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MANAGERIAL ACTIONS, STOCK RETURNS, AND EARNINGS:  
THE CASE OF BUSINESS-TO-BUSINESS INTERNET FIRMS

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BUSINESS-TO-BUSINESS INTERNET FIRMS**

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# **MANAGERIAL ACTIONS, STOCK RETURNS, AND EARNINGS: THE CASE OF BUSINESS-TO-BUSINESS INTERNET FIRMS**

## **ABSTRACT**

In this study we investigate the role played by managerial actions in explaining stock market returns and accounting earnings of 57 Internet firms engaged in Business-to-Business (B2B) e-commerce. We classify 3,166 managerial actions undertaken by our sample firms between the firm's IPO date and September 30, 2000 into ten key action categories: (1) acquisition of major customers, (2) introduction of new products and services, (3) promotional and marketing actions, (4) expansion into international markets, (5) actions taken to address the concerns of stakeholders such as employees and the community at large, (6) announcements of technology, marketing, and distribution alliances, (7) completion of acquisitions, (8) management team building actions, (9) announcement of recognition and awards bestowed upon the firm, and (10) organizational changes.

We undertake an event study over a three-day window surrounding the announcement of each action. Our event study results indicate that announcements of alliances (technology, marketing, and distribution), acquisition of new customers, and promotions are associated with positive abnormal returns. Next, using the factor analysis technique we group the counts of managerial actions taken by each firm over its post-IPO life into three broad managerial initiatives—market penetration, organization building, and legitimacy building. These three initiatives explain a substantial portion of the cross-sectional variation in the firms' post-IPO life stock market returns beyond that explained by accounting earnings. However, accounting earnings do not explain variation in post-IPO stock returns. Thus, investors appear to supplement relatively meager accounting information with data about managerial actions in setting stock prices of B2B Internet firms.

# MANAGERIAL ACTIONS, STOCK RETURNS, AND EARNINGS: THE CASE OF BUSINESS-TO-BUSINESS INTERNET FIRMS

## 1. Introduction and Summary

In this paper we explore the role played by managerial actions in explaining stock market returns and accounting earnings of Internet firms engaged in Business-to-Business (B2B) e-commerce. B2B commerce, or industrial purchasing, refers to the many different types of interactions related to the purchase and sale of goods and services between businesses (Federal Trade Commission, 2000). According to Forrester Research, an Internet research company, annual B2B e-commerce is expected to account for 92 percent of the total e-commerce by 2003.

Given the size of the U.S. economy, even a small reduction in transaction costs (Williamson, 1989) resulting from B2B transactions can have profound implications for business and consumers. In an attempt to exploit this market opportunity, many B2B start-ups have recently gone public with attractive market valuations. One set of start-ups hosts online marketplaces to mediate transactions among businesses (e.g., VerticalNet and Freemarkets) while the other set provides software solutions that enable businesses to build or participate in online marketplaces (e.g., Ariba and Commerce One). Even though only one firm in our sample of 57 B2B firms has reported an annual profit, the combined equity value of our sample firms exceeded \$100 billion as of September 30, 2000. The co-existence of significant market capitalizations with negative accounting earnings raises interesting questions about the factors that drive valuation of B2B firms.

There are several impediments to understanding the value of B2B stocks. First, the median firm in our sample has been public only for a year and a long history of commonly used performance measures such as accounting earnings is unavailable for forecasting future

profitability. Second, the B2B sector is an emerging industry and the determinants of value creation for such firms are not well documented. Third, unlike Business-to-Consumer (B2C) e-commerce firms, cross-sectionally comparable non-financial indicators of stock prices such as web traffic (Trueman et al 2000a and b; Hand 2000b, Rajgopal et al 2000, Demers and Lev 2000) are not readily available for B2B firms. This is because transactions in the B2B domain are not driven as much by mass consumer interest as they are by the proportion of cost savings or overall value obtained from purchasing of supplies or manufacturing inputs.

Because of the absence of meaningful financial numbers and easily identifiable non-financial indicators of value such as web traffic, we compile a list of managerial actions taken by B2B firms and examine which of those actions are associated with shareholder value creation. Because managerial actions form the basic building blocks of the entrepreneurial functions of acquiring, combining, and deploying resources in the marketplace, firm-specific measures of such actions are likely to be informative about future profitability. Our investigation provides an opportunity to explore how investors supplement relatively meager financial data with non-financial data such as managerial actions in valuing an economically significant subset of e-commerce firms.

Our focus on B2B firms was deliberate. Such a focus does not imply that managerial actions would not explain stock prices of B2C Internet firms or even non-Internet firms. We do not consider non-Internet firms because the incremental contribution of managerial actions data in explaining stock prices is likely to be small. Non-Internet firms have longer accounting performance histories that are likely to better reflect the impact of managerial actions when

compared to Internet firms.<sup>1</sup> Within the Internet domain, we do not consider B2C firms because previous research (Trueman et al., 2000, Hand 2000b, Demers and Lev 2000, Rajgopal et al., 2000 a and b) has found non-financial indicators (such as web traffic and customer experience) that explain substantial cross sectional variation in the stock prices of B2C firms. In contrast, we are unaware of research into non-financial indicators that explain stock prices of B2B firms.

Our sample of 57 public B2B firms is drawn from a list published in a Morgan Stanley report titled “The B2B Internet Report” (available on [www.msdc.com](http://www.msdc.com)). Our approach is to obtain managerial actions that firms disclose in their press releases between the firm’s IPO date and September 30, 2000 (a period we label as the post-IPO life of a firm). We collect 3,166 actions and classify them into ten key categories: (1) acquisition of major customers, (2) introduction of new products and services, (3) promotional and marketing actions, (4) expansion into international markets, (5) actions taken to address the concerns of stakeholders such as employees and the community at large, (6) announcements of technology, marketing, and distribution alliances, (7) completion of acquisitions, (8) management team building actions, (9) announcement of recognition and awards bestowed upon the firm, and (10) organizational changes.

After classifying actions taken by firms, we conduct three tests. First, we examine the stock market reaction over a three-day window surrounding the day a specific managerial action is announced. Event study results indicate that the stock market reacts positively to announcements about the addition of new customers and promotions and the signing of alliances.

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<sup>1</sup> Moreover, it is harder to assess the vintage of managerial actions that we might consider for mature non-Internet firms. For example, a first mover advantage stemming from early entry into an industry a number of years ago might continue to provide a competitive advantage and hence, serve as the primary source of wealth creation for a firm. It is difficult to assess which set of earlier actions impact wealth creation in later years and over what time-period we should investigate such impact. We do not study non-Internet early stage companies because they are more likely to be profitable at the time of their IPO and more likely to have significant accounting performance histories relative to Internet firms (Meeker 2000, Hand 2000a).

In particular, announcements of technology, marketing, and distribution alliances are associated with abnormal three-day returns of 0.5%, 2.3% and 1.6% respectively. Acquisition of new customers is related to a 0.6% abnormal return, while promotion announcements are associated with a 0.8% return.

Second, we correlate the stock returns of our sample firms over their post-IPO life with a count of the actions taken by each firm in each of the categories enumerated above. The longer window results are broadly similar to the event study results. The stock market values new customers, technology alliances, and promotions. However, we find no significant association between post-IPO accounting earnings and stock returns. Hence, our evidence is consistent with accounting earnings not providing value-relevant information to investors in valuing B2B firms.

Finally, we use the factor analysis technique to group the counts of managerial actions taken by each firm over its post-IPO life into three broad managerial initiatives—market penetration (consisting of acquisition of new customers, technology alliances, international expansion, and distribution alliances), organization building (comprising stakeholder actions, organization changes, management team building, and acquisitions) and legitimacy building (comprising promotions, new products, and marketing alliances). We then correlate these three initiatives with stock market returns and accounting earnings over each firm's post-IPO life. The three managerial initiatives explain a substantial portion of the cross-sectional variation in the firms' post-IPO life stock market returns beyond that explained by accounting earnings. In particular, the three initiatives add *24 percentage points* in adjusted  $R^2$  to a regression of post-IPO stock returns on accounting earnings. This suggests that measures of managerial actions convey important valuation related information to investors.

Our study adds to the growing body of literature on the role that non-financial indicators play in explaining stock prices. Prior research has explored several industry-specific non-financial measures. For example, Amir and Lev (1996) study market share in the wireless communications industry while Chandra, Procassani, and Waymire (1996) investigate the book-to-bill ratio in the semi-conductor industry. In the Internet industry, research by Demers and Lev (2000), Hand (2000b), Rajgopal et al., (2000a and b), and Trueman et al., (2000) investigates the role of web traffic and customer experience ratings. In contrast to prior research, our study examines the value implications of a broad range of managerial actions taken by firms. Ours is perhaps the first paper to consider a portfolio of managerial actions in the set of non-financial information that investors appear to use while setting stock prices.

The remainder of the paper is organized as follows. In section 2, we briefly describe the two key types of business models in B2B e-commerce-online marketplaces and technology providers. In section 3, we develop the taxonomy of managerial actions listed in the introduction and argue why these actions are expected to be associated with firms' stock returns. In section 4, we describe the research methodology, data, and the results. Section 5 concludes and makes suggestions for future research.

