study of proteins, without bearing the risks inherent in attempting to discover new drugs.

The above statement shows that the company is presenting itself as conservative and one that attempts to avoid risky projects. We coded this statement as indicative of a defender rather than a prospector. However, the first two statements were coded as that of a prospector. Hence, the company has an inconsistent presentation of product/market dimension.

By including other dimensions, communication of the prospector strategy should be consistent to establish the credibility. An exemplar prospector firm would show (a) a strong focus on innovative and basic research, (b) the wide application of technologies, and (c) the multiple diverse technologies on the technological dimension. The following are illustrations from exemplar firms’ prospectuses:

Our innovative technology and corporate collaborations enable us to create value through the discovery of novel drug targets.
Our technologies are applicable across a broad range of diseases and disorders.
We have developed two core technologies that we believe enhance our ability to simultaneously identify and initially validate new drug targets for further development.
Contrasting examples are as follows:

We pursue opportunistic acquisitions of complementary technologies and leverage our technologies into other value-added businesses. We have focused our discovery efforts on our core technology. We believe that our core technology is substantially more cost-effective and provides higher throughput than available commercial alternatives.

The above statements indicate the firm’s focus on core technology, technology improvement, and cost-effectiveness rather than discovery of diverse innovative technologies and innovation. We coded these contrasting examples as an analyzer or defender rather than a prospector.

An exemplar prospector firm would show (a) a strong focus on innovative and basic research, (b) the wide application of technologies, and (c) the multiple diverse technologies on the technological dimension.

The following examples show the difference between consistent communication and inconsistent communication on the administrative dimension. A consistent communication highlights the high percentage of R&D staff, and the R&D or marketing background of the CEO and the focus of top management on R&D and marketing. For example,

As of June 30, 2000, we had 128 full-time employees, 98 of whom comprise the research staff and are engaged in research, development, and scale-up activities. Our top management team members are mainly from R&D, marketing, and business development sectors. Our president, chief executive officer, and a member of our board of directors, Dr. . . ., joined us in January 1997. . . . During his 10 years at . . ., he was responsible for business development, sales, and marketing functions.

By contrast, inconsistent communication on the same dimension may indicate the low percentage of R&D staff, the engineering background of the CEO, and the focus of the top management on operations and financial management. Specific examples are as follows:
As of December 31, 2000, we employed approximately 247 persons, of whom approximately 43 employees are engaged in research and development, 21 in business development, sales, and marketing, 162 in operations and manufacturing, and 21 in intellectual property, finance, and other administrative functions.

. . . has served as our president, chief executive officer, and a director since October 1999. Prior to joining us, Mr. . . . was vice president of engineering.

Our top management team is composed of the president, chief financial officer, and chief operating officer.

The above sets of examples show how we interpreted signal clarity and signal consistency. These have some practical implications for the IPO communication of strategic management. The IPO firms should place importance on the clear, multiple, and consistent strategy signals through all three dimensions: (a) product/market dimension, (b) technological dimension, and (c) administrative dimension. These three dimensions establish the credibility of the strategy communication in the IPO process and reduce the confusion among the investors and analysts toward the strategy and potential value of the firm.

Table 2 provides the results for the content analysis. Line 1 shows that 60% of IPO cases clearly identified their overall strategic objectives. More specifically, 49% of IPO firms communicated a prospector strategy, whereas none of them clearly claimed an analyzer or defender strategy. Another 11% communicated a mixed strategy. Prospector signals dominated all three dimensions. This result appeared consistent with the characteristics of the biotechnology industry in which prospectors dominate (Weisenfeld-Schenk, 1994).

Table 2 also shows that the most common index signals were risk taking (100% of the IPO firms), recruitment of the CEO (100%), success posture (96%), product innovation (95%), and product/market breadth (93%). It is interesting that 57% of firms described an analyzer success posture, whereas only 26% described a prospector posture and 13% a defender posture. In addition, 46% of firms indicated their technology focus as a defender, whereas 42% indicated an analyzer management structure. This analysis clearly demonstrates that an IPO prospectus contains multiple signals to communicate strategy.

However, only 49% of firms clearly articulated an overall prospector strategy from their statement of “strategic objective.” This finding reveals that a significant portion of IPO biotechnology firms were not deliberately labeling themselves as “prospector,” even though they are in a prospector-dominated
industry (Weisenfeld-Schenk, 1994). This reluctance to identify prospec-
tor intentions may be due to an awareness of the signaling costs—that is,
a fear that the firm will be devalued by investors or analysts (Higgins &
Diffenbach, 1989) if a credible strategy and strategic fit are not demon-
strated (Doty et al., 1993; Miles & Snow, 1978).

