

**Does the Quality of Online Customer Experience Create a Sustainable Competitive Advantage for E-commerce Firms?**

Shivaram Rajgopal  
University of Washington  
Box 353200  
Seattle, WA 98195  
Tel: (206) 543 7525, Fax: (206) 685 9392  
E-mail: rajgopal@u.washington.edu

Mohan Venkatachalam  
Graduate School of Business  
Stanford University  
Stanford, CA 94305  
Tel: (650) 725-9461, Fax: (650) 725-0468  
E-mail: vmohan@gsb.stanford.edu

Suresh Kotha  
University of Washington  
Box 353200  
Seattle, WA 98195  
Tel: (206) 543 7525, Fax: (206) 685 9392  
E-mail: skotha@u.washington.edu

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### **Abstract:**

Claims have often been made that the quality of the online customer experience in terms of web site ease of use, selection of goods offered, quality of customer service, the effectiveness of virtual community building, and site personalization are crucial to the success of e-commerce firms. If differences in the quality of online customer experiences provide a long-term competitive advantage, we would expect a positive relation between quality of online customer experience and shareholder value. Skeptics, however, argue that any advantage arising from the quality of online customer experiences would simply be competed away through imitation and innovation. To test these opposing views, we use scorecards of online customer experience provided by Gomez Advisors for a sample of 48 e-commerce firms during the period 4Q:1999 to 3Q:2000 and examine the relation between the scores and shareholder value. We measure shareholder value as the price-to-sales ratio, a measure commonly used for e-commerce firms. On average, we find that the association between online customer experience scores and the price-to-sales ratio is positive. In addition, the magnitude of the positive association is decreasing in the extent of competition (especially from brick-and-mortar firms) and the probability of failure, as measured by the amount of cash left to fund operations. The stock market appears to view differences in the quality of online customer experience as a viable competitive advantage even after the April 2000 stock market crash.

# Does the Quality of Online Customer Experience Create a Sustainable Competitive Advantage for E-commerce Firms?

## 1. Introduction

This study examines whether the quality of online customer experience is associated with shareholder value for Internet firms focused on Business to Consumer e-commerce (hereafter “e-commerce” firms). Forrester Research, an Internet research firm, estimates that revenues in the Business to Consumer segment will grow from \$20 billion in 1999 to \$184 billion by 2004. Such explosive growth is due, in part, to the superior shopping experiences offered by the new e-commerce firms. For example, Amazon made it easier and convenient to buy books, E\*Trade made trading stocks cheaper and faster than calling a traditional broker, and eBay revolutionized person-to-person trading by providing an online auction forum for anyone to reach a vast community of buyers and sellers. When asked why people come to his firm’s site, Jeff Bezos, CEO of Amazon.com, responded (*Fast Company*, 1996):

Bill Gates laid it out in a magazine interview. He said, “I buy all my books at Amazon.com because I’m busy and it’s convenient. They have a big selection, and they’ve been reliable.” Those are three of our four core value propositions: convenience, selection, [and] service. The only one he left out is price: we are the broadest discounters in the world in any product category... These value propositions are interrelated, and they all relate to the Web.

However, skeptics point to low barriers to entry and intense competition on the web and posit that the quality of online customer experience can be easily imitated by other businesses, especially by established businesses with deep pockets (*New York Times* 3/29/00, 6/7/00; *Economist* 7/1/00; *Wall Street Journal* 6/27/00). For example, Steven Riggio, the CEO of Barnes and Noble, observes (*Fortune*, 1997: 248):

Anything Amazon.com can do on the Internet, so, too can Barnes & Noble. There was a mystique about how difficult it was to get started on the web, but it is quickly fading. Hiring hot designers from Silicon Valley, Barnes & Noble now offers a web shop front that’s just as inviting and useful as Amazon’s, with easy-to-use subject indexes, online author events every day, book forums, book reviews, and other features.

Thus, there are two opposing views on whether the quality of online customer experience can create a sustainable long-term competitive advantage for pure Internet firms. If differences in the quality of online customer experience persist thereby creating long run competitive advantage we would expect a positive association between online customer experience quality and shareholder value ('the sustainable advantage hypothesis'). Alternatively, if these differences are simply competed away through imitation and innovation by rival firms we would not observe a positive association ('the imitation hypothesis').

To test these hypotheses, we use a sample of 48 e-commerce firms over four quarters starting with the fourth quarter of 1999 and examine the association between the quality of online customer experience and shareholder value. We use price-to-sales ratio as our measure of long-term shareholder value. We measure the quality of online customer experience using customer experience scores compiled by Gomez Advisors, a respected Internet rating firm. Gomez Advisors, as explained in greater detail in section 2, provides a scorecard that attempts to systematically capture the quality of the online customer experience offered by firms along five dimensions: (1) web site usability, (2) customer confidence in the web business, (3) selection of goods and services offered on the site, (4) the effectiveness of relationship services such as virtual community building and site personalization, and (5) the extent of price leadership practiced by the firm.

We find that the association between the average quality of online customer experience scores and the price-to-sales ratios is positive and statistically significant consistent with the sustainable advantage hypothesis. A detailed investigation of the five dimensions of online customer experience reveals interesting insights. The positive association between the quality of online customer experience and the price-to-sales ratio is driven by two dimensions: customer

confidence in the web business, and the effectiveness of relationship services such as virtual community building and site personalization. We do not observe a significant positive association between the scores and price-to-sales ratios for web site usability and price leadership dimensions, consistent with the imitation hypothesis. This suggests that providing superior customer experience through easy to use websites, and lower prices is easy to imitate. We also find that selection of goods and services exhibits a weak negative association with price-to-sales ratio. This indicates that the benefits associated with carrying a broad variety of goods and services *per se* do not exceed the costs of such a strategy.

In additional analyses, our results indicate that the extent of the positive association between the quality of online customer experience and firm value is not a cross-sectional constant across firms. The extent of the association decreases with the number of firms that conduct commerce on the web in the industry that a firm operates in. Moreover, the impact of online customer experience quality on firm value decreases with the proportion of competition that comes from ‘brick-and-mortar’ firms (firms that derive revenues primarily from offline operations) possibly because such firms have the advantage of deeper pockets, better-known brands, and well-established supplier relationships compared to their online counterparts.

Also, the extent of the positive association between the quality of online customer experience and shareholder value decreases with the probability of failure, as measured by the number of quarters of cash left to fund operations, i.e. “cash burn.” This finding indicates that the stock market views the quality of online customer experience to be more valuable to firms that are able to sustain “cash burn.” We also find that the stock market views differences in the quality of online customer experience as a viable competitive advantage even after the April 2000 crash in e-commerce stocks.

This study contributes to extant accounting literature on the value-based management perspective advocated by Ittner and Larcker (2000) in their recent review of empirical research in management accounting. The value-based management perspective encourages researchers to identify the financial and operational drivers leading to increased shareholder value. By identifying the specific factors that impact shareholder value, value driver analysis is expected to improve resource allocation and performance measurement. Consistent with this perspective, we provide evidence on the shareholder value implications of a key competitive tool in e-commerce - quality of online customer experience.

Our paper is related to recent work by Ittner and Larcker (1998) that examines the value-relevance of customer satisfaction measures. Ittner and Larcker (1998) document that a composite index of customer satisfaction is a leading indicator of firm performance. We examine the impact of online customer experience, a measure unique to the Internet industry, on shareholder value. Providing a good online customer experience consists of managing dimensions such as website usability, site personalization, and virtual community building that are unique to e-commerce. We also identify specific dimensions of the online customer experience-customer confidence and relationship services- that are relatively harder for competitors to imitate. Finally, our study adds to the emerging literature on the value-drivers of Internet stocks (Demers and Lev, 2000; Hand, 2000a and b; Rajgopal et al., 2000; Trueman et al., 2000a and b).