## **2. Institutional background: The B2B sector**

A 1999 study by the Organization for Economic Co-operation and Development (OECD) concludes that savings across five nations from B2B commerce could represent a one-half to a two-third percent increase in productivity, \$250 billion savings in inventory, a 10-50 percent savings in customer service costs, and a 50 percent fall in order processing costs in the 2003-2005 timeframe (*The Industry Standard*, April 26, 1999). Most of these productivity gains are expected to come from savings in transaction costs for both buyers and sellers.



The B2B sector consists of firms in two categories: (1) electronic marketplaces for buying and selling products and services, and (2) technology providers marketing software necessary to build and maintain marketplaces. Each category is described in greater detail below.

### *2.1 Electronic Marketplaces*

With the Internet emerging as an important e-commerce transaction platform, new intermediaries or net market makers are attempting to establish electronic marketplaces. Kaplan and Sawhney (2000) define these emerging electronic marketplaces as Internet-based metamediaries that focus on specific industries or business processes and use various market-making mechanisms to mediate transactions among businesses.

Marketplaces attempt to create value by first attracting and then aggregating buyers and sellers. Once a critical mass of buyers and sellers congregate and a high degree of market liquidity is attained, buyers and sellers both benefit from reduced transaction costs. Generally, B2B marketplaces can be separated into two distinct types: vertical hubs and functional hubs. Vertical hubs focus on industry-specific markets. Sciquest.com (chemicals), Partsbase (aerospace), and Neoforma (health products) are examples of such hubs. In contrast, functional hubs focus on providing standardized inputs required by many businesses across a wide range of industries such as computer paper, stationery, cleaning supplies, etc. An example of a functional hub is Onvia.com, an exchange focused on facilitating trade in manufacturing and office products for small businesses. Prices on these marketplaces can be set in a variety of ways: by auction, the seller's catalog, bid-ask system, or negotiation.

Marketplaces charge commissions based on the gross amount of each transaction. Some exchanges charge fees for participating in the exchange or for anticipated usage. Besides such

fees, exchanges sell advertising space on their sites and or provide market participants with data mining services on various aspects of market behavior by firms participating in the exchange.

## *2.2 Technology providers*

Technology providers market and support software-based applications for trading on the electronic marketplaces on either the buy-side or sell-side, or as market makers. The trading models described above are driven by software platforms developed and supported by firms such as Commerce One, Ariba, and i2 Technologies, among others.

These firms typically have two main streams of revenue. One revenue stream is derived from software licensing, which is usually a one-time fee charged on a per-user basis. The second stream is derived from a host of services such as software integration, customization of the software platform, software maintenance, and other consulting activities. Some technology providers such as Commerce One also receive a percentage of commission fees that the electronic marketplaces collect on transactions carried out by the buyers and sellers who frequent the marketplace. Recently, the distinction between electronic marketplaces and technology providers is blurring as firms that subscribe to one business model continue to adopt features of the other business model.

## **3. Managerial Actions and Value Creation**

In this section we identify ten key action categories used in the study and argue how these actions are likely to affect shareholder value. Our taxonomy of actions and the hypothesized links of actions to firm value creation are primarily motivated by a review of literature in various disciplines of business research such as finance, economics, strategy and marketing. Examples of actions taken by our sample firms are reported in Table 2.

### *3.1 Introduction of New Products or Services*

With the emergence of the Internet as a trading platform, firms have introduced a number of new products or services. Chaney, Devinney, and Winer (1991) argue that new products and innovations are essential to the continued existence of firms. Introducing new products and features is one way to create competitive advantage. Hence, new products or service introductions are likely to be valued by investors. Firms that innovate would be expected to generate excess returns, the more innovation, the better the signal to shareholders that firms are willing to invest substantially in the future.

An alternative hypothesis is that new product introductions are risky since failures are fairly commonplace. Mansfield, Rapoport, Schnee, Wagner, and Hamburger (1971), for example, found new product failure rates that varied from 32% for a chemical laboratory to 48% for a drug laboratory. Moreover, innovators run the risk that other firms will imitate their actions and earn a greater share of profits than their original investment. This concern is especially relevant to Internet businesses where competitors appear rapidly to imitate products and services offered by first-movers. If stockholders anticipate that product innovations would likely fail or be imitated by others to the point at which the innovator cannot recoup the cost of its investment, we would not expect firms that announce new products or services to generate excess stock returns.

A press release that announces new software applications, new features to an existing software application, or the launch of new electronic marketplaces is classified as an introduction of a new product or service.

### *3.2 Acquisition of Major Customers*

Acquiring major new customers is vital to the firm's prospects for a variety of reasons. All new ventures face concerns associated with "liability of newness" (Stinchcombe, 1965), and because of a lack of legitimacy arising from this, they may not be able to compete successfully in the marketplace. Besides providing a source of future revenues, major new customers are likely to serve as references to attract others. Furthermore, unless a critical mass of buyers and sellers joins an electronic marketplace, the technology used to operate the marketplace (or the marketplace itself) may not achieve the necessary market liquidity to function effectively. Failure of sellers to join a firm's marketplace in sufficient numbers would make the network less attractive to buyers and consequently even to other sellers. Based on the above arguments, we expect the stock market to react positively to announcements of customer acquisition.

Announcements that a software enabler was chosen to provide the technology platform for a major client or the addition of a major supplier or buyer to an electronic exchange are counted as actions in this category.

### *3.3 Promotions*

Promotional or marketing campaigns are directed towards building or reinforcing brand awareness among existing and potential customers by associating a firm with specific causes and themes, and by the use of stories and evocative symbols (Aldrich and Fiol, 1994). Furthermore, new technologies and business models associated with new Internet businesses increase the perceived risk associated with these ventures, calling for intensified communication activities. Hence, we expect the market to value promotional and marketing efforts positively.

Initiatives taken to promote the firm via publicity and marketing campaigns, retaining an advertising or a public-relations agency, and sponsoring marketing-related events are coded as actions in this category.

### *3.4 International Expansion*

Firms pursue international expansion to offload excess capacity, reduce unit costs, spread economic risks over more markets, and exploit lower production costs or the lack of competition in foreign markets (Caves, 1996). International expansion, however, is not without costs. Firms sometimes confront different and often little understood social, political, or economic forces in foreign markets, which researchers have termed “liability of foreignness” (Hymer, 1976; Kotha et al 2000; Zaheer, 1995). Such forces increase the costs associated with coordinating and monitoring overseas operations. Moreover, firms have been known to underestimate the weaknesses of foreign competitors (Dunbar and Kotha, 2000). Hence, we hypothesize a two-sided market reaction to announcements of international expansion.

### *3.5 Stakeholder Actions*

Management literature has argued that firm performance depends on relationships with multiple stakeholders such as employees, customers, and the community as a whole. Perceived commitment of a firm to the interests of a stakeholder group is likely to facilitate resource exchanges between the firm and members of the stakeholder group (Berman, Wicks, Kotha and Jones, 1999; Jones, 1995), and to enhance firm performance (Jones and Wicks, 1999).

For example, improving employee relationships can reduce turnover and increase productivity, worker commitment, and effort. Also, positive customer perceptions about product quality and safety might lead to increased sales. Waddock and Graves (1997) report that good community relations can help a firm lower its tax bill, lower its regulatory burden, and improve

the quality of local labor. Altman (1998) found that many executives believe that community involvement is a business imperative and often creates a competitive advantage. Based on these arguments, we expect the stock market to react positively to actions taken by Internet firms to address stakeholder issues. A press release that announces a firm's actions to address the concerns of employees, suppliers, or the community at large is coded as an action in this category.

### *3.6 Strategic Alliances*

Strategic alliances represent inter-organizational cooperative strategies. They usually entail pooling specific resources and skills by the cooperating organizations to achieve common goals, as well as goals specific to the individual partners. The usual objectives of alliances include gaining access to new markets; accelerating the pace of entry into new markets; sharing research and development, manufacturing, or marketing costs; or broadening the product lines offered (Kogut and Zander, 1993). Moreover, alliances provide the opportunities for leveraging resources and learning and for drawing on a broader base of resources embedded in a network of partners (Chang, 1995).

Firms enter into alliances for long-term strategic considerations (Kogut, 1988; Jarillo, 1989). If such long-term strategic advantage creates shareholder value, then investors would be expected to react positively to such news. Strategic alliances create an organizational structure situated in the continuum between a hands-off market transaction and a hierarchical relationship within a firm. An alliance would be expected to create shareholder value by releasing benefits from cooperation and flexibility that stems from the loose structure of the arrangement without incurring the high transaction costs associated with negotiation, coordination, and monitoring

inter-firm transactions (Williamson, 1989). Thus, for firms entering into strategic alliances, we expect abnormal returns to all alliance announcements to be positive.

An alternative hypothesis is that costs associated with the alliance often exceed potential benefits. Das, Sen, and Sengupta (1998) identify two costs associated with alliances. First, shareholder-manager agency problems may prevent managers from entering into alliances that may be in the best interests of the shareholders. For example, managers may form alliances to protect their jobs. Second, because alliances are inherently incomplete contracts in which all the future contingencies cannot be fully anticipated and contracted upon, alliances may expose each partner to opportunistic exploitation by the other (Williamson and Ouchi, 1998; Elfenbein and Lerner, 2000) that could lead to renegotiation and unequal gain sharing (Hart, 1995; Hart and Moore, 1990). If such costs of entering into alliances exceed the benefits on the margin, alliances would be less valuable to shareholders.

