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THE *DOT COM EFFECT*: THE IMPACT OF E-COMMERCE ANNOUNCEMENTS ON THE MARKET VALUE OF FIRMS

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Abstract

The media hype surrounding the growth of electronic commerce has led to considerable firm interest in making the significant investments required to participate in this growing market. However, the evidence on benefits to firms from e-commerce is far from unequivocally positive, as popular accounts would lead us to believe. In this paper, we explore the following questions: What are the economic returns to firms from engaging in e-commerce? How do the returns to *non-net, brick and mortar* firms from e-commerce initiatives compare with returns to the new breed of net firms? How do returns from *business-to-business* e-commerce compare with returns from *business-to-consumer* e-commerce? We examine these issues using event study methodology and assess the *cumulative abnormal returns* (CARs) for 305 e-commerce announcements between October and December 1998. The results suggest that e-commerce initiatives announced in this period do indeed lead to positive CARs for firms. However, the hypothesis drawing on the *resource-based view* of the firm: that the CAR to non-net firms is significantly more than the CAR to net firms is not supported. Further, the CARs associated with business-to-consumer e-commerce announcements are higher than the CARs for business-to-business e-commerce, a result contrary to the hypothesized direction. The results are robust to the removal of outliers and time windows of varying length between firm announcements and capital market adjustments of prices. Most importantly, the magnitudes of CARs (between 3% and 11%) observed in response to e-commerce announcements are considerably larger than those observed for a variety of firm actions in the prior literature. This paper presents the first empirical test of the *dot com effect*, validating the popular notion that capital markets recognize the transformational potential of e-commerce and expect significant future benefits to firms entering into e-commerce arrangements.

> What did the CEO say to the CIO?
> Nice website, but what is it doing for our business?

1. INTRODUCTION

The barrage of reporting in the general and business press suggest that we are in the midst of an unprecedented burgeoning of interest in the use of the Internet. The number of web users is growing rapidly: one estimate is that over one million new users come online every week, and that the current number of U.S. adults using the Internet and the web numbers over 85 million (*Ziff-Davis' Infobeads* 1999). This represents an enormous potential base of customers for electronic commerce activities that are estimated by Forrester Research at $7.8 billion in 1998 growing to $100 billion by 2003. Drawing the growing base of Internet and web users to participate in online shopping and trading activities is the most visible opportunity for e-commerce today (Green

1999). Increasingly, the opportunities in the business-to-business e-commerce activities that streamline supply chains are receiving recognition. Early movers like Cisco Systems are reportedly transacting over 90% of their dealings with distributors over the Internet. By most accounts, the opportunities in the business-to-business e-commerce arena far exceed the opportunities in business-to-consumer e-commerce.

In spite of anecdotal accounts, evidence on the benefits to firms from e-commerce initiatives is far from being unequivocal while the costs of entry are real and staggering. Considerable up-front investments in creating e-commerce capabilities are required to be a viable player in the current e-commerce environment. The Gartner Group estimates that e-commerce sites spend $1 million in the first five months, and $20 million "for a place in cyberspace that sets them apart from the competition" (Diederich 1999). Further, the publicly reported figures for hardware and software expenditures in e-commerce ventures comprise only about 20% of the overall costs, with the predominant expense being the labor costs for developing the site and implementing interfaces to *back-end* business applications (Satterthwaite 1999). Amazon.com's annual report lists $33 million worth of computer equipment, and $4.5 million worth of software. Yahoo lists $17 million in computer equipment, a $10 million increase over 1997. Even a relatively small firm like CDnow lists $6.9 million in computer equipment, up from $2 million in 1997. This suggests that the overall level of investment in establishing e-commerce infrastructures is over five times these high numbers. Moreover, these costs are projected to increase at a rate of over 25% per year over the next two years (Satterthwaite 1999).

Once these investments are in place, the costs of entry into e-commerce also include significant marketing expenses in activities such as the placement of banner ads in one or more portal sites. For instance, three brokerage houses—DLJdirect, E*Trade Securities, and Waterhouse Securities—agreed to pay AOL $25 million apiece over two years for prime screen estate in the finance area of AOL's service. Because a growing number of firms are making or considering making such investments both in information technologies and in organizational changes related to e-commerce, a logical question that follows is: *What are the economic returns to firms from engaging in e-commerce?*

In an efficient capital market, investors are believed to recognize future benefit streams accruing from managerial initiatives announced by firms, a judgment subsequently reflected in the stock price of the firm. If e-commerce activities enhance future cash flows, the capital market would respond favorably to e-commerce announcements by firms that would be reflected in a positive movement of their stock price. Event study methodologies are very useful tools for management researchers to examine the consensus estimates regarding the future benefits streams attributable to organizational initiatives (McWilliams and Siegel 1997).