The remainder of the paper is organized as follows. Section 2 discusses the data gathered by Gomez Advisors to capture the five dimensions of online customer experience and the hypothesized links between the quality of online customer experience and long-term shareholder value. Section 3 presents the empirical specifications tested. Section 4 describes the data and

descriptive statistics while section 5 presents our main results. Section 6 describes some additional analyses we conduct. Section 7 provides some concluding remarks.

## **2. Online Customer Experience Scores and their Links to Future Profitability**

We begin by discussing the data set of customer experience scorecards compiled by Gomez Advisors (hereafter, Gomez), a leading rating agency, and how such experience might be related to future profitability.<sup>1</sup> Next, we discuss whether differences in the quality of online customer experiences can persist and create long-term shareholder value. This discussion leads us to two competing hypotheses on the association between the quality of online customer experience and shareholder value.

### *Gomez scorecards and links to future profitability*

Gomez tracks a firm's web site if the firm operates in the national market in an industry that meets certain (undisclosed) minimum standards of service in terms of the breadth and depth of products sold. Data collection methods employed by Gomez include a direct examination of the web site, monitoring the performance of the ranked firm's secure and non-secure web pages every five minutes, conducting transactions and customer service interaction over the telephone and the Internet. The firms being ranked are also required to fill out a supplemental questionnaire. Data thus collected feeds into 150 to 250 criteria for every ranked firm and is condensed into a score for each of five dimensions of online customer experience: web site usability (EASE), customer confidence (TRUST), onsite resources (SELECTION), relationship

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<sup>1</sup> Bizrate.com and Forrester.com also provide scorecards on online customer experience e-commerce firms. Bizrate provides consumer's perceptions whereas Forrester and Gomez Advisors provide expert ratings of online customer experience. Forrester and Gomez both rank firms on various dimensions; however Gomez Advisors covers significantly more public firms. Bizrate's coverage of firms does not include some prominent players in the industry. For example, Bizrate did not have a rating for Amazon.com in the books category although Amazon.com is the leader in this category.

services (REL) and price leadership (COST). Gomez publishes a score on a scale of 1 to 10, up to two decimal places, every quarter on these five aspects for the firms they track.

In the following paragraphs we discuss the five dimensions in greater detail. Each paragraph starts with a description of the methodology adopted by Gomez to measure a particular dimension. This description is followed by an analysis of the links between that dimension and long run profitability.

*Web site usability (EASE):* Top ranked firms in this category have an intuitive layout with tightly integrated content, useful demonstrations and extensive online help. Gomez examines the functionality of the site, availability of online help, a glossary of terms, a list of FAQs (frequently asked questions), the degree of simplicity of account opening and the transaction process, consistency in web site design and navigation, and tight integration of data providing efficient access to information commonly accessed by consumers.

We argue that low barriers to entry, the lack of location-based advantages (i.e., competition is a click away) and low switching costs (Shapiro and Varian, 1999) on the Internet may make e-commerce firms more dependent on the willingness of customers to remain on their web site and undertake a commercial transaction. In a recent customer survey conducted by Cognitative, an Internet consulting firm, 54% of respondents ranked navigational ease as the most important reason why they patronize an online business regularly (*The Wall Street Journal*, 11/22/1999). If improving ease of web site use reduces the cost of acquiring new customers or creates more loyal repeat customers, such improvement should result in future profitability (Anderson et al., 1994; Reichheld and Sasser, 1990).

*Customer confidence (TRUST):* The leading firms in this category operate highly reliable web sites, maintain knowledgeable and accessible customer service organizations and provide



quality and security guarantees. Gomez investigates the posted availability of customer service via phone, e-mail, and branch locations, privacy policies, service guarantees, fees and explanations thereof.<sup>2</sup>

Several characteristics of the Internet intensify the importance of customer confidence or trust in Internet-based exchange relationships. The novelty of the Internet creates pervasive uncertainty among buyers and sellers, which in turn, increases the importance of trust in mediating commercial transactions among them (Weigelt and Camerer, 1988). To illustrate, consumers rely on numerous cues in making purchasing decisions. The marketing literature has shown that although consumers use both intrinsic cues (e.g., ingredients, taste, and texture) and extrinsic cues (e.g., price, packaging, and labeling) as indicators of product or service quality (Richardson, Dick and Jain, 1994), they rely more on intrinsic cues in their purchase decisions. Since the Internet deprives consumers of intrinsic cues, it increases their transaction risk. Hence, a firm's ability to signal trust, and thus engender customer confidence, becomes more important as a guarantor of quality (Shapiro, 1983).<sup>3</sup>

Furthermore, e-commerce firms employ innovative software tools such as email alerts, chat rooms, and collaborative filtering to deliver value to consumers in ways that have not been economically viable in traditional physical settings (Hamel and Sampler, 1998; Kotha, 1998).<sup>4</sup>

Hence, cognitive schemas used by customers in the offline world may not smoothly translate to

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<sup>2</sup> Moreover, test phone calls are made and e-mails are sent to customer service units covering simple technical and industry specific questions. The responses are measured in terms of the quality, speed, and accuracy. Each web site is monitored every five minutes for speed and reliability of both public and secure areas of the site. Other factors such as technological abilities, technological independence, years in business, years online and membership in trade organizations also contribute to a higher rank on the customer confidence dimension.

<sup>3</sup> A case in point is Ebay's decision to suspend an art-seller from their site after he artificially inflated the sale price (*The New York Times*, 5/11/2000).

<sup>4</sup> With collaborative filtering, a site collects data a visitor provides about her taste in say, books or movies. The filtering software compares her preferences with those of thousands of other people and suggests fresh books or movies that the visitor might like.

Internet-based transactions. Therefore, providing explicit statements of privacy policies, highly reliable web sites, information on quality and security guarantees aimed to engender customer confidence may be of greater importance in inducing online purchasing decisions than offline buying (Ward, Bitner and Barnes, 1992). Thus, efforts to enhance customer confidence would attract new customers and retain older customers thereby reducing customer acquisition costs and improving future profitability.

*Onsite Resources (SELECTION)*: This dimension of the ranking process measures the range of products and services that the ranked firm carries and, as such, captures the richness of product and service information (e.g., product reviews) that a firm is able to assemble. Firms are also ranked on whether the web site provides detailed information on the product through electronic forms and information look-up facilities.

Given that the Internet provides “infinite shelf space,” many pure e-commerce firms explicitly tout selection as one of their most important value propositions vis-à-vis their traditional brick-and-mortar counterparts. For example, the largest superstore of Barnes and Noble can only accommodate about 175,000 books, whereas Amazon.com claims that its virtual store carries over 3 million books (Kotha, 1999). Based on such claims by leading online retailers (e.g., Amazon.com and CDNow), many customers now expect that they should be able to enter a site and see the whole catalog (*The Wall Street Journal*, 11/22/1999). Hence authoritative selection is one strategy that an online firm can employ to attract customers to its web site (Evans and Wurster, 1999). A few exemplar online retailers are then able to induce or entice such customer traffic into creating content (onsite resources) such as customer book reviews or product reviews (Kotha, 1998; Prahalad and Ramaswamy, 2000).

Unlike online retailers, firms such as drkoop.com use content (in this case health related content) to signal the breadth and depth of their onsite resources. Such content is generated internally or aggregated from multiple sources. Although expensive to generate, it is the breadth and depth of such onsite resources that attracts customers to the site. The online firm then aims to monetize this traffic via advertising revenues from various sponsors. In sum, the greater the onsite resources a firm has been able to assemble, the greater the firm's potential to attract new customers and retain old customers leading to greater future sales and future profitability.