We examine three types of alliances for our sample firms: technology, distribution, and marketing alliances. Actions that involve a partnership with another company to use its technology or jointly develop new technology are coded as technology alliances. Technology alliances become necessary in high-technology industries such as the Internet where the rapid pace of frontier technology development, product complexity, and the high cost of product development make cooperation beneficial to even to the most sophisticated company (Teece, 1986). Arrangements with another company to distribute products or services are coded as distribution alliances. Co-marketing agreements are coded as marketing alliances. As discussed, we expect a two-sided market reaction to the announcement of alliances.

### *3.7 Attracting Recognition and Awards*

Attracting recognition and awards enables the firm to gain legitimacy in the marketplace and mitigate the liability of newness (Rao, 1994). Previous event studies on announcement of awards (e.g., Przasnyski and Tai, 1999) have not found a significant stock market reaction, possibly because the announcement of the award *per se* did not provide new information to the market. Hence, we do not predict whether announcement of awards and recognition will have a positive effect on stock prices. Announcement of various third party awards, including best products, and industry leadership are coded as actions under this category.

### *3.8 Acquisitions*

As Schultz and Zaman (2000) point out, Internet firms have generally pursued a strategy of growth through acquisition. Acquisitions allow a firm to acquire new technological resources, market share, or skilled man-power the acquiring firm lacks or cannot develop internally in a reasonable period of time. The extant evidence about the shareholder wealth effects of acquisitions, in general, has been mixed. Some researchers have found value-decreasing effects of mergers due to difficulties in integration (Porter, 1987), diversion from R & D investment (Hitt, Hoskisson, Ireland, and Harrison, 1991) and excessive premiums (Sirower, 1997). However, Jensen and Ruback (1983) found that, on average, the shareholders of the acquiring firm do not lose, and the shareholders of the acquired firm experience stock price gains from acquisitions. Because of the conflicting results from extant research, we did not formulate directional predictions on the impact of acquisitions on shareholder wealth changes.

### *3.9 Management Team Building*

Building a strong senior management team is crucial for Internet firms because many of these companies are creating business models that did not exist before. A good senior



management team can quickly adjust the business model and the firm's vision in response to changes in the competitive environment and avoid potential pitfalls. Because managerial team building is likely to increase the venture's chances of success and its ability to capture customers and capital, we expect a positive stock market reaction to such announcements. Almost all actions in this category relate to hiring a new member of the senior management team to manage a functional area, a group, or a division of the firm.

### *3.10 Organization Changes*

Announcement of a change in the organizational structure, including spin-offs, the formation of a new corporate entity, or change in locations, are coded under this category. Because our sample firms are very young, organizational changes are likely to signal growth or installation of work flow processes to address rapid growth. Hence, we expect a positive market reaction to the announcement of organization changes.

Although we collect data on actions related to filing of financial statements with the SEC, we do not discuss the value implications of that action because filing statements with the SEC is mandated by law and is not an action management takes to acquire competitive advantage or maximize firm value.

## **4. Empirical tests**

We discuss three empirical tests in this section. In our first test, we conduct an event study surrounding the announcement of each action to assess the direction and magnitude of the stock market reaction. In our second test, we expand the return window from the time surrounding an event to the firm's post-IPO life. In the third test, we reduce the various managerial actions using factor analysis into three factors and assess whether such factors can explain cross-sectional variation in stock returns above and beyond accounting earnings.

#### 4.1 Event Study

Information flows constantly to the financial markets and consequently affects a firm's stock price. Evaluating the market value of a specific managerial action is difficult because it is impossible to determine exactly when information about the action is first available. We must view the daily change of a firm's stock price around its press release as possessing only some of that information. Therefore, the stock market reaction around the announcement of an action represents only a portion of the true market value of the action to the firm.

We use a variation of the market-adjusted returns technique to assess excess return attributable to an action undertaken by a firm in our sample i.e., we specify the following regression equation for each action category:

$$R_{i,3\text{day}} = \beta_0 + \beta_1 R_{i,m,3\text{day}} + \varepsilon_{i,3\text{day}} \quad (1)$$

In equation (1),  $R_{i,3\text{day}}$  is the compounded return for firm  $i$  for the event window measured as a trading day before, the day of, and one day after the date on a press release announces the managerial action;  $R_{i,m,3\text{day}}$  is the return on the NASDAQ equally weighted index for the same event window as that of each firm. We test whether  $\beta_0$  is statistically different from zero to assess any detectable abnormal return is attributable to the managerial action.

Estimating abnormal returns using the conventional market model requires a history of returns for a period prior to the event. Specifying such an estimation period would force us to ignore the market effects of managerial actions the firm took during the estimation period. Hence, we choose to use the market adjusted returns technique described by Brown and Warner (1985) in specifying equation (1).

Under the market adjusted returns technique, the researcher takes into account market wide movements that occurred at the same time the sample firms experienced events. Brown and Warner (1985) show that the market adjusted returns technique rejects the null hypothesis of

no abnormal performance as many times as the traditionally used market model for a sample of randomly chosen event dates and firms. Although we have no reason to expect event clustering, our sample firms are not randomly drawn; they come from the same industry. Hence, the presence of cross-sectional dependence in the excess returns could potentially underestimate the variance of the mean excess returns creating, in turn, too many rejections of the null of no abnormal excess returns. To address such cross-correlation, we estimate Generalized Least Squares (GLS) models.

#### 4.1.1 Data

As noted earlier, to undertake the study, we collect a list of B2B firms from *The B2B Internet Report* published by Morgan Stanley in April 2000 ([www.msdc.com](http://www.msdc.com)). The Morgan Stanley report identifies 13 public firms that run online marketplaces and 50 public firms that are B2B technology providers.<sup>2</sup>

We restrict the sample to firms that were public as of April 1, 2000. This was done to ensure collection of action information for at least 6 months for each firm i.e., until September 30, 2000, the date we terminate data collection. Despite our best efforts, five firms were removed from the original listing because we could not find their press releases. One foreign firm, Open text, was dropped to restrict the sample to U.S. firms. Thus, the final sample consists of 57 B2B firms (see Table 1 for the list).

We hand collect all press releases issued by each sample firm from the “Investor relations” or “Press releases” tab of the firm’s website to classify its actions into one of the categories described in section 3. A few actions are coded under more than one category. This

coding of the press releases yields a unique database of 3,401 actions undertaken by our sample firms between their IPO date and September 30, 2000.<sup>3</sup>

Table 3 presents a frequency count of action categories. As shown, 1,127 actions or about a third of the actions undertaken relate to the announcement of new customers. Announcement of technology alliances constitutes the second largest set of actions (412 actions or 12.11% of all actions). The other significant categories of managerial actions include addition of new products or product features (360 actions), announcements pertaining to promotional and marketing initiatives (292 actions), filing of quarterly and annual financial statements (223 actions), and actions undertaken to address stakeholder issues (206 actions). We did not pursue further analysis of content alliances because they are too few in number (12 actions) or the filing of financial statements (223 actions) because it is a mandatory action required by reporting laws.

#### *4.1.2. Event Study Results*

Table 4 reports the results of the event studies. Stock return and stock price data are collected from [www.yahoo.com](http://www.yahoo.com). As shown in Table 4, there are five action categories where  $\beta_0$  happens to be statistically significant (all positive): announcement of new customers, promotions and alliances (technology, marketing, and distribution alliances). Acquiring customers is associated with a 0.6% abnormal return. Acquiring new customers is crucial for technology enablers because customers are likely to incur substantial switching costs if they were to abandon

<sup>2</sup> Unlike a number of past studies (Hand, 2000 a,b,c; Trueman et al 2000 a and b; Demers and Lev, 2000; Rajgopal, Kotha and Venkatachalam, 2000 a and b) we did not choose to use the Internet Stock List at [www.internet.com](http://www.internet.com) because the Internet Stock List does not separately identify either marketplaces or technology providers focused on the B2B space. For example, B2B marketplaces such as B2Bstores.com are classified as content and community sites along with B2C firms such as Amazon.com.

<sup>3</sup> One of the authors coded these actions into the categories described above. To ensure integrity of the coding scheme, another author coded a sub-sample of 853 randomly selected actions which constitute approximately 25% of the total actions. The two coders were in agreement 85% of the time. This level of agreement indicates high levels of inter-coder reliability (Miles and Huberman, 1984). The initial differences between the coders were resolved in discussions.

an existing software application in favor of a competitor's offering. Participation of new trading partners on online marketplaces is important because such trading partners add liquidity, which reduces suppliers' marketing costs as suppliers find more buyers and buyers spend less time searching for suppliers in their industry.

It is interesting to note that three of the five statistically significant returns are associated with alliances. The abnormal returns attributable to the announcements of technology, marketing, and distribution alliances are 0.6%, 2.3%, and 1.6% respectively. Thus, alliances appear to highly important in the Internet space (see also Garud, Jain & Phelps, 1998). Technology alliances enable broadening the range of capabilities offered to minimize time-to-market so that the technology provider can quickly offer a whole suite of software solutions to its customers. Technology providers usually sign marketing alliances to co-market their software products with support services offered by consulting firms such as Andersen Consulting, Price Waterhouse, or A.T. Kearney. Online marketplaces set up distribution alliances with portals like America Online (AOL) or Microsoft's b-central to reach potential buyers and sellers of manufacturing or office inputs.