In this paper, we employ the event study methodology to assess the value implications of e-commerce initiatives announced by firms. Drawing on the resource-based view of the firm (Conner and Prahalad 1996; Peteraf 1993), we examine if the economic value of e-commerce initiatives is linked to the nature of the resource stocks of the firm: whether the firm is a conventional firm with a considerable understanding of the market and its customers or one of the new breed of Internet-enabled firms with a considerable understanding of internet technologies. We also examine whether the profitability of e-commerce initiatives is influenced by the nature of the e-commerce initiative: whether it relates to *business-to-consumer* e-commerce or *business-to-business* e-commerce.

2. HYPOTHESES

2.1 Link Between E-commerce Activities and Market Value

E-commerce initiatives undertaken by firms reflect the active engagement of firms to build capabilities to compete in the emerging market. These moves allow them to position themselves advantageously to exploit the potential of the expected growth in online commerce, thus leading to benefits in future periods. Further, e-commerce initiatives signal that a firm is likely to be able to take advantage of significant efficiencies in streamlining operational processes through the deployment of information technologies.

In terms of the resource-based view of the firm (Peteraf 1993), the firm can be viewed as making investments in creating the resources to gear up for the large emerging e-commerce opportunity. These initiatives are advantageous not only because they drive the firm up the learning curve in the activity but also because the path dependent resources created over time, organizational experience and understanding of e-commerce markets, are likely to provide the firm competitive advantages in future periods.

This suggests that firms engaging in e-commerce are likely to realize significant strategic and operational advantages in the future. If so, investors should react positively to e-commerce announcements, creating a positive abnormal stock market return—a risk-adjusted return in excess of the average stock market return—around the date of the e-commerce announcement by firms. This leads to the hypothesis that e-commerce initiatives would be associated with enhanced benefits streams in the future and consequently enhanced market valuation.

> *H1:* *For firms engaging in e-commerce activities, the abnormal returns attributable to e-commerce announcements are positive*

2.2 Non-net Firms vs. Net Firms

We view firms as falling into two categories: conventional brick and mortar firms engaging in e-commerce and emerging firms for whom e-commerce is central to the business model. The first category comprises traditional firms with a history of competing in their traditional markets. For these firms, e-commerce initiatives offer a strategic opportunity to redefine and extend their current activities using the Internet. We term these *non-net* firms. Examples include Toys"R"Us and IBM: firms established in their particular industries that have extended their activities to include e-commerce operations as an extension of their conventional operations. The second category comprises newer firms such as Amazon.com, Yahoo!, and E*Trade, whose operations are primarily enabled by Internet technologies. We term these *net* firms. This categorization parallels the distinction made by investment analysts between *pure-play* e-commerce firms engaged primarily in e-commerce activities and conventional firms for whom e-commerce is an extension of their traditional activities (Burnham 1998).

The resource-based view (Conner and Prahalad 1996; Peteraf 1993) highlights that non-net firms, over years of operating in their chosen product-market space, accumulate valuable experience and understanding of their market and their customers. These resources are embedded in the knowledge of their employees as well as in the design of their organizational structures and operational processes. Non-net firms can draw on these valuable resources related to the business context as they extend their operations to the e-commerce domain. For instance, mail order firms such LL Bean and Fingerhut are able to deploy their understanding of products, customers, and fulfillment operations in establishing their online catalog operations. However, while non-net firms have significant experience in the business domain, in comparison to net firms, they often are deficient in their understanding of the technology component required for e-commerce operations.

The technology components required in e-commerce initiatives are general-purpose: networking equipment and general-purpose hardware such as web servers and communications servers. The software components are modular and comprehensive e-commerce packages, as well as toolkits to develop e-commerce software, and are offered by a variety of vendors that can be integrated with the existing IT applications of the firm. Furthermore, a market for business consulting as well as e-commerce technology consulting has emerged with a variety of leading IT vendors and business consultants playing an active role, easing the assimilation of expertise in e-commerce technologies (Attewell 1992). The technology component of e-commerce thus poses only a minimal hurdle for non-net firms in exploiting e-commerce opportunities.

In contrast, net firms tend to be technology driven and have significant capabilities related to Internet technologies. However, net firms are likely to confront a steeper learning curve with respect to the business context than non-net firms face with respect to the technology component. The challenge for net firms is the creation of effective organizational structures and organizational processes to exploit their technological advantages in executing in a product-market space that is novel to the firm. While the ability to build an organization particularly suited to e-commerce operations is a major opportunity, the unfamiliarity of the business context and the lack of established industry relationships is a big handicap faced by these firms.

We, therefore, argue that the initial disadvantages of non-net firms from being on the learning curve with respect to Internet technologies and the novel e-commerce context are likely to be largely offset by the considerable advantages derived from the migration of existing firm competencies to e-commerce operations. Further, non-net firms can extend their intangible assets in the form of supplier relationships, brand recognition and positive reputation to the Internet while net firms would not have these considerable advantages, for instance, a bookseller like Barnes and Noble with key resources: a dominant brand name in book retailing, established relationships with book publishers and brokers, and a deep understanding of customers and their requirements. Since these attributes of non-net firms are path-dependent and relatively inimitable, resource-based theories suggest that they confer competitive advantages to the firm in contending with new entrants into the industry. This suggests that a firm

like Barnes and Noble would in the long run outperform upstarts in the business whose sole advantage is a superior understanding of the technology and the advantage of early exposure to the Internet by being *early to market*.