*Relationship Services (REL):* To operationalize this dimension, Gomez examines the availability of advice, tutorials, ability to customize a site, whether the customer data is re-used to facilitate future transactions, support of repeat-buying including offer of frequent buyer incentives. The dimension measures the ability of the firm to build electronic relationships through personalization by enabling customers to make service requests and inquiries online and through programs that build customer loyalty and a sense of community.

E-commerce firms invest in relationship services to motivate repeat purchases from their customer base and decrease a customer's propensity to switch to a competitor. Online firms build customer relationships primarily through virtual communities and site personalization.<sup>5</sup> Activities aimed at building a virtual community heighten consumer involvement with the firm, create a sense of collective belonging (Hagel and Armstrong, 1997) and hence generate a critical mass of customers and make it difficult for new entrants to draw customers away to other communities.<sup>6</sup>

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<sup>5</sup> Virtual communities are online forums that include contributions from, and encourage discourse among, specific sets of like-minded netizens (Kotha, 2000).

<sup>6</sup> For instance, Amazon offers space for readers to post their "own" reviews. It then steps out of the way and lets its customers sell to each other. Thus, customers themselves (along with the firm's editors) create much of the editorial content on the firm's site. As the content grows, it attracts others to add to the richness of the mix, thus creating a virtuous cycle (*Economist*, 1997; Kotha, 1998).

Personalization is another important strategy undertaken by many online firms to generate repeat buying (e.g., Amazon.com, CDNow, and Yahoo). The Internet offers means for “memorizing” detailed personal knowledge about exchange partners in transactions. Many e-commerce firms have taken advantage of personalization and interaction technologies to develop relationships with customers that were both personal and communal and thereby increase customer loyalty. The “Eyes” program run by Amazon is a personal notification service in which customers can register their interests in a particular author or topic. Once customers register, they are notified each time a book by their favorite author, or topic of interest is published. Personalization increases costs of switching to the nearest competitor and thus creates loyal customers for the firm leading to lower customer acquisition costs and better future profitability.<sup>7</sup>

*Price Leadership (COST):* The price leadership dimension rates the cost competitiveness of purchasing a typical basket of goods or services sold on a site. Costs include a basket of typical services and purchases and added fees due to shipping and handling. Firms with higher scores on this dimension offer services and costs at a lower cost.

A low-cost strategy, where the total cost of ownership for a typical basket of services sold on the site is less than those available via a competitor’s site, represents an attempt by an online firm to generate a competitive advantage by becoming a price leader. In pursuing this approach, the emphasis is on the efficient and rigorous pursuit of cost reduction from all possible sources (Porter, 1980). To some firms (e.g., buy.com) that compete on low price, the allure of the

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<sup>7</sup> Amazon.com has placed personalization at the core of its relationship with consumers. To this end the company developed proprietary technologies dedicated to creating personalized e-mails, compiling customer purchase histories, and recommending additional books based on customers’ manifest preferences. Explains Jeff Bezos, CEO of Amazon.com: “We also want to ‘redecorate the store’ for every customer. We can let people describe their preferences, analyze their past buying patterns, and create a home page specifically for them.” (Kotha, 1999).

Internet is simple: Online technologies provide a low-cost, extremely efficient way to display merchandise, attract customers and handle purchase orders (*Wall Street Journal*, 11/22/1999).

To price-sensitive customers, such firms offer the appropriate value proposition and thus generate a competitive advantage vis-à-vis their competitors who emphasize other dimensions of the online customer experience. Hence, *ceteris paribus*, if the firm makes up these lower costs by greater volume, price leadership would be positively associated with long run profitability.

The above discussion suggests that each dimension of online customer experience is related to long run profitability. In a cross-sectional analysis of firms, unless differences in the quality of online customer experiences offered by various firms persist over time, we would not expect these differences to be related to differences in shareholder values. The next sub-section examines this issue in greater depth.

*Can the quality of online customer experience create a sustainable long-term advantage?*

As mentioned earlier, the marketing literature suggests that exemplary online shopping experiences can lead to greater customer loyalty and hence, secure future revenues (Fornell, 1992; Rust et al., 1994). Better online customer experiences could potentially reduce the cost of future customer transactions, new customer acquisition, decrease price elasticity of demand and minimize the likelihood that customers will defect if quality falters (see Anderson et al., 1994). Moreover, better online customer experiences help to attract new customers by building the firm's reputation and encouraging positive word of mouth (Fornell, 1992). The word-of-mouth effect is especially important in the Internet space as illustrated by this statement by Jeff Bezos of Amazon.com:

If you make customers unhappy in the physical world, they might each tell 6 friends. If you make customers unhappy on the Internet, they can each tell 6,000 friends with one message to a newsgroup. If you make them really happy, they can tell 6,000 people about that. (Taylor, 1996: 132).

Improving the quality of online customer experience also has internal benefits to the firm such as reduced costs associated with servicing complaints (Fornell and Wernerfelt, 1988; Garvin, 1988).

However, skeptics argue that superior online shopping experience can be imitated by online and offline competitors. Classical micro-economic theory suggests that if barriers to imitating superior online customer experiences were low, any excess rents accruing to a firm on account of providing superior online customer experiences to their customers would be competed away through innovation and imitation (Varian, 1992).

In contrast, the resource-based view in the strategy literature takes an opposing stand (Wernerfelt, 1994; Mazvancheryl et al., 1999). Under the resource based perspective, superior business performance results from access to superior, inimitable resources and capabilities to use these resources better than others. Successful firms are those that identify these resources and take actions to build product-market positions that effectively utilize these resources and capabilities to build a sustainable competitive advantage which, in turn, leads to higher quality of online customer experiences and ultimately, to long run economic value (Barney, 1991). Moreover, economics research (Lippman and Rumelt, 1982 and Tesler, 1982) has argued that returns from successful knowledge-related resources such as R&D investments can persist through time on account of “uncertain imitability” i.e., the outcome of efforts to replicate resources and strategies of a successful firm is uncertain. Two firms that spend the same dollar amounts on R&D may realize different levels of success. Hence, different outcomes from investments in R&D may persist through time on account of the uncertainty in the outcomes of efforts to imitate others. Analogous arguments can be made for investments in online customer experiences. The skills and activities of a firm with a superior degree of market orientation may be difficult to imitate and potentially lead to superior economic returns. In a clinical study,

Rindova and Kotha (2000) document that Barnes & Noble and CDNow, despite significant efforts to imitate Amazon, were unable to catch up with Amazon's lead in selling books, music and video products.

Based on the above arguments, we posit two competing hypotheses. The "sustainable advantage" hypothesis argues that higher quality online customer experience is the result of resources and skills that are difficult to imitate and have a positive effect on shareholder value. The "imitation" hypothesis reflects the position that differences in the quality of online customer experiences can be competed away and hence should not exhibit a positive association with shareholder value.

**Sustainable Advantage Hypothesis:** The quality of online customer experiences should be positively associated with long-term value.

**Imitation Hypothesis:** The quality of online customer experiences should not be associated with long-term value.

### **3. Tests of association between online customer experience scores and price-to-sales ratio**

In this section, we describe the tests that associate various dimensions of online customer experience with the price-to-sales ratio. We use the price-to-sales ratio as the dependent variable because our hypotheses require a long-term measure of firms' economic value. The price-to-sales ratio has the advantage of being a forward-looking and cross-sectionally comparable measure of long-term value.