Promotions are associated with a 0.8% abnormal return. As mentioned earlier, promotions reduce the firm's "liability of newness" and create brand awareness among customers.<sup>4</sup>

#### *4.2 Longer Window Tests*

Only five of the action categories are associated with statistically significant returns in the event study tests. As pointed out in section 4.1, the absence of an abnormal return surrounding an action creates inference problems in that it is hard to untangle whether the

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<sup>4</sup>For purely descriptive purposes, we also examined abnormal return in the three day event window surrounding the release of financial statements. The abnormal return was 0.7% and the corresponding t-statistic was 1.26

particular action is not valued by the stock market or whether the market anticipated that event and hence did not respond to the announcement. An association test that correlates returns computed over a longer event window against firm actions taken in that window could potentially address some of these inference problems. A longer event window also enables us to assess the relative informativeness of earnings against managerial actions in explaining returns (see section 4.4 for details).

Two important design choices are necessary to operationalize the long window tests. First, we need to define the duration of the longer event window. Considering that the post-IPO life (defined as the time from the IPO till 9/30/00, the day we terminated our data collection) of our average sample firm is approximately one year (mean 383 days, median 365 days), we define our event window as the firm's post-IPO life. Hence, our longer window tests can be thought of as an assessment of the informativeness of managerial actions taken over one event-year for each firm in our sample. Second, we need to aggregate actions taken by a firm during the event window in a meaningful way. As a first cut, we decided to count the number of actions the firm took under each category during its post-IPO life i.e., we expect firms that take a greater number of actions to be associated with higher returns. We use a count measure because firms do not usually disclose the future cash flow implications of a number of important actions such as hiring senior management personnel or signing a technology alliance. The difficulty associated with quantifying the financial implications of actions may be one important reason such actions are not contemporaneously reflected in the firm's accounting earnings.

However, there are several limitations in using such a count measure. Our count measure weights each action as equally important even though an alliance with an important competitor or associate with significant market power may be more valuable than ten similar

alliances with less endowed firms. Further, our count measure ignores rich information about the competitive dynamics among our sample firms. For example, we do not explicitly measure whether a firm's actions are responses to stimuli of a competitor's initial actions or whether one set of actions necessitates a follow up set.

Perhaps the most important limitation is that our measure relies solely on voluntary disclosures made by firms. Firms have fewer incentives to disclose bad news or spell out actions taken in response to a negative external shock. For example, a technology provider that loses a software contract to a competitor would have little incentive to announce the loss even though the stock market would incorporate the future cash flow implications of this event into the firm's stock price. While we recognize these limitations, we proceed with our count measure and note that addressing the limitations deserves consideration in future work.

We specify the following regression equation to test whether the count of managerial actions explains variation in firm returns. The regression is conducted individually for every action category:

$$R_{i,\text{life}} = \beta_0 + \beta_1 R_{i,m,\text{life}} + \beta_2 \text{Actions}_{i,\text{life}} + \varepsilon_{i,\text{life}} \quad (2)$$

In equation (2),  $R_{i,\text{life}}$  is the continuously compounded daily return of a firm  $i$  over its post-IPO life until September 30, 2000;  $R_{i,m,\text{life}}$  is the continuously compounded daily return on NASDAQ index over the time period corresponding to each firm  $i$ 's post-IPO life,  $\text{Actions}_{i,\text{life}}$  represents the sum of actions a firm took under each category over its post-IPO life. If a firm did not report any action under a particular category during its post-IPO life, we set the action count for that category to zero. We test whether  $\beta_2$  is statistically different from zero to assess whether any detectable abnormal return is attributable to the number of managerial actions firms take over their post-IPO lives. A positive and significant  $\beta_2$  would indicate that initiating greater

actions of a particular type when compared to the average firm is associated with long run wealth creation as measured by post-IPO returns. A statistically insignificant  $\beta_2$  would indicate that there is no evidence to suggest that greater actions of a particular type when compared to the average firm are associated with long run wealth creation.

#### *4.2.1 Longer Window Results*

Table 5 reports the summary statistics of firms' action counts and stock returns over their post-IPO lives. To prevent outlier returns from influencing our inferences, we winsorize the returns distribution at the 99% and 1% percent levels. The reported summary statistics reveal interesting trends. The median firm makes 15 announcements of major customers, initiates 4 promotional campaigns, and signs 4 technology alliances over its post IPO life. The median firm undertakes no international expansion and announces no content or distribution alliance over its life. The median firm reports a stock market return of 0.1% over its post-IPO life whereas the mean firm earned a return of 33% over the same event period. Even after winzorizing the returns distribution, we are still left with a few very successful firms.<sup>5</sup>

Table 6 reports the results of estimating equation (2) by action category. Action counts related to six action categories are positively associated with stock returns: new customer sign-ups, new products, promotions, stakeholder actions, technology alliances, and organizational changes. When the longer window results are compared with the event study results, it is clear the stock market values announcements of new customers, technology alliances, and promotions regardless of the event window considered. However, the long window results differ from the event study results on two counts.

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<sup>5</sup> Qualitatively similar inferences obtain when we re-conduct our regressions after two sensitivity checks. First, we redefined the firms' post-IPO life returns as  $\log(1 + \text{post life returns})$  to address the skewness. Second, we deleted statistical outliers whose absolute R-student scores in an OLS version of our regressions exceed 3.



First, new products, stakeholder actions, and organizational changes are significantly related to returns in the longer window, but not in the event study. Perhaps the longer window is more powerful for detecting the association between these action categories and stock returns. Alternatively, firms that launch more new products, take greater stakeholder actions, or initiate more organization changes than the average firm are more successful. Second, the market reaction to marketing alliances and distribution alliances is significant in the event study, but not in the longer window. Hence, entering into more marketing or distribution alliances than the average firm does not appear to be necessarily associated with long run wealth creation.

#### *4.3 Coordinated actions*

The discussion so far treats the action categories as independent initiatives undertaken by our sample firms. However, managerial actions are usually implemented as a portfolio of initiatives (Porter, 1987). Certain actions necessitate or facilitate other actions. For example, new product features or new technology alliances have to be promoted via marketing campaigns to acquire more customers. Similarly, signing new technology alliances makes it easier to develop new product features or acquire new customers. Hence, we would expect to observe substantial correlation among action counts. The correlations reported in Table 7 confirm that conjecture. Potential multi-collinearity arising from such correlation also makes it difficult to assess whether one set of actions dominates another set in explaining stock returns. Moreover, due to the high correlations among action counts, we can never be sure whether the results for action counts of a particular type reported in Table 6 are not subject to significant omitted variable bias. In an attempt to reduce the number of managerial actions to a few parsimonious variables, we carry out a factor analysis using principal components estimation of the actions counts under each action type. The factor analysis technique maximizes commonalities within a

group (i.e., a factor) and minimizes commonalities among groups. Hence, we implicitly assume that actions that fall under one factor tend to occur more often with other actions that cluster in that factor but are less likely to occur with actions that fall under another factor.

From a scree test, three factors with eigenvalues greater than 1.0 emerge. Out of the 12 actions categories shown in Table 8, 11 exhibit strong loadings on at least one factor (Kim and Mueller, 1986). Based on actions that exhibited loadings greater or equal to 0.49, the three factors are represented in the table. Together, these three factors account for 64.77% of the variance in our sample. Three items (i.e., promotions, acquisition of new customers, and introduction of new products and features) load on more than one factor, suggesting that these actions may be germane to more than one factor.

The five actions that load on Factor 1 include international expansion, distribution alliances, technology alliances, promotions, and acquisition of new customers. These actions appear to represent a managerial orientation external to the firm and as such seem to capture the attempts the firms in our sample made to grow their business through international expansion and alliances. Hence, we label this group of actions as the *market penetration* factor.

The five actions that load on Factor 2 include organizational changes, actions directed at stakeholders, management team building efforts, acquisitions of other firms, and the introduction of new products or product features. In contrast to actions that load on Factor 1, these actions focus mostly on the activities internal to the firm (e.g., management team building, organizational changes, and acquisitions). They appear more representative of actions that emphasize organization building efforts. Hence, we label this set of actions as the *organizational building* factor.

The four actions that load on Factor 3 include promotions, the acquisition of new customers, introduction of new products or product features, and actions announcing the recognition and awards garnered by the firm. However, two actions (i.e., promotional and marketing activities, the acquisition of new customers) that load on this factor also load on Factor 1. One action (the introduction of new products or product features) loads on Factor 2 as well. However, all four actions exhibit greater loadings on Factor 3 and as such can be considered more representative of Factor 3 than Factor 1 or Factor 2.

Many of the firms in our sample are new ventures, and as such they are forced to deal with the “liability of newness” discussed earlier. The set of actions that load on Factor 3 can be interpreted as attempts by firms to garner greater legitimacy. Put differently, these actions can be interpreted as activities undertaken to overcome the “liability of newness” problem for start-ups. Hence, we label these actions as the *legitimacy building* factor.