Phase 2 of the research used regression analysis and examined the
effect of corporate strategy communication on the initial returns at the 1st
day and 30 days after an IPO event. After examining the value of IR1 and
IR30, this study selected only companies with positive initial returns for
the regression analysis (i.e., underpricing as opposed to overpricing
because of the focus of this research). As a result, the research included 49
cases for IR1 analysis and 40 cases for IR30 analysis. The authors are aware
that a relatively small number of observations in the above regression
analysis is usually discouraged but note that Type II error was constrained
and estimated and also note that the data represented a census of under-
priced biotechnology IPOs within this stock market over this study period.

The $F$ statistic for IR1, model (3) above, at 0.41, was not significant at
the .05 level (with an associated $p$ value of .80). There was no support in

### Table 2. Summary of Content Analysis Results

<table>
<thead>
<tr>
<th>Coding Category</th>
<th>Strategy Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Defender</td>
</tr>
<tr>
<td>Strategic objective</td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial (product/market)</td>
<td></td>
</tr>
<tr>
<td>dimension</td>
<td></td>
</tr>
<tr>
<td>Product innovation</td>
<td>66%</td>
</tr>
<tr>
<td>Product/market breadth</td>
<td>58%</td>
</tr>
<tr>
<td>Risk taking</td>
<td>9%</td>
</tr>
<tr>
<td>Success posture</td>
<td>13%</td>
</tr>
<tr>
<td>Technological (engineering) dimension</td>
<td></td>
</tr>
<tr>
<td>R&amp;D focus</td>
<td>25%</td>
</tr>
<tr>
<td>Production capacity</td>
<td>27%</td>
</tr>
<tr>
<td>Technological adaptation</td>
<td>21%</td>
</tr>
<tr>
<td>Technological breadth</td>
<td>46%</td>
</tr>
<tr>
<td>Administrative dimension</td>
<td></td>
</tr>
<tr>
<td>Recruitment of the CEO</td>
<td>72%</td>
</tr>
<tr>
<td>Background of the CEO</td>
<td>17%</td>
</tr>
<tr>
<td>R&amp;D team</td>
<td>15%</td>
</tr>
<tr>
<td>Structure of top management team</td>
<td>17%</td>
</tr>
</tbody>
</table>
this study for significant relationships to exist between any of the predictor variables (i.e., the clarity, intensity, and consistency of strategic signals), represented in a parsimonious and noncollinear way by their principal components, and IR₁. Thus, there was no evidence to support Hypotheses 1a through 1c, and so this research cannot conclude that effective communication of corporate strategy signal plays a role in reducing information asymmetry at the 1st day of an IPO event and therefore reducing underpricing.

Model F statistics for IR₃₀, Models (4), at 0.16 (p value = .97), and (5), at 4.25 (p value = .02), show support for the statement that the consistency of defender and prospector signals significantly impacts the 30-day initial returns, with an R² statistic of 0.18 (see Table 3). Clarity and intensity of strategic signals impacts on IR₃₀ were not supported. Hypotheses 2a and 2b are therefore rejected. In addition, no support for the prediction by any control variables of firm size, firm age, the presence of a venture capital, and the reputation of the underwriter was found in this study for the 30-day underpricing response, IR₃₀. Subsequent Type II error analysis indicates that the overall Type II error of the sequential inferences reported from the F statistics of Models (3), (4), and (5) and the t statistics for the prospector and defender consistency signals in Table 3 was limited to less than 0.44 at the .05 significance level for the F and t tests, based on 200 random resamples.

Note that, in this study, due to the need for model specification parsimony to control for Type II errors, the significance of control variables on the 1-day underpricing response, IR₁, was not explored, as their exclusion from Model (3) above does not contribute to model misspecification bias if none of the effects of interest are significant, as was the case in this study.

It is interesting that Table 3 shows that a consistent signal of a prospector strategy had a negative impact on the 30-day initial returns and this result supported Hypothesis 2c, whereas consistent signals for a defender strategy had a positive impact on the 30-day returns, and so we partially rejected Hypothesis 2c. One possible explanation is that biotechnology firms are expected to be prospectors (Weisenfeld-Schenk, 1994). Therefore, the consistent communication of prospector intentions successfully reduces the knowledge gap about the IPO firm between informed investors and uninformed investors. However, because biotechnology firms are expected to be prospectors, the consistent communication of defender intentions will increase the value differences between informed and uninformed investors.

Summarizing the above results, Hypotheses 1a through 1c were rejected in this study. The failure to identify the relationships between strategy-based signals and the 1st-day initial returns may be attributed to (a) faddish behaviors of the 1st-day investors who may pay less attention to
the strategic information, and (b) strategic information needs time to be well distributed and digested. Further on, this study did not find support for Hypothesis 2a and 2b but partially supported Hypothesis 2c. This study demonstrates that if a firm consistently communicates its strategy type from its IPO documentation, the initial returns in the short term (e.g., 30 days) after-IPO market will be affected. In the biotechnology industry, consistent communication of prospector signals reduces the knowledge gap between informed investors and uninformed investors in the 30-day after-IPO market; however, consistent communication of defender signals enhances the expectation differences among investors. The main reason for this difference can be attributed to IPO firms favoring prospector intentions.