We choose the price-to-sales ratio as opposed to other conventional measures such as price-earnings (P/E) multiple or the market-to-book ratio for the following reasons. First, since most e-commerce firms report negative earnings, P/E ratio is not a meaningful measure for them. In the absence of meaningful P/E multiples, equity analysts following the Internet sector often report and follow price-to-sales ratios for such firms (Demers and Lev, 2000). Second, we do

not use the market-to-book ratio because this measure ignores most intangible assets that are likely to be the source of value creation for e-commerce companies. Furthermore, this measure is artificially depressed because the costs associated with improving the quality of online customer experience are expensed rather than capitalized. This adds to the interpretation problems with using the market-to-book ratio as our dependent variable. Finally, we also do not pursue return on investment (ROI) or return on assets (ROA) as alternative measures for long-term value because a majority of our firms report negative earnings. Such negative earnings are likely to represent investments geared towards providing superior online customer experiences without capturing the future benefits that such investments will fetch.

We estimate the following regression specification to assess whether superior online customer experiences create sustainable long-term competitive advantages:

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_{2i} \text{IND}_{ijt} + \phi_{jt} \quad (1)$$

where P/S is the price-to-sales ratio, DIMENSION is one of the dimensions of online customer experience discussed in section 2 (i.e., EASE, SELECTION, TRUST, REL, COST), IND is an industry dummy that reflects a firm's membership in each of the eight markets (i.e., i = 1,..8, personal finance, shopping, health, computers and office equipment, auto, travel, home and garden, and auctions) in which it operates. The industry dummies are added to control for unmodeled variables that might covary with industry membership of the firm.

Our primary coefficient of interest is  $\gamma_1$ . A positive  $\gamma_1$  is consistent with the sustainable advantage hypothesis. If superior online customer experiences are expected to create long-term value, investors would price such expected benefits and such pricing would be reflected in a positive  $\gamma_1$  coefficient. However, if investors do not expect excess rents to accrue to a particular



firm on account of superior online customer experiences, we would expect  $\gamma_1$  to be zero, consistent with the imitation hypothesis.

#### **4. Data and Descriptive Statistics**

##### *Data*

We begin with the universe of firms for which Gomez provides quarterly online customer experience scorecards. We hand collect the scorecards for Winter 1999, Spring 2000, Summer 2000, and Fall 2000 quarters from Gomez's web site ([www.gomez.com](http://www.gomez.com)). Because Gomez releases scores for each industry on various dates throughout a quarter, we match these scores with the firms' fiscal quarter in which the scores are released.<sup>8</sup> For example, Spring 2000 scores for mortgage brokers were released on February 11, 2000. Hence, for a calendar year mortgage broker Spring 2000 scores are considered as belonging to the first calendar quarter of 2000. Market value of equity is measured on the last day of the fiscal quarter in which the scores are released. Hence, most market values corresponding to the Spring 2000 quarter are as of March 31, 2000.

We obtain Gomez scores for 622 online and offline firms. Of these, we find only 51 firms that operate predominantly online and trade in public markets. Following Hand (2000a), we classify a publicly traded firm as a pure online firm if the firm is a part of the Internet stock list compiled by [www.internet.com](http://www.internet.com). We eliminate three firms that derived less than 50% of revenues from online operations. The final list of the 48 pure Internet firms used in the analysis is reproduced in Panel A of Table 1.

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<sup>8</sup> For six firms (Amazon, Buy.com, Netbank, Value America, Yahoo, Barnes and noble.com) in our sample Gomez provides scores in multiple product categories. For example, Gomez scores for Amazon are available for books, music, videos, toys, electronics and auctions. In such cases, we use the equally weighted average of these scores as the independent variable in our empirical specifications. Because segment disclosures of product-wise sales are patchy or non-existent we cannot use weighted average scores.

We hand collect all financial information variables from SEC 10-K and 10-Q filings from the SEC's EDGAR database at the [www.sec.gov](http://www.sec.gov) website. Stock prices are obtained from [www.yahoo.com](http://www.yahoo.com) and Bloomberg data services. Due to the unavailability of financial data or stock price data, we were left with 114 usable firm-quarter observations.

### *Descriptive Statistics*

Panel B of Table 1 provides descriptive statistics for the relevant dependent and independent variables used in the study. The first part of panel B provides the descriptive statistics on the scores for various dimensions of e-commerce customer experience. Note that we have only 52 firm-quarter observations for the COST dimension. This is because Gomez does not rate the COST dimension for many industries (e.g., apparel, furniture, gifts, health advice, home buying, insurance, sporting goods) they track. It is evident from panel B that the scores display modest variation. The standard deviation scaled by the mean score ranges from about 23% for the ease of use (EASE) dimension to 31% for the relationship (REL) dimension. We also compute an (equally weighted) average score of the four dimensions excluding COST (CSCORE).<sup>9</sup> This variable displays the least cross-sectional variation (standard deviation/mean is 18%). Limited variation on the scores might dampen the power of the empirical tests in detecting significant relations between the scores and the performance measures. Such limited variation is probably on account of restricting the sample to pure Internet firms. Moreover, Gomez probably chooses to cover well-followed web sites that meet certain minimum thresholds of customer confidence and reliability. Hence, self-selection in firm coverage possibly precludes more cross-sectional variation in reported scores.

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<sup>9</sup> Gomez also provides a composite score of all the dimensions but it is unclear how the composite score is determined. It is noteworthy that the average score that we compute is very highly correlated ( $\rho = .96$ ) with the overall score provided by Gomez.

The descriptive statistics related to financial measures of the sample firms reveal some interesting regularities. Consistent with recent research on Internet stocks we find that the median firm incurs a loss of \$11.81 million and has a significant price-to-sales ratio of 17.86. The average (median) market value of firms in our sample was \$3.9 (\$0.3) billion while the average (median) sales was \$66.83 (\$15.49) million.

Panel C of Table 1 presents the Pearson correlation matrix of the overall score (CSCORE) and its component dimensions. Not surprisingly, CSCORE is highly correlated with component dimensions. Also note that some of the individual dimensions display high correlation with one another (for example, correlation between SELECTION and EASE is 0.54 and the correlation between REL and EASE is 0.47). Such correlation is not entirely unexpected. For example, firms that invest heavily in community building and site personalization are also likely to have navigable web sites.

## **5. Results**

Table 2 presents the results of the association between price-to-sales ratio and each of the five dimensions of online customer experience. We find that the overall score (CSCORE) that represents the average of all the dimensions is significantly associated (coefficient = 4.70;  $t = 1.72$ ) with the price-to-sales ratio. This suggests that, on average, market participants view superior customer experience as a source of shareholder value.

However, when we examine the association between the scores of individual dimensions and price-to-sales ratio a different picture emerges. We find that only TRUST (coefficient = 5.53;  $t = 2.77$ ) and REL (coefficient = 4.41;  $t = 2.40$ ) variables are positively associated with the price-to-sales ratio. In contrast, we do not find a significant positive relationship between price-

to-sales ratio and the three remaining dimensions, namely, EASE, SELECTION and COST.<sup>10</sup> It is interesting to note that the coefficient on SELECTION is negative but very weak (coefficient = -3.08; t=-1.37). One interpretation of the negative coefficient is that market participants not only view the provision of a wide selection of goods as a value-decreasing proposition.

It is perhaps not surprising that EASE, SELECTION and COST are dimensions that the stock market participants do not view as a viable long run competitive advantage. On the Internet, since every competitor is only a “click” away, information regarding price (COST) and the depth of product and service offerings (SELECTION) are highly transparent. Moreover, the layout of the website and its functionality (EASE) can be readily studied and understood and hence, likely to be imitated by competitors.

The positive relation between TRUST and price-to-sales ratio highlights the importance of customer confidence or trust in Internet based exchange relationships. Similarly, the positive relation between REL and price-to-sales ratio highlights the importance of relationship building activities undertaken by an online firm. Because the medium’s novelty creates uncertainty for commercial exchanges, trust becomes an important factor in mitigating such uncertainties. In many ways, developing trust is intricately intertwined with efforts to build a firm’s reputation. Similarly, firms also create reputation through relationship building activities such as creating virtual communities and site personalization strategies. Both reputation and trust are difficult to create, trade, imitate and substitute and these are the very characteristics that resource-based theorists associate with a sustainable competitive advantage (Wernerfelt, 1994; Barney, 1991).