To assess whether these three portfolios of managerial actions explain variation in firms’ returns, we estimate a modified version of equation (2) where the action counts are replaced by standardized factor scores corresponding to the three factors described earlier. Standardized factor scores for each firm are computed in accordance with the following formula:  $f_k = a_{1k} z_1 + a_{2k} z_2 + a_{3k} z_3 + \dots + a_{jk} z_j$ , where  $a_{jk}$  is the factor score coefficient for action type  $j$  ( $j = 1, \dots, 12$ ) on the factor  $k$  ( $k = 1, 2, 3$ ), and  $z_j$  is the firm’s standardized value on action type  $j$ . These factor scores, labeled as Factor1<sub>*i*</sub>, Factor2<sub>*i*</sub>, and Factor3<sub>*i*</sub>, are introduced as independent variables in the following regression:

$$R_{i,\text{life}} = \delta_0 + \delta_1 R_{m,i,\text{life}} + \delta_2 \text{Factor1}_i + \delta_3 \text{Factor2}_i + \delta_4 \text{Factor3}_i + \varepsilon_{i,\text{life}} \quad (3)$$

Because the factor scores are computed after a varimax rotation, the factor scores are orthogonal to one another. Thus, factor analysis enables us to assess the impact of unique

managerial action choices captured by the three factors on stock returns. Because we have no evidence at this stage to suggest that any of the managerial actions is value decreasing, we hypothesize that the signs of the coefficients on the factors will be positive.

The results of estimating equation (3) are reported in column 1 of panel A of Table 9. Factors 1, 2 and 3 are strongly associated with returns at conventional levels. The respective coefficients on Factors 1, 2 and 3 are 0.772 (t-statistic of 4.24), 0.869 (t-statistic of 6.47), and 0.752 (t-statistic of 5.07) respectively. The regression equation explains 51.02% of the variation in post-IPO returns. We could not reject a test of equality of the three coefficients. Hence, managerial actions related to market penetration, organization building, and legitimacy building seem to be equally important in terms of their association with post-IPO returns. Whether accounting earnings captures attributes of these managerial actions is explored next.

#### *4.4 Earnings and managerial actions*

An important issue to accounting researchers is the extent to which contemporaneous accounting earnings captures information about a firm's multiple managerial actions. To assess that, we compute the sum of accounting earnings reported by the firm over its post-IPO life and scale that sum by the average market value of equity for each firm. Accounting earnings is collected from 10-Q or 10-K reports filed by the firm on the EDGAR database at [www.sec.gov](http://www.sec.gov). Because some research (Hand 2000a, Trueman et al 2000) has shown that components of earnings are likely to be more informative about stock prices of Internet firms than earnings itself, we also compute the sum of gross margin, marketing and advertising expense, and research and development (R&D) expenses over firms' post IPO lives and scale such sums by the average market value of the firm.

Panel B of Table 9 reports the descriptive statistics of such scaled earnings and its components. As shown, the mean (median) firm has accumulated losses of about 4.6% (2.55%) of its average market value. We found only one sample firm, Broadvision, whose lifetime earnings were positive. The mean (median) firm had an average market capitalization of about \$2.09 (\$0.937) billion over its life. The average firm earns a gross margin of 2.3% of its market value, spends 3.4% of its market value on marketing and advertising, and 1.2% of its market value on R&D.

Panel C of Table 9 reports the correlation between the factor scores and in turn, lifetime accounting earnings and earnings components. It is interesting to note that the only statistically significant correlation in the panel is the one between contemporaneous lifetime earnings and the legitimacy building factor (correlation = 0.23,  $p=0.08$ , two tailed). While earnings components are not correlated with any factor, lifetime earnings do not appear to contemporaneously capture information about market penetration (Factor 1) and organizational building (Factor 2).

Panel D of Table 9 reports the results of regressing the lifetime earnings against post IPO stock returns. As shown in column (1) of panel D, accounting earnings do not appear to explain any variation in stock returns. When accounting earnings are introduced as an independent variable in addition to the three factors, we observe that the coefficients on the three factors remain strongly significant. The adjusted R-squared of the model in column (2) with earnings and the factor scores is almost double (50.12%) the adjusted R-squared of the model in column (1) with just accounting earnings (24.99%). Thus, information about managerial action choices of B2B firms explains a substantial portion of stock returns over and above accounting earnings.

Although post-IPO earnings of firms do not appear to explain cross sectional variation in firm returns, it is quite possible that components of earnings, especially gross margins, marketing expenditure, and R&D expenses, might be informative about stock returns. For example, Hand (2000a) argues that the stock market views advertising and R&D expenses of Internet firms as investments. Trueman et al. (2000a) show that gross margins are valued by the stock market for a sample of B2C firms. As shown in column (3) of panel D, when earnings are decomposed, the coefficient on marketing expenditure is positive and weakly significant while the coefficients on gross margins and R&D expenditure are statistically indistinguishable from zero. Most important, the three managerial action choices (market penetration, organization building and legitimacy building) continue to be strongly associated with stock returns.

#### *4.4.1 Sensitivity checks*

We conduct two sensitivity checks (results not tabulated). First, to assess whether firm age is an omitted variable, we introduce the firm's age (computed as the number of days from the IPO to 9/30/00) as an independent variable in equation (3) and re-run the regression with and without accounting earnings. The qualitative inferences remain unchanged. Age is not a significant explanatory variable in any regression.

In a second set of sensitivity tests, we investigate whether the short window and long window market reaction to an action category differs for online marketplaces vis-à-vis technology providers. The short window market reaction for marketplaces differs from the average reaction for the pooled sample of both technology providers and marketplaces in three cases: announcement of new customers (1.1%, t-statistic =2.23), international expansion (2.24%, t-statistic=1.92), and acquisitions (3.6%, t-statistic =1.67). However, we find no distinct reaction attributable to marketplaces in the long window tests.

## 5.0 Conclusions

Our study is among the first in the accounting and finance literatures to operationalize the idea of managerial actions empirically and relate such a measure to stock returns and earnings. We compile a count of managerial actions taken by a sample of B2B e-commerce firms under ten action categories and reduce such counts into three broad initiatives (market penetration, organization building and legitimacy building) using factor analysis. These initiatives are strongly associated with the lifetime stock returns of our sample firms. With the exception of the legitimacy building factor, lifetime accounting earnings and its components such as gross margin, marketing and, R&D expense do not reflect the three managerial initiatives. We also find that the value-relevance of these three initiatives overwhelms that of accounting earnings and its components. This finding suggests that investors appear to use information about managerial actions to supplement the meager financial information available to set prices of B2B firms.

Our focus on early stage companies with negative earnings might have tilted the explanatory power for returns in favor of managerial actions over accounting earnings. Future work could assess the incremental explanatory power of managerial actions over accounting earnings for mature firms. Further, differences in the managerial actions that we document here give rise to economic differences, which will eventually be reflected in differences in future earnings (Revsine, Collins and Johnson 1998: 164). Hence, it might be worthwhile to examine whether firms' actions can explain future earnings.

One limitation of our action measures deserves mention. We implicitly assume that certain managerial actions such as acquisitions are exogenous signals about firm's stock returns

although such actions are most likely endogenous to firms' stock market behavior. Future work could address this limitation by endogenizing our measures of managerial actions.



## REFERENCES

- Aldrich, H.E, C.M. Fiol. 1994. Fools rush in? The institutional context of industry creation. *The Academy Of Management Review*, 19: 645-671.
- Altman, B.W. 1998. Corporate community relations in the 1990s: A study in transformation. *Business and Society*, 37:221-227.
- Amir, E. and B. Lev. 1996. Value-relevance of nonfinancial information: The wireless communications industry. *Journal of Accounting and Economics*, 22, 3-30.
- Berman, S.L., A.C. Wicks, S. Kotha, and T.M. Jones. 1999. Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *Academy of Management Journal*, 42: 488-506.
- Brown, S.J. and J.B. Warner. 1980. Measuring security price performance. *Journal of Financial Economics*, 8, 205-258.
- Caves, R. 1996. *Multinational enterprise and economic analysis*. 2<sup>nd</sup> edition. Cambridge, UK: University Press.
- Chandra, U., A. Procassini, and G. Waymire. 1996. Credible disclosure of industry-wide information through trade associations. Evidence from the semi-conductor industry. Working paper, University of Oklahoma, Santa Clara University and Emory University.
- Chaney, P.K. T.M. Devinney, and R.S. Wine. 1991. The impact of new product introductions on the market value. *The Journal of Business*, volume 64, issue 4; 573-611.
- Chang, S.J. 1995. International expansion strategy of Japanese firms: Capability building through sequential entry. *Academy of Management Journal*, 38: 383-407.
- Das, S., K.S. Pradyot and S. Sengupta. 1998. Impact of strategic alliances on firm valuation. *Academy of Management Journal*, 41: 27-42.
- Demers, E. and B. Lev. 2000. A rude awakening: Internet value drivers in 2000, Working paper, University of Rochester and New York University.
- Dunbar, R. L.M. and S. Kotha. 2000. Managing institutional and cultural contrasts: The case of Sanyo Electric in the United States. *Advances in International Comparative Management*, 13: 149-174.
- Elfenbein, D. and J. Lerner. 2000. Links and hyperlinks: An empirical analysis of Internet portal alliances, 1995-1999. Working paper, Harvard University and the National Bureau of Economic Research.