However, because biotechnology firms are expected to be prospectors, the consistent communication of defender intentions will increase the value differences between informed and uninformed investors.

There are some limitations in this research. We investigated only IPO prospectuses and ignored other communication devices such as press releases and media reports around the IPO event. Other devices may have an important role to play at the time of the IPO, particularly in supporting

<table>
<thead>
<tr>
<th>Model (3) IR, Statistics</th>
<th>Model (3) IR, Values</th>
<th>Model (4) IR. Statistics</th>
<th>Model (4) IR. Values</th>
<th>Model (5) IR. Statistics</th>
<th>Model (5) IR. Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>–0.602 (–2.95)**</td>
<td>Constant</td>
<td>–1.059 (–3.28)**</td>
<td>Constant</td>
<td>–0.918 (–1.56)</td>
</tr>
<tr>
<td>FIX₁</td>
<td>–0.100 (–0.49)</td>
<td>ALLBUT₁</td>
<td>–0.171 (–0.52)</td>
<td>CON₉</td>
<td>+2.559 (2.51)**</td>
</tr>
<tr>
<td>FIX₂</td>
<td>+0.078 (+0.38)</td>
<td>ALLBUT₂</td>
<td>–0.027 (–0.08)</td>
<td>CON₉</td>
<td>–0.418 (–2.34)**</td>
</tr>
<tr>
<td>FIX₃</td>
<td>+0.084 (+0.40)</td>
<td>ALLBUT₃</td>
<td>–0.104 (–0.32)</td>
<td>CON₉</td>
<td>–0.418 (–2.34)**</td>
</tr>
<tr>
<td>FIX₄</td>
<td>+0.2717 (+1.05)</td>
<td>ALLBUT₄</td>
<td>–0.134 (–0.41)</td>
<td>CON₉</td>
<td>–0.418 (–2.34)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ALLBUT₅</td>
<td>+0.166 (+0.51)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F value</td>
<td>0.41 (0.799)</td>
<td></td>
<td>0.16 (0.975)</td>
<td></td>
<td>4.25 (0.022)**</td>
</tr>
<tr>
<td>R²</td>
<td>0.036</td>
<td></td>
<td>0.022</td>
<td></td>
<td>0.183</td>
</tr>
</tbody>
</table>

*Note: The cumulative Type II, or false positive, error rate over all significance inferences at the .05 level in this table is 0.44. Data in parentheses are t-statistics.
*p < .10. **p < .05.
the strategic information communicated in IPO prospectuses. Furthermore, we chose the Miles and Snow typology; other strategy frameworks such as the Ansoff typology, Porter typology, or Mintzberg typology might also provide promising insights. In addition, although a single industry study (biotechnology) over a 6-year period allows for a thorough examination in one context, it also limits the generalization of the results from this research. Measures of all three dimensions—clarity, intensity, and consistency—are narrowly defined with respect to content and specifically do not address format characteristics, such as color, heading styles, and the graphic design aesthetics. Finally, the relatively low $R^2$ of the best model, Model (5), at 0.18, indicates that there may be other important explanatory variables not included in our model specifications. These limitations can be addressed and accommodated in further research on this topic.

Notwithstanding these limitations, this research makes several important contributions for both academics and practitioners. The research applies market-signaling theory, combined with a corporate strategy typology, to identify important strategic information for reducing the market uncertainty and IPO underpricing. This article establishes and operationalizes multiple indices based on the Miles and Snow typology to capture corporate strategy from the content analysis of public documents. This may provide some insights for further studies on corporate strategy. Furthermore, the research also assesses the quality of strategy signals with measures of clarity, intensity, and consistency and particularly highlights the importance of signal consistency when assessing the quality of multidimensional signals. This approach can be useful for future communication studies.

This study also distinguishes 1st-day and 30-day initial returns (underpricing). By taking a slightly longer term view, 30-day underpricing may be a useful indicator of a credible strategic communication in the IPO communication process.

This research suggests that those charged with IPO communications place importance on the consistent disclosure in relation to the firm’s strategy intentions (e.g., prospector, analyzer, and defender). Specifically, in the biotechnology industry, if the firm attempts to reduce the 30-day underpricing (i.e., reduce the need to discount the offer price to attract prospector-centered investors before an IPO communication), they may need to consistently communicate their prospector intentions across all three important dimensions—product/market, technology, and administration. By contrast, if the firm attempts to increase the 30-day underpricing (i.e., attract the defender strategy-centered investors before an IPO communication), firms may need to consistently indicate their defender strategic intentions across dimensions in their public documents.
NOTES

1. This measure of the signal consistency from multiple dimensions borrows the concept of “variance” from statistics (i.e., the high consistency of signals for strategy \( j \) across three dimensions can be indicated by the low variance of signals across three dimensions as shown in the formula).

2. The meaning of signal intensity is self-evident. It can only be evaluated by a quantitative measure.

REFERENCES