These arguments suggest that non-net firms are better positioned than net firms are to reap rewards in e-commerce activities and that the e-commerce initiatives of non-net firms are likely to lead to greater future benefit streams than those of net firms leading to:

> H2:   *The abnormal returns attributable to e-commerce announcements of non-net firms are higher than the abnormal returns attributable to e-commerce announcements for net firms.*

2.3 Business-to-Business vs. Business-to-Consumer

While the volume of business-to-business e-commerce (B2B) is currently at the same level as business-to-consumer (B2C) commerce online, the volume of transactions between firms is expected to grow far more rapidly. The potential for business-to-business e-commerce, currently projected at \$1.3 trillion by 2003 is an order of magnitude larger than the \$100 billion estimated for business-to-consumer e-commerce (*Ziff-Davis' Infobeads* 1999).

Ceteris paribus e-commerce initiatives by a firm to enter into transactions in the larger B2B market should be more strongly related to future profit streams than initiatives aimed at the smaller B2C market. Further, as a firm can potentially participate in a large number of B2B interactions, firms initiating B2B initiatives would have the opportunity to transfer the learning from the current B2B initiative to be more efficient in subsequent relationships through the development of *alliance capabilities* (Kale and Singh 1999). Overall, firms that enter into B2B e-commerce in the present period are thus likely to be positioned advantageously to leverage the learning from early experience (Conner and Prahalad 1996) as this market grows exponentially. We, therefore, hypothesize that:

> H3:   *The abnormal returns attributable to business-to-business e-commerce announcements are higher than the abnormal returns attributable to business-to-consumer e-commerce announcements.*

3. METHODOLOGY

Linking e-commerce activities and the economic returns to evaluate the payoff to firms from investments in information technologies, investments in human capital, and in creating organizational structures geared to e-commerce to firms is an extremely complex task. Prior approaches to measure returns from IT and complementary investments have used return on assets (Barua, Kriebel, and Mukhopadhyay 1995), cost savings (Mukhopadhyay, Kekre, and Kalathur 1995), or return on investment (Hitt and Brynjolfsson 1996) to understand the value of these investments. All of these use accounting-based measures of firm benefits from IT that have been criticized as being insensitive to the strategic nature of IT investments that often create benefits to firms in the form of flexibility and expanded operating choices in future periods (Benaroch and Kauffman 1999). Moreover, as these benefits often accrue over time, evaluating the value of IT and complementary investments related to specific firm initiatives is problematic. To overcome the difficulty faced by prior researchers in capturing the impact of individual firm initiatives on the stream of future benefits, we focus on the *abnormal returns* arising from the consensus estimates of the large number of investors in the capital markets on the *expected future benefits* associated with an e-commerce announcement. If the consensus of investors regarding the e-commerce initiatives is that they creates value for firms in future periods, investors would react positively to e-commerce announcements by firms. This would be reflected in a positive abnormal stock market return—*a risk-adjusted return in excess of the average stock market return*—around the date of the e-commerce announcement. Abnormal returns thus provide a unique means to associate the impact of a specific action by the firm on the firm's expected profitability in future periods (McWilliams and Siegal 1997).

Event study methodology draws on the efficient market hypothesis (Fama, Fisher, and Jensen 1969) that capital markets are efficient mechanisms to process information available on firms. The logic underlying the hypothesis is the belief that investors in capital markets process publicly available information on firm activities to assess the impact of firm activities, not just on current performance but also the performance of the firm in future periods. When additional information becomes publicly available on firm activities that might affect a firm's present and future earnings, the stock price changes relatively rapidly to reflect the current assessment of the value of the firm. The strength of the method lies in the fact that it captures the overall

assessment by a large number of investors of the discounted value of current and future firm performance attributable to individual events, which are reflected in the stock price and the market value of the firm (for a detailed review, see McWilliams and Siegal 1997).

The event study methodology provides management researchers with a powerful technique to explore the strength of the link between managerial actions and the creation of value for the firm[1] (McWilliams and Siegal 1997). This methodology is well accepted and has been used in a variety of management research to study the effect on the economic value of firm actions such as IT investments (Dos Santos, Pfeffers and Mauer 1993), corporate acquisitions (Chatterjee 1986), CEO succession (Davidson, Worrell, and Dutia 1993), joint venture formations (Koh and Venkatraman 1991), celebrity endorsements (Agrawal and Kamakura 1995), and new product introductions (Chaney, Devinney, and Winer 1991).