- Federal Trade Commission. October 2000. Entering the 21st century: Competition policy in the world of B2B electronic marketplaces. [URL [www.ftc.gov/os/2000](http://www.ftc.gov/os/2000)]
- Forrester Research. 2000. Retail's pan-European future. Report published in April [URL: [www.forrester.com](http://www.forrester.com)]
- Garud, R., Jain, S., & Phelps, C. 1998. Organization Linkages and Product Transience: New Strategic Imperatives in Network Fields. *Advances in Strategic Management*, 15: 205-237.
- Hand, J. 2000a. Profits, losses and the non-linear pricing of Internet stocks, Working paper, University of North Carolina, Chapel Hill, NC.
- Hand, J. 2000b. The role of accounting fundamentals, web traffic, and supply and demand in the pricing of U.S. Internet stocks. Working paper, University of North Carolina, Chapel Hill, NC.
- Hand, J. 2000c. The net present value and returns-to-scale of intangibles in the new economy. Working paper, University of North Carolina, Chapel Hill, NC.
- Hart, O. 1995. *Firms, contracts, and financial structure*. New York: Oxford University Press.
- Hart, O. and J. Moore. 1990. Property rights and the nature of the firm. *Journal of Political Economy*, 98: 1119-1158.
- Hitt, M.A., R.E. Hoskisson, R.D. Ireland, and J.S. Harrison. 1991. Are acquisitions a poison pill for innovation? *The Academy Of Management Executive*, 5: 22-13.
- Hymer, S. 1976. *The international operations of national firms: A study of direct foreign investment*. Cambridge, MA: MIT Press.
- Jarillo, J.C. 1989. Entrepreneurship and growth: The strategic use of external resources. *Journal of Business Venturing*, 4:133-147.
- Jensen, M.C., and R.S. Ruback. 1983. The market for corporate control: The scientific evidence. *Journal of Financial Economics*, 11: 5-51.
- Jones, T.M., and A.C. Wicks. 1999. Convergent stakeholder theory. *The Academy of Management Review*, 24: 206-222.
- Kaplan, S. and M. Sawhney. 2000. E-Hubs: The new B2B marketplaces, *Harvard Business Review*, May-June.
- Kogut, B. 1988. Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal*, 9:361-374.

- Kogut, B., and U. Zander. 1993. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organizational Science*, 3: 383-397.
- Kotha, S., V.Rindova, and F. Rothaermel. 2000. Identifying firm specific factors in the internationalization of U.S. Internet firms. Working paper, University of Washington, Seattle, WA.
- Kim, J. and Mueller, C. W. 1986. *Factor analysis: statistical methods and practical issues*. Sage: University Paper Series on Quantitative Applications in Social Sciences.
- Mansfield, E., J. Rapoport, J. Schnee, S.Wagner, and M. Hamburger. 1971. *Research and innovation in the modern corporation*. New York: W.W. Norton.
- Meeker, M. 2000. The technology and Internet IPO yearbook (Sixth edition). Morgan Stanley Dean Witter.
- Miles, M. and A.M. Huberman. 1984. *Qualitative data analysis: A sourcebook of new methods*. Beverly Hills, CA: Sage.
- Porter, M.E. 1987. From competitive advantage to corporate strategy. *Harvard Business Review*. May-June: 43-60.
- Przasnyski, Z.H. and L. Tai. 1999. Stock market reaction to Malcolm Baldrige National Quality Award announcements: Does quality pay? *Total Quality Management*, 10, 391-400.
- Rao, H. 1994. The social construction of reputation: Certification, contents, legitimation, and the survival of organizations in the American automobile industry, 1895-1912. *Strategic Management Journal*, 15: 29-44.
- Rajgopal, S., M.Venkatachalam and S.Kotha. 2000a. The relevance of traffic for the stock prices of Internet firms. Working paper, University of Washington and Stanford University.
- Rajgopal, S., M.Venkatachalam and S.Kotha. 2000b. Does online customer experience affect the performance of e-commerce firms? Working paper, University of Washington and Stanford University.
- Revsine, L., D.W. Collins and B.W. Johnson. 1998. *Financial reporting and analysis*. Prentice Hall, New Jersey.
- Shultz, P. and M. Zaman. 2000. Do individuals closest to Internet firms believe they are overvalued? *Journal of Financial Economics* (forthcoming).
- Sirover, M.L. 1997. Less than meets the eye. *The Journal of Business Strategy*, 18: 8.
- Stinchcombe, A.L. 1965. Social structure and organizations. In J.G. March, editor, *Handbook of Organizations*. Rand McNally, Chicago IL, 153-193.

- Teece, D.J. 1986. Profiting from technological innovation: Implications for integration, collaboration, licensing, and public policy. *Research Policy*, 15:285-305.
- Trueman, B., M.H. Wong and X. J. Zhang. 2000a. The eyeballs have it: Searching for the value in Internet stocks, Working paper. University of California, Berkeley. CA.
- Trueman, B., M.H. Wong, and X. J. Zhang. 2000b. Back to basics: Forecasting the revenues of Internet firms, Working paper, University of California, Berkeley.
- Waddock, S.A. and S. Graves. 1997. The corporate social performance-financial performance link. *Strategic Management Journal*, 18, 303-317.
- White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 817-838.
- Williamson, O. 1989. Transaction cost economics. In R. Schmalensee and R. Willing (Eds.), *Handbook of Industrial Organization*: 135-182. Amsterdam: Elsevier Science.
- Williamson, O. and W.G. Ouchi. 1981. The markets and hierarchies and the visible hand perspectives. In A. Van de Ven and W. Joyce (Eds) *Perspectives on Organization Design and Behavior*: 347-370. New York: Wiley.
- Zaheer, S. 1995. Overcoming the liability of foreignness. *Academy of Management Journal*, 38: 341-363.

**Table 1: Sample of firms**

	<b>Online marketplaces</b>		<b>Technology providers</b>		<b>Technology providers</b>
1	VerticalNet	1	Ariba	25	OTG software
2	FreeMarkets	2	i2 Technologies	26	Intraware
3	Ventro	3	Commerce One	27	Accrue Software
4	Purchasepro.com	4	Broadvision	28	Delano
5	Onvia.com	5	Vignette	29	Bluestone
6	Neoforma	6	WebMethods	30	Marimba
7	Emerge	7	Software.com	31	Extensity
8	Fair Market	8	Art Technology	32	Viador
9	Sciquest.com	9	E.phipany	33	Net.Genesis
10	Iprint	10	Niku	34	Choridant
11	Rowecom	11	Selectica	35	Netobjects
12	Partsbase.com	12	Agile Software	36	Centra
		13	Interwoven	37	Apropos Technology
		14	Silknet Software (Kana Communications)	38	Eprise
		15	Versata	39	Pcorder.com
		16	Allaire	40	Prime Response
		17	Matrixone	41	Imanage
		18	Mcafee.com	42	Optio
		19	OnDisplay.com	43	Xcare.net
		20	Broadbase	44	Landacorp
		21	Interworld	45	Vantagemed
		22	Firepond		
		23	Calico Commerce		
		24	Silverstream software		

Notes: The sample is drawn from a list of 63 firms identified as B2B firms in Morgan Stanley's report titled *The B2B Internet Report* dated April 1, 2000. One foreign firm, Open Text, was dropped to restrict the sample to U.S. firms. Five U.S. firms were dropped from the initial list because we could not find their press releases.

**Table 2: The categories of managerial Actions – Definitions and examples**

Action Type	Definition	Examples in the dataset
New customers	Acquisition of a new customer.	<ul style="list-style-type: none"> <li>Ericsson chooses <i>BroadVision</i> to personalize Third Generation (3G) M-commerce infrastructure offering</li> <li>Foodbuy.com selects <i>PurchasePro.com</i> to build online E-marketplace for its more than 4,000 foodservice professionals</li> </ul>
New Products/ Services	Introduction of new product, services, or product features.	<ul style="list-style-type: none"> <li><i>Ariba</i> hosts European E-commerce advisory council launching New Solutions for broad market coverage of large, medium and small enterprises in Europe</li> <li><i>FreeMarkets</i> announces availability of web-based eMarketplace platform</li> </ul>
Promotions	Efforts to promote the company, retain advertising or public relations agencies or sponsor thematic events.	<ul style="list-style-type: none"> <li><i>VerticalNet</i> to present at Emerald Research Forum</li> <li><i>Vignette</i> Launches New U.S. Executive E-Business Forum</li> <li>Houston, we have an announcement: <i>Ariba Inc.</i> to sponsor Apollo 13 anniversary gala</li> </ul>
Stakeholder Actions	Actions that deal primarily with employee and community concerns.	<ul style="list-style-type: none"> <li><i>PurchasePro.com</i> establishes a role with women and minority-owned business associations</li> <li>Silicon Valley gives back: <i>Ariba</i> employees donate \$50,000 to the United Way</li> </ul>
Content Alliances	Partnership with another company for using their content or for creating new content jointly.	<ul style="list-style-type: none"> <li><i>PCorder.com</i> and The Chalk.com network partner to enhance computer product information for online shoppers</li> <li><i>RoweCom/IQ</i> partners with two publishers to expand electronic content database</li> </ul>
Technology Alliances	Partnership with another company to use their technology or jointly develop new technology.	<ul style="list-style-type: none"> <li><i>OnDisplay</i> works with Oracle to accelerate business process-focused enterprise and B2B integrations</li> <li>IKON and <i>iPrint</i> team to provide high volume digital printing and document delivery</li> </ul>
Marketing alliances	Partnership with another company to co-brand or co-market products.	<ul style="list-style-type: none"> <li><i>Vitria</i> Technology and <i>Calico</i> Commerce Team form a strategic marketing partnership to power trading communities</li> <li><i>Travelscape.com</i>, <i>PurchasePro.com</i> announce strategic marketing partnership.</li> </ul>
Distribution alliances	Arrangements with another company to distribute products or services.	<ul style="list-style-type: none"> <li>CKS Group and <i>Interwoven</i> announce reseller agreement to support enterprise web production</li> <li>NetVendor and <i>Commerce One</i> link supplier distribution channels with Commerce One marketsite</li> </ul>

Note: Sample firms are in italics.