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<sup>10</sup> Note that for the COST dimension we have significantly lower number of observations because Gomez does not provide scores for this dimension for all industries.

### *Robustness checks*

We conduct two sets of robustness checks. The first set relates to econometric robustness and alternative model specifications. The second test evaluates the impact of the April 2000 crash in e-commerce stocks. We examine whether the error terms in the reported regressions are subject to serial correlation that may affect the standard errors in our estimation. We conduct the Durbin Watson test of first order serial correlation and find that the Durbin Watson statistics are well within the acceptance region of the null hypothesis of no serial correlation. Nonetheless, we include quarter dummies in our empirical specification to consider time effects but we do not observe significant differences in our results reported in Table 2. With respect to the cross-correlation among error terms, we believe that the industry dummies partially addresses the issue. To control for unmodeled firm-specific differences that may cause cross-correlation in the error terms, we include net income scaled by sales as an additional variable in the regression specification but we find that our results are qualitatively similar.<sup>11</sup>

We also estimate a regression where all the dimensions of online customer experience (EASE, SELECTION, TRUST and REL), except COST, are simultaneously introduced as explanatory variables. The tenor of the inferences is qualitatively similar to that discussed above. There are two issues associated with including the COST dimension. One, as mentioned before, Gomez does not report a COST score for all industries. Hence, the inferences from such a regression would be unrepresentative of the industries in the sample without a COST score. Second, the small sample size (52 observations) coupled with the presence of other dimensions

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<sup>11</sup> Our inferences are unchanged when we include components of net income in the regression estimation.

causes severe multicollinearity problems rendering the inferences unreliable.

### *The impact of the April 2000 crash*

We also examine the effect of stock market crash in e-commerce stocks in April 2000 on the relation between online customer experience and price-to-sales ratios. Recent research (e.g., Demers and Lev, 2000; Rajgopal et al., 2000) examines the impact of the April 2000 sell-off in e-commerce stocks and finds that the pricing of various factors such as web traffic significantly declined subsequent to the sell-off. If the relation between online customer experience quality and price-to-sales ratios observed is a result of systematic over-valuation prior to the crash, we should observe significant declines in this relation subsequent to the crash.

To examine the impact of the crash, we include a dummy variable (POST) that takes is 1 if the observation corresponds to a quarter ending after April 1, 2000 and zero, otherwise. We also interact our independent variables with POST to examine whether there was a shift in the relation between the dependent and independent variables. We estimate the following regression equation:

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{POST} + \gamma_3 \text{DIMENSION}_{jt} * \text{POST} + \gamma_4 \text{IND}_{ijt} + \phi_{jt} \quad (2)$$

The results of estimating equation (2) are presented in Table 3. Given that the prices of Internet stocks fell significantly after April 2000, the coefficient on POST,  $\gamma_2$ , is predicted to be negative. If the systematic relation between online customer experience quality and price-to-sales ratio is a manifestation of overvaluation then coefficient  $\gamma_3$  will be negative. Because we do not have strong priors about the directional prediction of  $\gamma_3$  we conduct a two-sided test for  $\gamma_3$ .

Findings presented in Table 3 indicate that coefficient on POST ( $\gamma_2$ ) is negative and statistically significant consistent with the decline in market valuations after the April sell-off. However, the coefficient,  $\gamma_3$ , representing the interaction term with the customer experience is

not significantly different from zero except for the composite score (CSCORE) and ease of use (EASE) dimension. For the EASE dimension we find that the interaction term with POST, i.e.,  $\gamma_3$ , is positive but weakly significant (coefficient = 9.41;  $p < 0.10$ ). This indicates that the coefficient on EASE is more positive after the April sell-off than before. With respect to the overall score (CSCORE) the coefficient on the interaction term ( $\gamma_3$ ) is positive and statistically significant (coefficient = 15.06;  $p < 0.05$ ). Taken together, it appears that market views the quality of online customer experience as a source of competitive advantage even after the April 2000 crash.

## **6. Additional analyses**

We conduct two additional analyses that examine cross-sectional differences in the relation between online customer experience scores and price-to-sales ratios. First, we examine the impact of the ability of a firm's survival given their existing use of cash to sustain their operations. Second, we consider the effect of the level of competition on the perceived competitive advantage of providing superior online customer experience.

### *The probability of survival*

Here, we examine whether the relations observed in Table 2 are influenced by the ability of firms to survive given their current level of "cash burn." A firm that has limited resources and capital to keep up with the expenditures, i.e., experiences a higher "cash burn," will be less likely to survive and reap the excess rents from strategies designed to improve online customer experience.

Following, Demers and Lev (2000) we use the ratio of cash flow from operations to the cash balance at the end of the quarter (BURN) as our proxy for cash burn. Because for most firms cash flow from operations is negative, a high negative number indicates extensive cash

burn and hence, a lower likelihood of survival. For firms with positive cash flow from operations, we code the BURN as zero. Thus, a higher BURN represents a higher likelihood of survival and a lower cash burn. Descriptive statistics presented in Panel B of Table 1 indicate that BURN is negative across all quartiles suggesting that most of the firms have negative cash flows from operations.

To determine whether the likelihood of survival influences the relation observed in Table 2, we interact the various dimensions with BURN and estimate the following empirical specification.

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{DIMENSION}_{jt} * \text{BURN}_{jt} + \gamma_3 \text{IND}_{ijt} + \phi_{jt} \quad (3)$$

We predict that the coefficient on the interaction ( $\gamma_2$ ) would be positive. This is because the higher the BURN variable the higher is the likelihood of survival of the firm and hence, higher will be the potential future benefits from providing superior online customer experiences.

Consistent with this prediction, we find that the coefficients on the interaction terms are positive and statistically significant for each of the dimensions as well as the overall score (see Table 4). While the relationship is stronger (significant at 5%) for EASE, TRUST, and SELECTION dimensions it is weaker for REL and COST dimensions (significant at 10%). This finding suggests that stock market participants view strategies to improve online customer experience as more valuable for firms that are able to sustain cash burn.

#### *The impact of competition*

As posited before, the extent to which firms may be able to obtain superior returns by providing better online customer experiences will depend on the barriers to imitation (Varian 1992, Tirole 1988). We posit that higher the level of competition (i.e., higher the number of



players in the market space in which a firm operates), greater is the likelihood that the benefits accruing to firms will be competed away through imitation.

We consider two proxies for the level of competition across industries. First, we use the number of firms (COMP) that operate on the Internet in the industry to which a specific firm belongs as per the Gomez database. We would expect that firms with fewer competitors in their product market space to be more likely to reap future benefits from providing superior online customer experience.

Second, we use the number of brick-and-mortar firms (B&MCOMP) that operate on the Internet relative to the total number of firms that have web businesses in the industry as per the Gomez database. Brick-and-mortar firms have the advantage of better-known brand names, ample resources, and well-established supplier relationships (Rindova and Kotha, 2000). Hence, greater the proportion of brick-and-mortar firms operating in a product market, lower the benefits from improved online customer experience for pure Internet firms. We estimate the following regressions:

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{DIMENSION}_{jt} * \text{COMP}_{jt} + \varphi_{jt} \quad (4)$$

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{DIMENSION}_{jt} * \text{B\&MCOMP}_{jt} + \varphi_{jt} \quad (5)$$

We expect the interaction term ( $\gamma_2$ ) using either of the proxies for the level of competition (i.e., COMP and B&MCOMP) to have a negative coefficient.