3.1 Data

We define the event as a public announcement of a firm's e-commerce initiative in the media. We collected the data from a full text search of company announcements related to e-commerce in the period between October 1, 1998, and December 31, 1998, using two leading news sources: PR Newswire and Business Wire. Based on an examination of several candidate announcements, we used the online search features of Lexis/Nexis, to search for announcements containing the words *launch* **or** *announce* within the same sentence as the words *online* **or** *commerce*[2] **and** *.com*. The search yielded a total of 536 announcements.

3.2 Coding

The criteria we used to classify an announcement as an event was that the news item be an announcement of a new electronic commerce related initiative or the extension or expansion of an existing initiative. In cases where the announcements contained news about multiple companies jointly engaged in e-commerce initiatives, as in the case of firms establishing strategic partnerships or marketing partnerships related to e-commerce, consistent with the tradition in the literature, we counted the announcement as multiple events, one relating to each of the firms involved.[3]

In classifying firms as net or non-net firms, we followed the classification system devised for the Dow Jones Internet Index (*Wall Street Journal* 1999) classifying firms as net firms if they derived more than 50% of revenue from Internet activities. The coding of events as B2B and B2C was based on the analysis of the text of the announcement. We used a textbook definition of B2B and B2C to evolve the coding scheme for B2B and B2C. We independently coded the events using the coding scheme and the description of the announcement in the text of the press release. Inconsistencies in coding were resolved through discussion of the differing interpretations of the event.

Announcements such as a firm's products and services becoming accessible to end users through the Internet were considered B2C. Announcements by multiple firms of e-commerce products and services involving cooperative action to serve specific markets or special arrangements to make the products of one firm available to the customers of the other were classified as B2B. For instance, we coded the alliance between K-Tel and Playboy Online to sell CDs through Playboy's online site as B2B. Similarly, we coded announcements involving portals as B2B. For instance, we coded the announcement: "Apartments.com Signs Advertising and Distribution Agreement with Yahoo! Inc.; National Online Apartment Guide Becomes Premier Apartments Listings Provider For Yahoo!" as being B2B. While the revenue model of Apartments.com is based on providing value to the customer at its website, we viewed this traffic as generated by the cooperative action by the two firms involved. We thus considered the event to be analogous to an announcement by Whirlpool Corp. and Sears of an arrangement to offer Whirlpool's products to customers shopping at Sears' retail stores.

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[1]As is common practice in the literature, we consider market value, economic value, and firm profitability as being closely related and use them interchangeably in discussions.

[2]We observed considerable variation in the wording of announcements related to electronic commerce. Using the word commerce captured the most common variants: *e-commerce, e commerce,* and *electronic commerce.*

[3]In many instances where multiple firms were featured in the announcement, only one of the firms was publicly traded and, therefore, only one event was registered.

Overall, from the set of 536 announcements derived from the text search, we identified 375 events using the coding scheme described above. Of those, 305 events were used for analysis, while the other 70 were dropped for several reasons. Several net companies did not have a history of 180 days of operation to be included in our analysis. Also, when there were multiple e-commerce announcements by one firm on the same day, we dropped both events from our analysis. The breakup of this sample into events for net and non-net firms and the breakup between B2B and B2C e-commerce are provided in Tables 1 and 2.

3.3 Data Analysis

To calculate the effect of an event, it is necessary to estimate what the price of the stock would have been had the event not occurred. To do this, and to control for overall market effects, the price of the stock is regressed against a market index. The estimated coefficients from that regression are used to calculate the predicted value of the stock over the time window in which the stock price is adjusted. This yields the regression:

Table 1. Illustrative Sample of E-commerce Announcements

	B2B	B2C
	(n = 75)	(n = 68)
Non-net	(a) Business Wire, December 22, 1998, Tuesday, 831 words, Digital River Adds Kmart Corporation to Growing Network of Online Software Dealers, MINNEAPOLIS (b) PR Newswire, November 3, 1998, Tuesday, Entertainment, Television, and Culture, 678 words, Playboy Online and K-Tel International, Inc., Form Exclusive Online Music Partnership; Alliance Largest Financial Pact Ever Formed by Playboy Online, CHICAGO, Nov. 3	(c) PR Newswire, December 31, 1998, Thursday, Financial News, 353 words, Geerlings & Wade, Inc. Announces New Internet Plan, CANTON, Mass., Dec. 31 (d) PR Newswire, November 19, 1998, Thursday, Financial News, 892 words, Microsoft Revamps the MSN Gaming Zone, Adds New Services for 3 Million-Strong Community of Gamers; Extended Features Provide One-Stop Service to Growing Number of Gamers, REDMOND, Wash., Nov. 19
	(n = 114)	(n = 48)
Net	(e) Business Wire, December 22, 1998, Tuesday, 831 words, Digital River Adds Kmart Corporation to Growing Network of Online Software Dealers, MINNEAPOLIS (f) PR Newswire, November 17, 1998, Tuesday; Correction Appended, Financial News, 857 words, Apartments.com Signs Advertising and Distribution Agreement with Yahoo! Inc.; National Online Apartment Guide Becomes Premier Apartments Listings Provider For Yahoo! Real Estate, CHICAGO, Nov. 17	(g) PR Newswire, October 15, 1998, Thursday, Financial News, 446 words, eBay Launches New "About Me" Feature Allowing Users to Create Personal Homepages; eBay Promotes Strong Sense of Community for Online Trading With "About Me" Feature, SAN JOSE, Calif., Oct. 15 (h) PR Newswire, October 8, 1998, Thursday, Financial News, 515 words, Peapod Introduces New Web Site; New Site Streamlines Shopping Experience, SKOKIE, Ill., Oct. 8

Note: Events (a) and (e) are repeated in the table to highlight double counting of event.