**Table 2: The Categories of Managerial Actions – Definitions and Examples (cont'd)**

Action Type	Definition	Examples in the dataset
Acquisitions	Announcements of an acquisition.	<ul style="list-style-type: none"> <li>• <i>Software.com</i> to acquire @mobile.com</li> <li>• <i>BroadVision</i> extends its E-Business leadership with agreement to acquire Interleaf, the e-content company</li> </ul>
Internationalization	Expansion outside the U.S.	<ul style="list-style-type: none"> <li>• <i>Agile Software</i> expands European operations, opens central European regional headquarters.</li> <li>• <i>FairMarket</i> opens for business in Australia.</li> </ul>
Management team building	Hiring senior management or board members.	<ul style="list-style-type: none"> <li>• Leading e-Business investment banker joins <i>Versata</i> to direct business development.</li> <li>• <i>Calico Commerce</i> appoints Andersen Consulting luminary Joel Friedman to board of directors.</li> </ul>
Organizational changes	Announcement of a change in the organizational structure including spin-offs or new corporate entity or change in locations	<ul style="list-style-type: none"> <li>• Bank of America and <i>BroadVision</i> to form new company</li> <li>• <i>Calico</i> announces new business unit organization</li> </ul>
Filing financials	Filing quarterly and annual financial statements with the SEC.	<ul style="list-style-type: none"> <li>• <i>Marimba</i> announces strong third quarter financial results.</li> <li>• <i>Calico Commerce</i> license revenue up 143% in fourth quarter</li> </ul>
Recognition and Awards	Announcement of various third party awards	<ul style="list-style-type: none"> <li>• <i>Allaire Corporation's ColdFusion 4.0</i> wins PC Magazine Editor's Choice award</li> <li>• <i>Kana Communications</i> named one of Top 100 by Red Herring magazine for the second year in a row.</li> </ul>

Note: Sample firms are in italics.

**Table 3****Frequency distribution of the managerial actions taken by the 57 firms**

Action description	Action count	%
New customers	1127	33.13
New products or product features	360	10.58
Promotions	292	8.58
Stakeholder actions	206	6.05
Content alliances*	12	3.52
Technology alliances	412	12.11
Marketing alliances	121	3.55
Distribution alliances	116	3.41
Acquisitions	82	2.41
International expansion	79	2.32
Management team building	162	4.76
Organizational changes	50	1.47
Filing or announcing financials*	223	6.55
Recognition and awards	169	4.96
Total	3401	100

Notes: \* We do not pursue analysis of content alliances because they are too few in number to enable meaningful interpretation of inferences. We do not have any hypotheses on filing of financials as it is a mandated action required by reporting law.



**Table 4**  
**Summary statistics for the GLS regression of firm returns over a three day event window on market returns by action type**

$$R_{i,3\text{day}} = \beta_0 + \beta_1 R_{i,m,3\text{day}} + \varepsilon_{i,3\text{day}} \quad (1)$$

Action	# obs.	Pred. Sign	$\beta_0$	$\beta_1$	Adjusted R <sup>2</sup> (%)
New customers	1127	+	0.006*** (2.89)	1.579*** (25.04)	30.09
New products or product features	360	+/-	-0.001 (0.13)	1.365*** (12.73)	23.37
Promotions	292	+	0.008*** (1.96)	1.221*** (8.78)	17.48
Stakeholder actions	206	+	0.005 (0.81)	1.452*** (6.66)	15.80
Technology alliances	412	+/-	0.005*** (2.20)	1.395*** (13.21)	24.70
Marketing alliances	121	+/-	0.023*** (2.80)	1.993*** (8.84)	34.74
Distribution alliances	116	+/-	0.016*** (2.21)	2.043*** (8.37)	40.07
Acquisitions	82	+/-	-0.011 (1.23)	1.522*** (5.71)	33.66
Internationalization	79	+/-	-0.004 (0.44)	1.222*** (4.18)	7.58
Management team building	162	+	0.006 (1.04)	1.636*** (7.43)	22.39
Organizational changes	50	+	0.011 (0.87)	1.929*** (4.04)	26.50
Recognition and awards	169	+/0	0.008 (0.15)	1.121*** (5.61)	14.07

Notes:

1. Numbers in parentheses represent t-statistics. \*\*\*/\*\*/\* represents p values at one (two) tailed significance when a sign is (is not) hypothesized at 1%, 5%, and 10% significance levels respectively. Reported t-statistics are adjusted for White's (1980) heteroskedasticity correction. The potential serial correlation in standard errors that might arise from multiple instances of the action by one firm is also accounted for by modeling the errors as an AR(1) process.

2. In equation (1),  $R_{i,3\text{day}}$  is the compounded return for firm  $i$  on the trading before, including, and after the announcement date of the action,  $R_{i,m,3\text{day}}$  is the return on the NASDAQ equally weighted index for the same event window as the firm  $i$ .

**Table 5**  
**Summary statistics of the count of managerial actions and stock returns over the firm's post-IPO life**

N= 57 firms

Variable	Mean	Std dev	Median
New customers	19.77	16.96	15
New products or product features	6.31	5.33	5
Promotions	5.12	5.18	4
Stakeholder actions	3.61	3.04	2
Technology alliances	7.22	8.86	4
Marketing alliances	2.12	2.39	1
Distribution alliances	2.03	3.38	1
Acquisitions	1.43	1.60	1
International expansion	1.14	2.62	0
Management team building	2.84	2.52	2
Organizational changes	0.87	1.72	0
Recognition and awards	2.96	2.83	2
Stock returns over post-IPO life	0.33	2.31	0.001

**Table 6**  
**Summary statistics for the GLS regressions of post-IPO returns on count of actions by action type**

$$R_{i,\text{life}} = \beta_0 + \beta_1 R_{m,i,\text{life}} + \beta_2 \text{Actions}_{i,\text{life}} + \varepsilon_{i,\text{life}} \quad (2)$$

N=57 firms

Action	Pred. Sign	$\beta_0$	$\beta_1$	$\beta_2$	Adjusted R <sup>2</sup> (%)
New customers	+	-0.742 (1.42)	1.803* (1.36)	0.053*** (2.61)	26.48
New products	+/-	-0.710 (1.34)	1.687 (1.19)	0.163*** (2.75)	24.48
Promotions	+	-0.091 (0.22)	2.631** (1.71)	0.08* (1.55)	16.78
Stakeholder actions	+	-0.968 (1.58)	1.026 (0.75)	0.356*** (3.08)	28.46
Technology alliances	+/-	-0.691* (1.70)	1.231 (1.04)	0.141*** (3.92)	37.17
Marketing alliances	+/-	0.114 (0.25)	3.147*** (2.44)	0.095 (0.71)	15.22
Distribution alliances	+/-	0.322 (0.85)	3.456*** (2.85)	-0.001 (0.02)	14.34
Acquisitions	+/-	0.148 (0.71)	3.091*** (2.16)	0.119 (0.71)	14.87
Internationalization	+/-	-0.006 (0.02)	2.847*** (2.59)	0.283 (1.26)	24.60
Management team building	+	0.264 (0.56)	3.355*** (2.76)	0.019 (0.15)	14.38
Organizational changes	+	0.371 (0.12)	2.861*** (2.75)	0.325** (1.93)	19.99
Recognition and awards	+/0	0.007 (0.02)	3.017*** (2.22)	0.103 (1.05)	15.73

Notes:

1. Numbers in parentheses represent t-statistics. \*\*\*/\*\*/\* represents p values with one (two) tailed significance when a sign is (is not) hypothesized at 1%, 5%, and 10% significance levels respectively. Reported t-statistics are adjusted for White's (1980) heteroskedasticity correction.
2. In equation (2),  $R_{i,\text{life}}$  is the compounded return for firm  $i$  over the firm's post IPO life till 9/30/00,  $R_{m,i,\text{life}}$  is the return on the NASDAQ equally weighted index for the same event window as firm  $i$ ,  $\text{Actions}_{i,\text{life}}$  is the number of actions taken by each firm under a category.