Descriptive statistics presented in Panel B of Table 1 reports that average (median) number of firms in the industry in which a firm operates, i.e., COMP, is 25 (21). This indicates that, on average, the level of competition is significant. Furthermore, the proportion of brick-and-mortar competitors conducting business in the Internet is, on average, quite high (37%).

The results of estimating equations (4) and (5) are presented in Tables 5 and 6 respectively. Note that in estimating equations (4) and (5) we do not include the industry dummies because of severe multicollinearity problems associated with including both the industry dummies and the competition variables.<sup>12</sup> This causes the adjusted R<sup>2</sup>s to be significantly lower in Tables 5 and 6 when compared to previous tables.

Results in Table 5 indicate that the interaction variables for each of the dimensions are negative and statistically significant as expected. Results are similar from estimating equation (6) that uses the B&MCOMP variable (see Table 6). Thus, our finding is consistent with the level of competition significantly diminishing the sustainability of competitive advantage from superior online customer experience.

## **7. Conclusions**

This study provides evidence on whether superior online customer experience offers a sustainable long run competitive advantage to pure Internet firms. Using customer experience scores provided by Gomez, we document a positive association between price-to-sales ratio, our measure of shareholder value, and a composite score of online customer experience quality. While this indicates that, on average, capital market participants view investments in improving online customer experience as a viable long-term competitive advantage, an examination of five dimensions of customer experience reveals interesting insights. In particular, our evidence suggests that only two of the five dimensions of customer experience, customer confidence in the web business and relationship services appear to provide competitive advantage. For the other dimensions, namely, price leadership, website usability and product selection the evidence is

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<sup>12</sup> It is not surprising that multicollinearity obtains because the industry dummies perhaps capture some of the elements of competition across industries proxied by COMP and B&MCOMP.

consistent with the imitation hypothesis, i.e., these strategies to improve customer experience does not provide a long run competitive edge.

Additional analyses suggest that the magnitude of the documented positive association decreases with the extent of competition in the product-market that a firm operates in. In particular, greater the competition from brick-and-mortar firms that sell goods and services online, lower is the impact of online customer experience on firm value. We also find that the positive association between the quality of online customer experience and the price-to-sales ratio is inversely related to the likelihood of a firm's survival as measured by the sustainability of 'cash burn.'

There are several limitations to our analyses. First, we treat the quality of online customer experience as an exogenous variable although such experiences are very likely to be endogenous. Second, we have access to a limited time-series of Gomez scores. This data restriction may affect the power of our statistical analyses. Third, because we rely on experience scores provided by an external agency, these scores are likely to be influenced by measurement error and potential self-selection issues created by the methodology they employ. Analogous to caveats involved in using equity analysts' forecasts or AIMR rankings of firms' disclosure practices, the experience scores used in this study may be influenced by undisclosed economic relationships, if any, between Gomez and the rated firms.

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**Table 1**

**Sample and descriptive statistics**

*Panel A: Sample of firms*

| <b>Name</b> |                     | <b>Name</b> |                  |
|-------------|---------------------|-------------|------------------|
| 1           | 1-800-flowers.com   | 31          | Peapod           |
| 2           | Adam.com            | 32          | Pets.com         |
| 3           | Amazon.com          | 33          | PlanetRx.com     |
| 4           | Ameritrade          | 34          | Quotesmith.com   |
| 5           | Autoweb.com         | 35          | Realtor.com      |
| 6           | Autobytel.com       | 36          | SmarterKids.com  |
| 7           | Barnesandnoble.com  | 37          | Sportsline.com   |
| 8           | Bigstar.com         | 38          | Streamline       |
| 9           | Blue Fly            | 39          | Theglobe.com     |
| 10          | BUY.com             | 40          | Travelocity      |
| 11          | CDNOW               | 41          | Uniglobe.com     |
| 12          | drKoop.com          | 42          | Value America    |
| 13          | Drugstore.com       | 43          | varsitybooks.com |
| 14          | E*Trade             | 44          | Utrade           |
| 15          | Ebay                | 45          | Web Street       |
| 16          | Egghead             | 46          | WebMD            |
| 17          | E-Loan              | 47          | Webvan           |
| 18          | eToys.com           | 48          | Yahoo!           |
| 19          | Expedia             |             |                  |
| 20          | fatbrain.com        |             |                  |
| 21          | Fogdog              |             |                  |
| 22          | FTD                 |             |                  |
| 23          | HealthCentralRX.com |             |                  |
| 24          | HomeGrocer.com      |             |                  |
| 25          | HomeSeekers.com     |             |                  |
| 26          | Insweb              |             |                  |
| 27          | Mortgage.com        |             |                  |
| 28          | <u>Net.B@nk</u>     |             |                  |
| 29          | Onhealth            |             |                  |
| 30          | Outpost             |             |                  |

**Table 1 (continued)**

*Panel B: Descriptive statistics*

| Variable                            | N   | Mean    | Std.dev. | Median | 1 <sup>st</sup><br>quartile | 3 <sup>rd</sup><br>quartile |
|-------------------------------------|-----|---------|----------|--------|-----------------------------|-----------------------------|
| <i>Gomez Scorecard</i>              |     |         |          |        |                             |                             |
| Overall Score (CSCORE)              | 114 | 6.34    | 1.19     | 6.39   | 5.50                        | 7.41                        |
| Ease of use (EASE)                  | 114 | 7.16    | 1.68     | 7.42   | 5.62                        | 8.61                        |
| Customer confidence (TRUST)         | 114 | 6.43    | 1.50     | 6.58   | 5.51                        | 7.48                        |
| On-site resources (SELECTION)       | 114 | 6.32    | 1.56     | 6.37   | 5.28                        | 7.66                        |
| Relationship (REL)                  | 114 | 5.48    | 1.71     | 5.53   | 4.26                        | 6.86                        |
| Cost (COST)                         | 52  | 7.30    | 1.77     | 7.48   | 6.31                        | 8.77                        |
| <i>Other Variables</i>              |     |         |          |        |                             |                             |
| Book value of equity (BV) \$ mil.   | 114 | 267.84  | 554.37   | 80.54  | 33.32                       | 235.37                      |
| Market value of equity (MV) \$ mil. | 114 | 3941.35 | 15353.11 | 271.31 | 79.62                       | 888.12                      |
| Net Income (NI) \$ mil.             | 114 | -28.92  | 61.51    | -11.81 | -29.21                      | -5.87                       |
| Price-to-sales ratio (P/S)          | 114 | 47.13   | 90.86    | 17.86  | 7.81                        | 40.37                       |
| Sales \$ mil.                       | 114 | 66.83   | 131.15   | 15.49  | 5.84                        | 47.16                       |
| Cash Burn (BURN)                    | 114 | -0.36   | 0.51     | -0.20  | -0.44                       | -0.07                       |
| COMP                                | 114 | 24.67   | 14.12    | 21.00  | 15.00                       | 31.00                       |
| B&MCOMP                             | 114 | 0.37    | 0.24     | 0.37   | 0.20                        | 0.46                        |

*Panel C: Pearson Correlation matrix*

|                               | CSCORE      | EASE        | TRUST       | SELECTION   |
|-------------------------------|-------------|-------------|-------------|-------------|
| Ease of use (EASE)            | <b>0.71</b> |             |             |             |
| Customer confidence (TRUST)   | <b>0.69</b> | <b>0.37</b> |             |             |
| On-site resources (SELECTION) | <b>0.78</b> | <b>0.54</b> | <b>0.46</b> |             |
| Relationship (REL)            | <b>0.73</b> | <b>0.47</b> | <b>0.33</b> | <b>0.50</b> |
| Cost (COST)                   | <b>0.38</b> | 0.02        | <b>0.28</b> | <b>0.31</b> |

Notes:

(1) Variables: EASE measures ease of web site use, TRUST measures customer confidence, SELECTION measures onsite resources, REL measures relationship services, COST measures price leadership and CSCORE is the average of EAST, TRUST, SELECTION and REL. BURN = ratio of cash flows from operations to cash balance at the end of the quarter if cash flows from operations is negative, zero otherwise, COMP = number of online and offline firms competing in the industry in which the firm operates, B&MCOMP = proportion of brick-and-mortar firms that have presence in the Internet in the industry in which a firm operates.