Table 2. Average Returns of Net/Non-net and B2B/B2C in Dataset

	Observations	Mean Average Daily Return[a]	Std Dev Average Daily Return	Minimum Average Daily Return	Maximum Average Daily Return
Non-net	143	0.46%	0.80%	-0.88%	3.3%
Net	162	0.62%	0.87%	-1.0%	4.5%
Total	**305**				

[a]This number is calculated as the overall average of total percent increase in share value of firms in the dataset over the 90 day period from October 1, 1998, to December 31, 1998. The min and max represent the greatest average losses and gains of individual firms in the dataset.

Note: The number of B2B and B2C announcements by net and by non-net firms are in Table 1.

$$R_{s,t} = \beta_0 + \beta_1 R_{m,t} + \epsilon_{s,t}, \tag{1}$$

where $R_{s,t}$ is the return of stock s at time t: $R_{s,t} = (\text{Price}_{s,t} - \text{Price}_{s,t-1})/\text{Price}_{s,t-1}$. The subscript t indicates time, the subscript s indicates a specific stock, and the subscript m indicates the market. The $\epsilon_{s,t}$ is a random error term for stock s at time t, and the β's are coefficients to be estimated. For this study, we use the Dow Industrials Average as the market index.

The date of the event is $t = 0$, and the window as $t = [-5,5]$. To estimate the expected return we used the data from $t = [-50,-6]$; 45 days of data. Several other intervals were considered with no significant difference in the results. We used the coefficient estimates from this regression to predict the expected return over the $t = [-5,5]$ time frame. From this we calculated abnormal return as defined by McWilliams and Siegel (1997):

$$AR_{s,t} = R_{s,t} - \left(\beta_0 + \beta_1 R_{m,t}\right). \tag{2}$$

The coefficients β_0 and β_1 are estimates of the true parameters obtained via ordinary least squares. The abnormal returns are simply the prediction errors of the model over the event window. Notice here, that AR are abnormal returns; that is, they are returns over and above that predicted by the general trend of the market on a given day. The assumption of the methodology is that the abnormal returns are the result of the announcement and not some other random event occurring on the same day. The strength of the method is linked to the improbability of random events across different firms on different days coinciding with the announcement of an e-commerce initiative. The standard errors are calculated by the formula defined by Judge et al. (1988, p. 170).[4]

$$\text{var}(AR_{s,\tau}) = \left(S_S^2 \left[1 + \frac{1}{T} + \frac{(R_{m,t} - R_M)^2}{\sum_{t=1}^{T} (R_{m,t} - R_M)^2} \right] \right), \tag{3}$$

Where S_i^2 is the variance of the error from the estimation model, R_m is the mean market return over the prediction interval, and T is the number of days in the estimation interval. The τ indicates observations within the event window, while the t indicates observations in the estimation interval. Notice, then, that the standard error on any given day τ of the prediction interval is a function of how far the market return, on that day is from the mean market return during the estimation interval. So on days where

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[4]Other methods of calculating the standard errors are presented in MacKinlay (1997, p. 21) and McWilliams and Siegal (1997, p. 628). Using these methods produces slightly different standard errors, but does not affect the conclusions of the tests.

the market return is very different from the expected market return the standard errors of abnormal returns are greater. Notice, also, that the standard error depends on the length of the estimation interval, such that longer estimation intervals lead to lower standard errors.

Under the assumption that the returns on each day are independent, the standard errors are cumulative, so the proper standard error is the cumulative standard error. This is due to the fact that adding independent normal variables requires adding the standard errors. Thus, we have the following equations to describe CAR, and var(CAR):

$$CAR_{s,t} = \sum_{i=0}^{\tau} AR_{s,i} \tag{4}$$

and

$$var(CAR_{s,\tau}) = \sum_{i=0}^{\tau} var(AR_{s,i}). \tag{5}$$

From these equations we can calculate the average CAR across all firms and the variance of CAR. The resulting equations are:

$$\overline{CAR_{\tau}} + \frac{1}{N}\sum_{s=1}^{N} CAR_{s,\tau} \tag{6}$$

and

$$var(\overline{CAR_{\tau}}) + \frac{1}{N^2}\sum_{s=1}^{N} var(CAR_{s,\tau}). \tag{7}$$