**Table 7**  
**Pearson correlation matrix of the count of actions over firms' post-IPO life**  
N=57 firms

	1	2	3	4	5	6	7	8	9	10	11
<b>2</b>	<b>0.63</b> (0.00)	1									
<b>3</b>	<b>0.59</b> (0.00)	<b>0.64</b> (0.00)	1								
<b>4</b>	<b>0.52</b> (0.00)	<b>0.58</b> (0.00)	<b>0.42</b> (0.00)	1							
<b>5</b>	<b>0.79</b> (0.00)	<b>0.60</b> (0.00)	<b>0.65</b> (0.00)	<b>0.54</b> (0.00)	1						
<b>6</b>	<b>0.36</b> (0.00)	<b>0.28</b> (0.02)	<b>0.27</b> (0.04)	<b>0.41</b> (0.00)	<b>0.38</b> (0.00)	1					
<b>7</b>	<b>0.38</b> (0.00)	0.23 (0.07)	<b>0.66</b> (0.00)	0.16 (0.20)	<b>0.46</b> (0.00)	<b>0.27</b> (0.04)	1				
<b>8</b>	<b>0.26</b> (0.00)	<b>0.42</b> (0.00)	<b>0.35</b> (0.00)	<b>0.49</b> (0.00)	<b>0.35</b> (0.00)	0.07 (0.58)	<b>0.30</b> (0.02)	1			
<b>9</b>	<b>0.57</b> (0.00)	0.23 (0.07)	<b>0.43</b> (0.00)	0.19 (0.14)	<b>0.77</b> (0.00)	0.23 (0.08)	<b>0.53</b> (0.00)	0.18 (0.18)	1		
<b>10</b>	<b>0.31</b> (0.01)	0.18 (0.07)	<b>0.36</b> (0.00)	<b>0.46</b> (0.00)	<b>0.36</b> (0.00)	0.21 (0.11)	<b>0.35</b> (0.00)	<b>0.28</b> (0.03)	<b>0.31</b> (0.01)	1	
<b>11</b>	<b>0.47</b> (0.00)	<b>0.29</b> (0.02)	<b>0.25</b> (0.05)	<b>0.51</b> (0.00)	<b>0.31</b> (0.01)	0.22 (0.09)	0.12 (0.33)	<b>0.38</b> (0.00)	0.17 (0.20)	<b>0.30</b> (0.00)	1
<b>12</b>	<b>0.36</b> (0.00)	<b>0.38</b> (0.00)	<b>0.46</b> (0.00)	<b>0.33</b> (0.01)	<b>0.31</b> (0.02)	0.21 (0.11)	0.21 (0.11)	0.11 (0.41)	0.04 (0.74)	0.14 (0.27)	0.11 (0.40)

Notes:

- a) P-values are in parentheses. Correlations with p value < 0.05, two tailed, are reported in bold print;  
b) The following action codes have been used in the above table:

- 1 New customers
- 2 New products or product features
- 3 Promotions
- 4 Stakeholder actions
- 5 Technology alliances
- 6 Marketing alliances
- 7 Distribution alliances
- 8 Acquisitions
- 9 International expansion
- 10 Management team building
- 11 Organizational changes
- 12 Recognition and awards

**Table 8**  
**Factor loadings using principal components method with varimax rotation**

Actions	N=57 firms		
	Factor 1	Factor 2	Factor 3
	Market penetration	Organization building	Legitimacy building
International expansion	<b><u>0.891</u></b>	0.096	0.041
Distribution alliances	<b><u>0.776</u></b>	0.050	0.172
Technology alliances	<b><u>0.714</u></b>	0.319	0.451
Promotions	<b><u>0.579</u></b>	0.205	<b><u>0.587</u></b>
New customers	<b><u>0.533</u></b>	0.336	<b><u>0.675</u></b>
Organizational changes	0.025	<b><u>0.776</u></b>	0.169
Stakeholder actions	0.106	<b><u>0.744</u></b>	0.442
Management team building	0.437	<b><u>0.509</u></b>	-0.028
Acquisitions	0.176	<b><u>0.714</u></b>	0.442
New products or product features	0.163	<b><u>0.491</u></b>	<b><u>0.675</u></b>
Recognition and awards	0.009	-0.045	<b><u>0.838</u></b>
Marketing alliances	0.239	0.180	0.420
Eigenvalue	5.224	1.438	1.109
Cumulative percentage of variation explained (%)	43.54	55.52	64.77
Incremental percentage of variation explained (%)	43.54	11.99	9.25

**Table 9**  
**Panel A: Summary statistics of the GLS regression of firms' post-IPO returns on the three action choice factors**

$$R_{i,\text{life}} = \beta_0 + \beta_1 R_{m,i,\text{life}} + \beta_2 \text{Factor1}_i + \beta_3 \text{Factor2}_i + \beta_4 \text{Factor3}_i + \varepsilon_{i,\text{life}} \quad (3)$$

N=57 firms		
Variable	Pred. Sign	1
Intercept	?	0.057 (0.23)
Market return	+	0.013 (0.01)
<b>Managerial actions</b>		
Factor 1 Market penetration	+	0.772*** (4.24)
Factor 2 Organizational building	+	0.869*** (6.47)
Factor 3 Legitimacy building	+	0.752*** (5.07)
Adjusted R <sup>2</sup> (%)		51.02

Notes:

1. Numbers in parentheses represent t-statistics. \*\*\*/\*\*/\* represents p-values with one (two) tailed significance when a sign is (is not) hypothesized at 1%, 5%, and 10% significance levels respectively. Reported t-statistics are adjusted for White's (1980) heteroskedasticity correction.
2. In equation (3),  $R_{i,\text{life}}$  is the compounded return for firm  $i$  over the firm's post IPO life till 9/30/00,  $R_{m,i,\text{life}}$  is the return on the NASDAQ equally weighted index for the same event window as the firm  $i$ . The computation of the factor scores is explained in the text. Also see Table 6 for factor loadings.

**Table 9**

**Panel B: Descriptive statistics of post IPO earnings, average market value of equity, and the three factors**

Variable	N=57 firms		
	Mean	Std dev	Median
Earnings post IPO /ave MVE	-0.046	0.078	-0.025
Gross margin post IPO/ave MVE	0.023	0.025	0.014
Marketing post IPO /ave MVE	0.034	0.046	0.022
R&D post IPO/ave MVE	0.012	0.016	0.008
Ave MVE (\$ billion)	2.04	2.69	0.937

**Panel C: Pearson correlation between the three factors and in turn, post IPO earnings and earnings components**

	Factor 1 Market penetration	Factor 2 Organization al building	Factor 3 Legitimacy building
Earnings post IPO life/ave MVE (p value)	0.03 (0.82)	0.02 (0.88)	<b>0.23</b> <b>(0.08)</b>
Gross margin post IPO/ave MVE (p value)	-0.09 (0.50)	0.11 (0.40)	0.15 (0.24)
Marketing post IPO /ave MVE (p value)	-0.10 (0.45)	-0.07 (0.58)	-0.12 (0.35)
R&D post IPO/ave MVE (p value)	-0.11 (0.39)	-0.03 (0.79)	-0.11 (0.42)

Note: Earnings post IPO<sub>*i*</sub> refers to earnings accumulated over the firm *i*'s post IPO life (measured as time from the IPO date till 9/30/00), Gross margin post IPO<sub>*i*</sub>, Marketing post IPO<sub>*i*</sub>, R&D post IPO<sub>*i*</sub> refers to gross margin, marketing and advertising, and research and development expenses accumulated over the firm's post IPO life. Ave MVE refers to the average market value of the firm over its post IPO life. Correlations whose p value < 0.10 are shown in bold print.

**Table 9**

**Panel D: Summary statistics for the GLS regression of firm returns over the firm's post IPO life on three factors and accounting earnings**

$$R_{i,\text{life}} = \beta_0 + \beta_1 R_{m,i,\text{life}} + \beta_2 \text{Factor1}_i + \beta_3 \text{Factor2}_i + \beta_4 \text{Factor3}_i + \beta_5 (\text{Earnings/aveMVE})_{i,\text{life}} + \varepsilon_{i,\text{life}}$$

(3 modified)  
N=57 firms

Variable	Pred. Sign	1	2	3
Intercept	?	0.173 (0.33)	0.097 (0.34)	0.257 (0.93)
Market return	+	3.413*** (2.52)	0.001 (0.01)	0.385 (0.37)
<b>Managerial actions</b>				
Factor 1 Market penetration	+		0.769*** (4.21)	0.713*** (4.32)
Factor 2 Organizational building	+		0.866*** (6.48)	0.862*** (6.43)
Factor 3 Legitimacy building	+		0.736*** (4.94)	0.748*** (4.93)
<b>Accounting earnings post IPO</b>				
Gross margin post IPO	+	2.401 (0.61)	0.824 (0.33)	
Marketing post IPO	+			-6.311 (0.47)
R&D post IPO	+			13.762* (1.42)
				-40.161 (0.93)
Adjusted R <sup>2</sup> (%)		24.99	50.12	49.92

Notes:

1. Numbers in parentheses represent t-statistics. \*\*\*/\*\*/\* represents p-values with one (two) tailed significance when a sign is (is not) hypothesized at 1%, 5%, and 10% significance levels respectively. Reported t-statistics are adjusted for White's (1980) heteroskedasticity correction.

2. In equation (1),  $R_{i,\text{life}}$  is the compounded return for firm  $i$  over the firm's post IPO life till 9/30/00,  $R_{m,i,\text{life}}$  is the return on the NASDAQ equally weighted index for the same event window as the firm  $i$ , earnings post IPO life  $i$  refers to earnings accumulated over the firm  $i$ 's post IPO life (measured as time from the IPO date till 9/30/000) scaled by ave MVE which refers to the average market value of the firm over its post IPO life. Gross margin, marketing expense, and R&D expense post IPO represent the respective line item accumulated over the firm  $i$ 's post IPO life (measured as time from the IPO date till 9/30/000) scaled by ave MVE.