(2) Statistically significant correlation coefficients at the 5% level of significance (two-tailed) are indicated in bold.



**Table 2**

**Summary regression statistics of regressing price-to-sales ratio on online customer experience scores**

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{IND}_{ijt} + \varphi_{jt} \quad (1)$$

| Variable      | Sign | (1)                    | (2)                    | (3)                    | (4)                    | (5)                    | (6)              |
|---------------|------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------|
| Intercept     | ?    | <b>57.47</b><br>(2.92) | <b>95.66</b><br>(4.33) | <b>50.30</b><br>(2.88) | <b>99.04</b><br>(5.10) | <b>64.39</b><br>(4.25) | 8.27<br>(0.35)   |
| CSCORE        | +    | <b>4.70</b><br>(1.72)  |                        |                        |                        |                        |                  |
| EASE          | +    |                        | -2.33<br>(-0.84)       |                        |                        |                        |                  |
| TRUST         | +    |                        |                        | <b>5.53</b><br>(2.77)  |                        |                        |                  |
| SELECTION     | +    |                        |                        |                        | -3.08<br>(-1.37)       |                        |                  |
| REL           | +    |                        |                        |                        |                        | <b>4.41</b><br>(2.40)  |                  |
| COST          | +    |                        |                        |                        |                        |                        | -0.84<br>(-0.25) |
| N             |      | 109                    | 110                    | 109                    | 110                    | 109                    | 51               |
| Adj. R square |      | 69%                    | 64%                    | 70%                    | 65%                    | 70%                    | 23%              |

Notes:

(1) Variables: P/S = price-to-sales ratio, EASE measures ease of web site use, TRUST measures customer confidence, SELECTION measures onsite resources, REL measures relationship services, COST measures price leadership and CSCORE is the average of EAST, TRUST, SELECTION and REL.

(2) Coefficients on industry dummies have been suppressed for convenience.

(3) t-statistics are presented in parenthesis. t-values are White (1980) adjusted whenever the chi-square test for homoskedasticity is rejected. Statistically significant coefficients at the 5% (10%) level of significance (one-tailed when the sign is predicted, two-tailed otherwise) are indicated in bold (italics);

(4) Outliers representing observations with R-student greater than the absolute value of 2 were deleted.

Table 3

Summary regression statistics of regressing price-to-sales ratio on online customer experience scores after including an interaction term for the period after April 2000 stock market crash

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{POST} + \gamma_3 \text{DIMENSION}_{jt} * \text{POST} + \gamma_{4i} \text{IND}_{ijt} + \phi_{jt} \quad (2)$$

| Variable         | Sign | (1)                       | (2)                      | (3)                      | (4)                      | (5)                      | (6)              |
|------------------|------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| Intercept        | ?    | <b>119.67</b><br>(4.62)   | <b>107.98</b><br>(5.13)  | <b>63.96</b><br>(3.70)   | <b>104.69</b><br>(5.14)  | <b>76.33</b><br>(5.00)   | 4.38<br>(0.18)   |
| POST             | -    | <b>-122.65</b><br>(-2.90) | <b>-95.63</b><br>(-2.70) | <b>-56.43</b><br>(-2.28) | <b>-54.20</b><br>(-1.87) | <b>-49.98</b><br>(-2.81) | 13.95<br>(0.28)  |
| CSCORE           | +    | -5.17<br>(-1.41)          |                          |                          |                          |                          |                  |
| CSCORE * POST    | ?    | <b>15.06</b><br>(2.35)    |                          |                          |                          |                          |                  |
| EASE             | +    |                           | -3.39<br>(-1.23)         |                          |                          |                          |                  |
| EASE * POST      | ?    |                           | 9.41<br>(1.95)           |                          |                          |                          |                  |
| TRUST            | +    |                           |                          | <b>4.27</b><br>(2.02)    |                          |                          |                  |
| TRUST * POST     | ?    |                           |                          | 4.64<br>(1.25)           |                          |                          |                  |
| SELECTION        | +    |                           |                          |                          | -2.91<br>(-1.11)         |                          |                  |
| SELECTION * POST | ?    |                           |                          |                          | 4.14<br>(0.96)           |                          |                  |
| REL              | +    |                           |                          |                          |                          | <b>3.49</b><br>(1.67)    |                  |
| REL * POST       | ?    |                           |                          |                          |                          | 4.06<br>(1.32)           |                  |
| COST             | +    |                           |                          |                          |                          |                          | 0.02<br>(0.01)   |
| COST * POST      | ?    |                           |                          |                          |                          |                          | -5.76<br>(-0.90) |
| N                |      | 111                       | 110                      | 109                      | 110                      | 109                      | 51               |
| Adj. R square    |      | 61%                       | 71%                      | 76%                      | 70%                      | 76%                      | 32%              |

Notes:

(1) Variables: Variables: P/S = price-to-sales ratio, EASE measures ease of web site use, TRUST measures customer confidence, SELECTION measures onsite resources, REL measures relationship services, COST measures price leadership, CSCORE is the average of EAST, TRUST, SELECTION and REL, and POST is a dummy variable that takes on the value of 1 if the observation belongs to a quarter that ends after April 1, 2000 and zero, otherwise.

(2) Coefficients on industry dummies have been suppressed for convenience.

(3) t-statistics are presented in parenthesis. t-values are White (1980) adjusted whenever the chi-square test for homoskedasticity is rejected. Statistically significant coefficients at the 5% (10%) level of significance (one-tailed when the sign is predicted, two-tailed otherwise) are indicated in bold (italics);

(4) Outliers representing observations with R-student greater than the absolute value of 2 were deleted.

Table 4

Summary regression statistics of regressing price-to-sales ratio on online customer experience scores after including an interaction term for the extent of cash burn

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{DIMENSION}_{jt} * \text{BURN}_{jt} + \gamma_{3i} \text{IND}_{ijt} + \varphi_{jt} \quad (3)$$

| Variable         | Sign | (1)                    | (2)                     | (3)                    | (4)                     | (5)                    | (6)              |
|------------------|------|------------------------|-------------------------|------------------------|-------------------------|------------------------|------------------|
| Intercept        | ?    | <b>84.01</b><br>(3.79) | <b>102.50</b><br>(4.69) | <b>55.66</b><br>(3.21) | <b>107.56</b><br>(5.58) | <b>68.80</b><br>(4.49) | 10.28<br>(0.44)  |
| CSCORE           | +    | 1.09<br>(0.36)         |                         |                        |                         |                        |                  |
| CSCORE * BURN    | +    | <b>2.46</b><br>(2.16)  |                         |                        |                         |                        |                  |
| EASE             | +    |                        | -2.06<br>(-0.75)        |                        |                         |                        |                  |
| EASE * BURN      | +    |                        | <b>2.09</b><br>(2.27)   |                        |                         |                        |                  |
| TRUST            | +    |                        |                         | <b>5.78</b><br>(2.93)  |                         |                        |                  |
| TRUST * BURN     | +    |                        |                         | <b>2.00</b><br>(2.13)  |                         |                        |                  |
| SELECTION        | +    |                        |                         |                        | -2.91<br>(-1.33)        |                        |                  |
| SELECTION * BURN | +    |                        |                         |                        | <b>2.89</b><br>(2.48)   |                        |                  |
| REL              | +    |                        |                         |                        |                         | <b>4.22</b><br>(2.31)  |                  |
| REL * BURN       | +    |                        |                         |                        |                         | 2.06<br>(1.56)         |                  |
| COST             | +    |                        |                         |                        |                         |                        | -0.12<br>(-0.04) |
| COST * BURN      | +    |                        |                         |                        |                         |                        | 1.57<br>(1.34)   |
| N                |      | 110                    | 110                     | 109                    | 110                     | 109                    | 51               |
| Adj. R square    |      | 65%                    | 66%                     | 71%                    | 66%                     | 70%                    | 24%              |

Notes:

(1) Variables: P/S = price-to-sales ratio, EASE measures ease of web site use, TRUST measures customer confidence, SELECTION measures onsite resources, REL measures relationship services, COST measures price leadership, CSCORE is the average of EAST, TRUST, SELECTION and REL, and BURN is a “cash burn” proxy defined as the ratio of cash flows from operations to cash balance at the end of the quarter if cash flows from operations is negative, zero otherwise.