To test the hypothesis that the mean CAR is different from zero on any given day, then, one would use a Student's t test, which under the hypothesis of zero returns, is of the form:

$$t = \frac{\overline{CAR_{\tau}}}{\sqrt{var(\overline{CAR_{\tau}})}} \sim t_{(\alpha, df = N-1)} \tag{8}$$

For a detailed summary and critique of event studies, see McWilliams and Siegal (1997).
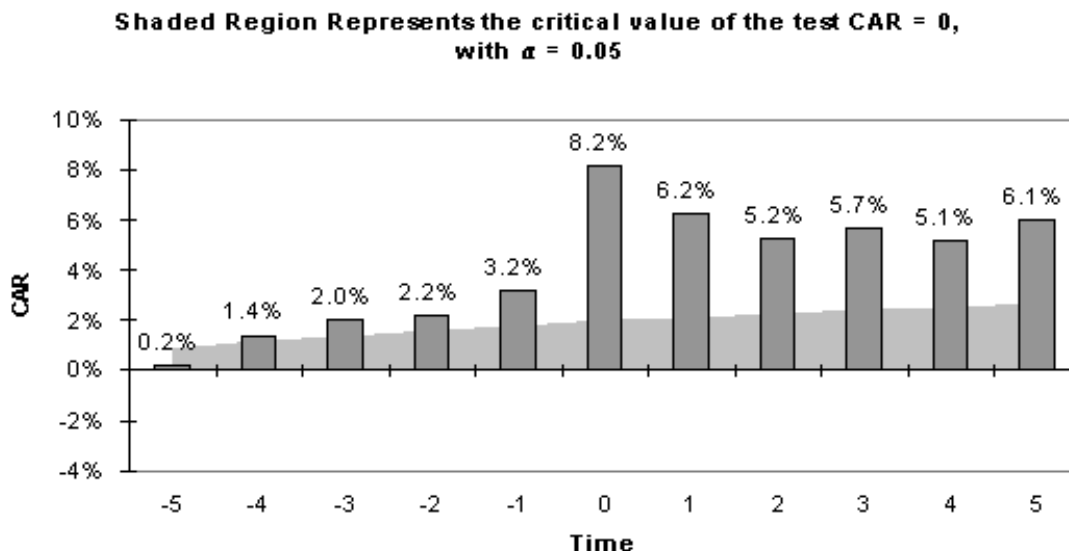
4. RESULTS

4.1 Effect of E-commerce Announcements

The results of the test for an overall effect are displayed in Figure 4.[5] The bars plot the mean CAR for all 305 events. The graph shows that there is a sharp increase in the CAR, from 3.2% to 8.2%, on the day of the event. There is a slight correction on the day after the event, which brings the CAR back down to 6.2%. After this correction, the CAR remains relatively stable, so that on day 5 the firms have, on average, experienced a 6% higher return than expected otherwise: an effect attributable to the e-commerce announcement.

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[5]The results we present are robust to removing outliers from the dataset.

The graph also includes a significance test of H1. The shaded region represents the outer limits of the 95% confidence interval in the event period for the hypothesis that CAR > 0.[6] Therefore, all bars rising above the shaded region are significant at the .05 level.[7] The data thus support H1, suggesting that there are positive abnormal returns from electronic commerce announcements.

Shaded Region Represents the critical value of the test CAR = 0, with α = 0.05

Figure 1. Cumulative Abnormal Returns for All Firms

4.2 Returns to Net firms vs. Non-net Firms

The CARs for non-net firms and net firms are presented in Figures 2a and 2b. The results for the test of H2 are presented in Figure 3. The heights of the bars in the figure show the difference ($CAR_{Non-Net}$ - CAR_{Net}), which we hypothesized as being positive. The shaded area is the 95% upper bound; we reject the null hypothesis if the difference in the CAR over the five-day time window (the last bar on the right) rises above the shaded region. As this is not the case, as shown in Figure 3, we fail to reject the null hypothesis. We observe that the sign of the CAR difference on the fifth day after the event is negative, suggesting that the CAR for non-net firms over the time window in this sample is higher than the CAR for net firms, but this difference is not significant. We also observe that none of the differences in CAR on any of the days is significantly larger than zero, providing no support for the hypothesis on any day in the time window. However, the results do suggest that leakage of news of the impending event raises the value of net firms more than non-net firms on a couple of days: the differences in CARs on day (t-3) and day (t-5)—three and five days before the actual announcement of the event—are significantly different from zero. Overall, the pattern of results reflects no support for H2 that returns to non-net firms are greater than for net firms.