(2) Coefficients on industry dummies have been suppressed for convenience.

(3) t-statistics are presented in parenthesis. t-values are White (1980) adjusted whenever the chi-square test for homoskedasticity is rejected. Statistically significant coefficients at the 5% (10%) level of significance (one-tailed when the sign is predicted, two-tailed otherwise) are indicated in bold (italics);

(4) Outliers representing observations with R-student greater than the absolute value of 2 were deleted.

Table 5

Summary regression statistics of regressing price-to-sales ratio on online customer experience scores after including an interaction term for the level of competition

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{DIMENSION}_{jt} * \text{COMP}_{jt} + \varphi_{jt} \quad (4)$$

| Variable         | Sign | (1)                     | (2)                     | (3)                     | (4)                     | (5)                     | (6)                     |
|------------------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Intercept        | ?    | <b>76.62</b><br>(3.25)  | <b>98.86</b><br>(4.71)  | 18.21<br>(1.09)         | <b>59.06</b><br>(3.79)  | <b>35.82</b><br>(2.66)  | 2.02<br>(0.12)          |
| CSCORE           | +    | <i>-4.80</i><br>(-1.37) |                         |                         |                         |                         |                         |
| CSCORE * COMP    | -    | <b>-3.44</b><br>(-2.59) |                         |                         |                         |                         |                         |
| EASE             | +    |                         | <b>-7.20</b><br>(-2.58) |                         |                         |                         |                         |
| EASE * COMP      | -    |                         | <b>-3.42</b><br>(-3.00) |                         |                         |                         |                         |
| TRUST            | +    |                         |                         | 3.34<br>(1.32)          |                         |                         |                         |
| TRUST * COMP     | -    |                         |                         | <b>-2.10</b><br>(-1.84) |                         |                         |                         |
| SELECTION        | +    |                         |                         |                         | -2.93<br>(-1.22)        |                         |                         |
| SELECTION * COMP | -    |                         |                         |                         | <b>-2.32</b><br>(-2.01) |                         |                         |
| REL              | +    |                         |                         |                         |                         | 0.55<br>(0.25)          |                         |
| REL * COMP       | -    |                         |                         |                         |                         | <b>-2.32</b><br>(-1.67) |                         |
| COST             | +    |                         |                         |                         |                         |                         | <b>4.08</b><br>(1.79)   |
| COST * COMP      | -    |                         |                         |                         |                         |                         | <b>-2.04</b><br>(-1.93) |
| N                |      | 111                     | 111                     | 110                     | 110                     | 110                     | 51                      |
| Adj. R square    |      | 5%                      | 11%                     | 2%                      | 4%                      | 1%                      | 7%                      |

Notes:

(1) Variables: P/S = price-to-sales ratio, EASE measures ease of web site use, TRUST measures customer confidence, SELECTION measures onsite resources, REL measures relationship services, COST measures price leadership, CSCORE is the average of EAST, TRUST, SELECTION and REL, and COMP is a proxy for the level of competition defined as the number of online and bricks and mortar firms competing on the Internet in the industry in which the firm operates.

(2) Coefficients on industry dummies have been suppressed for convenience.

(3) t-statistics are presented in parenthesis. t-values are White (1980) adjusted whenever the chi-square test for homoskedasticity is rejected. Statistically significant coefficients at the 5% (10%) level of significance (one-tailed when the sign is predicted, two-tailed otherwise) are indicated in bold (italics);

(4) Outliers representing observations with R-student greater than the absolute value of 2 were deleted.

Table 6

Summary regression statistics of regressing price-to-sales ratio on online customer experience scores after including an interaction term for the level of competition from brick-and-mortar firms

$$P/S_{jt} = \gamma_0 + \gamma_1 \text{DIMENSION}_{jt} + \gamma_2 \text{DIMENSION}_{jt} * \text{B\&MCOMP}_{jt} + \varphi_{jt} \quad (5)$$

| Variable            | Sign | (1)                     | (2)                     | (3)                     | (4)                     | (5)                     | (6)                   |
|---------------------|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|
| Intercept           | ?    | <b>65.94</b><br>(2.87)  | <b>89.13</b><br>(4.29)  | 22.91<br>(1.33)         | <b>59.36</b><br>(3.41)  | 20.75<br>(1.82)         | 1.48<br>(0.09)        |
| CSCORE              | +    | -2.70<br>(-0.76)        |                         |                         |                         |                         |                       |
| CSCORE * B&MCOMP    | -    | <b>-6.01</b><br>(-2.24) |                         |                         |                         |                         |                       |
| EASE                | +    |                         | <b>-5.67</b><br>(-1.97) |                         |                         |                         |                       |
| EASE * B&MCOMP      | -    |                         | <b>-5.36</b><br>(-2.39) |                         |                         |                         |                       |
| TRUST               | +    |                         |                         | 3.36<br>(1.29)          |                         |                         |                       |
| TRUST * B&MCOMP     | -    |                         |                         | <b>-5.10</b><br>(-1.98) |                         |                         |                       |
| SELECTION           | +    |                         |                         |                         | -2.01<br>(-0.71)        |                         |                       |
| SELECTION * B&MCOMP | -    |                         |                         |                         | <b>-5.11</b><br>(-1.99) |                         |                       |
| REL                 | +    |                         |                         |                         |                         | <b>3.58</b><br>(1.71)   |                       |
| REL * B&MCOMP       | -    |                         |                         |                         |                         | <b>-4.83</b><br>(-1.83) |                       |
| COST                | +    |                         |                         |                         |                         |                         | <b>4.49</b><br>(1.72) |
| COST * B&MCOMP      | -    |                         |                         |                         |                         |                         | -3.56<br>(-1.09)      |
| N                   |      | 111                     | 111                     | 110                     | 111                     | 109                     | 51                    |
| Adj. R square       |      | 4%                      | 8%                      | 2%                      | 4%                      | 2%                      | 2%                    |

Notes:

(1) Variables: P/S = price-to-sales ratio, EASE measures ease of web site use, TRUST measures customer confidence, SELECTION measures onsite resources, REL measures relationship services, COST measures price leadership, CSCORE is the average of EAST, TRUST, SELECTION and REL, and B&MCOMP is a proxy for the level of competition defined as the proportion of bricks and mortar firms to the total number of firms operating on the Internet in the industry in which the firm operates.

(2) Coefficients on industry dummies have been suppressed for convenience.

(3) t-statistics are presented in parenthesis. t-values are White (1980) adjusted whenever the chi-square test for homoskedasticity is rejected. Statistically significant coefficients at the 5% (10%) level of significance (one-tailed when the sign is predicted, two-tailed otherwise) are indicated in bold (italics);

(4) Outliers representing observations with R-student greater than the absolute value of 2 were deleted.