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[6]Specifically, the shaded region represents the solution to the following equation: $C.I._{\tau} = CAR_{\tau} - \sqrt{VAR(CAR_{\_})} \times t_{(df=304,5\%)}$.
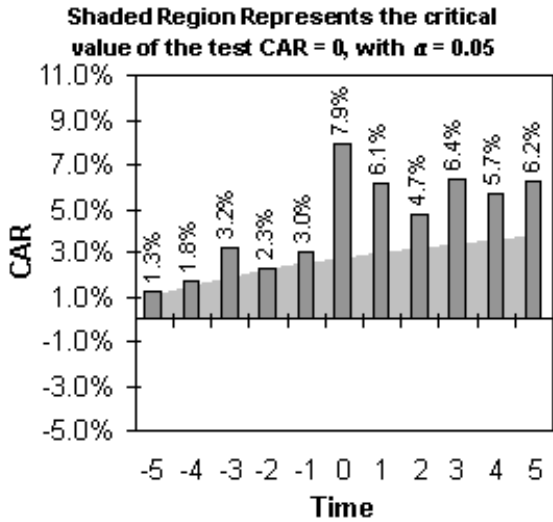
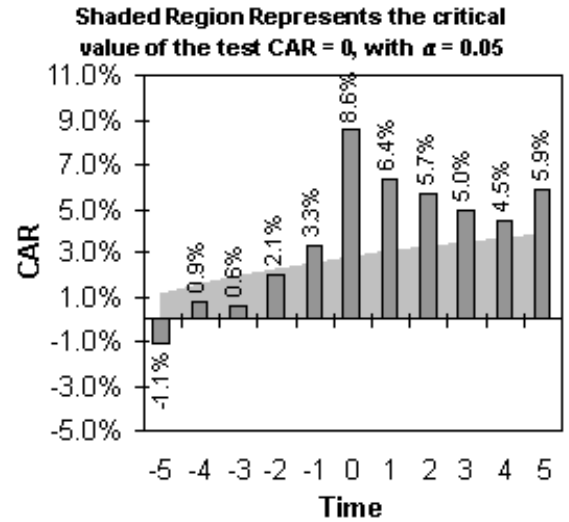[7]Note that this is a one tailed test.

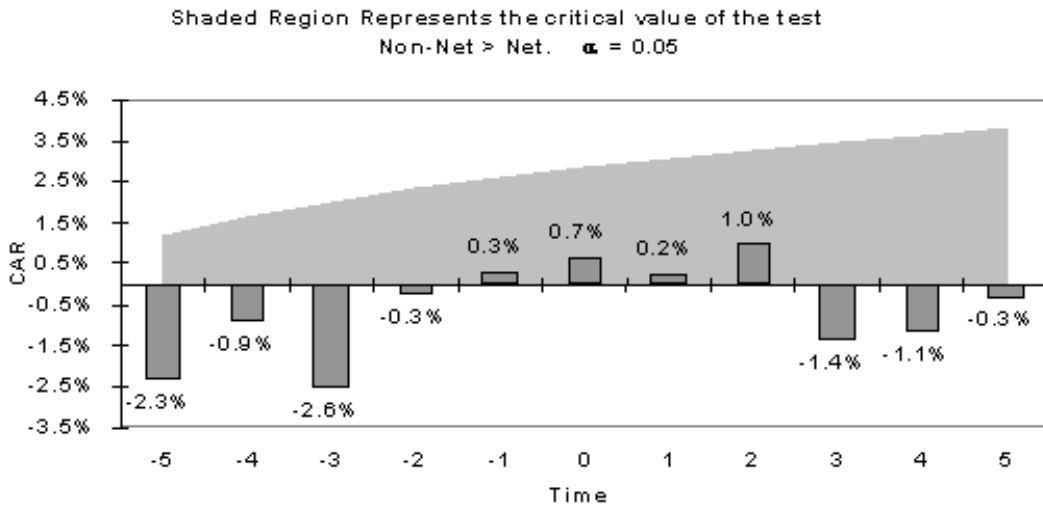Figure 2a: Mean CAR Net Firms

Figure 2b: Mean CAR Non-net Firms

Figure 3. Test of H2

4.3 Returns for B2B vs. B2C E-commerce

We begin the examination of H3 by plotting the CARs for B2B and B2C announcements. Figure 4 depicts the CARs for each of the initiatives for each of the days in the five day time window. Figure 5 presents the test of H3. The shaded region **above the horizontal axis** represents the critical value of the test for B2B > B2C. The height of the bars represents the differences in the CARs for each day in the time window around the event date. As the CAR on the fifth day (the bar on the extreme right in Figure 5) is below the critical level, this suggests that hypothesis H3, that B2B initiatives result in greater abnormal returns than B2C initiatives (B2B > B2C), is not supported by the data.
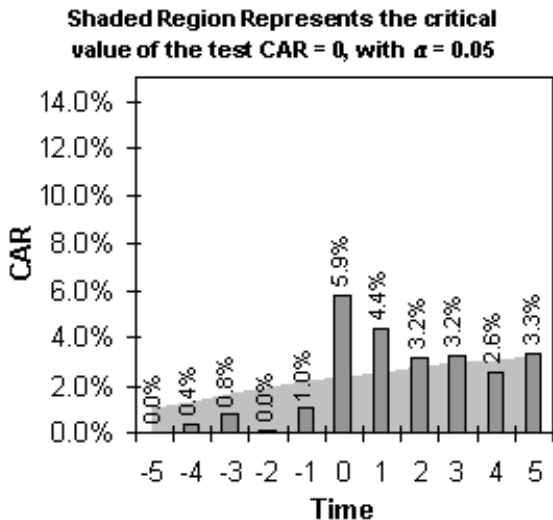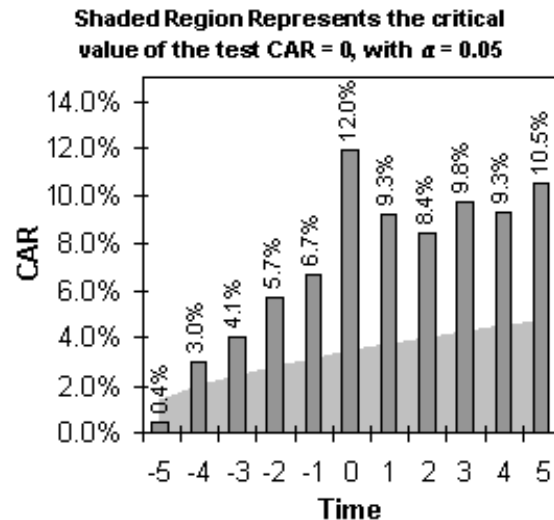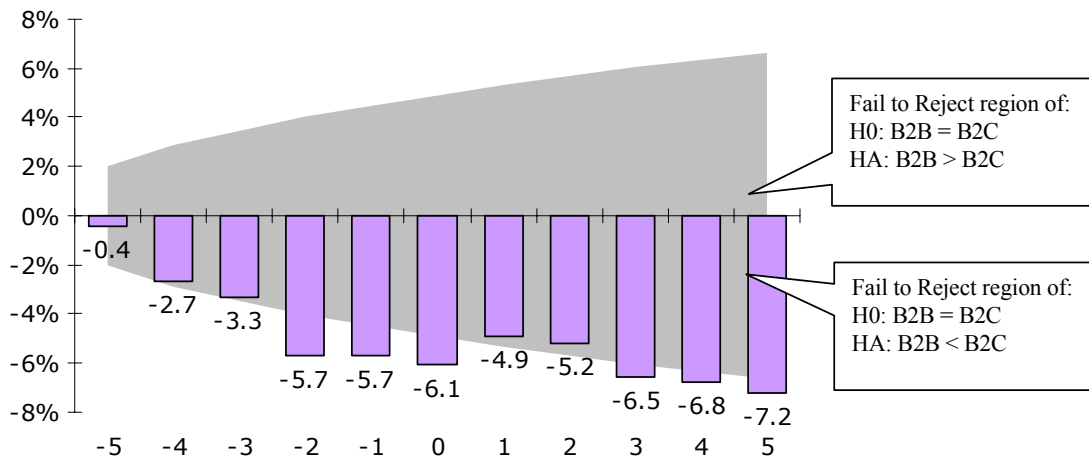
Figure 4a: CAR for B2B Announcements

Figure 4b: CAR for B2C Announcements

Note: The bars in the figure represent (B2B - B2C).

Figure 5. Test of H3' - B2B = B2C

In fact, the pattern of results—the bars representing the magnitude of B2B-B2C are consistently negative—suggests the *converse*: that the CAR from B2B on each of the days in the five-day time window around the event are smaller than those of B2C initiatives. To examine the statistical magnitude of this difference, we test the following post-hoc hypothesis H3': *abnormal returns of B2B initiatives are significantly lower than those of B2C* (B2B < B2C). The critical values of this test are represented in the **shaded region below the horizontal axis** in Figure 5.

On day 5, the difference in the cumulative abnormal returns (B2B - B2C) in the time window is -7.2%, a level below the critical value for the test, providing support for H3' that the abnormal returns associated with B2B initiatives are significantly lower than those related to B2C initiatives. In addition, Figure 5 reveals that the difference in CARs is significant for six of the 11 days in the time window.

5. DISCUSSION

Overall, the results of this event study suggest that e-commerce initiatives create significant future benefits for the firm, a judgment that is reflected in an enhancement of the market value of the firm. Therefore, our results demonstrate that the current rush by firms to enter the fray in the e-commerce arena may be more than a bandwagon effect or a mere reflection of mimetic managerial action: these initiatives do enhance the market value of firms and create value for the firms' stockholders.

Our main results are:

(1) Capital markets react positively to firm announcements of e-commerce initiatives, leading to a significant enhancement in the firm's market value. The cumulative abnormal return for e-commerce announcements is 8.2% on the day of the event and 6.1% over the five day time windows on both sides of the event date.

(2) This positive effect is observed for both net firms and non-net firms. The cumulative abnormal returns from e-commerce announcements for non-net firms is 8.6% on the day of the event and 5.9% over a five day time window around the event date. The CAR for net firms is 7.9% on the day of the event and 6.2% over a five day time window. The hypothesis that the returns are higher for non-net firms than for net firms is not supported.

(3) The hypothesis that cumulative abnormal returns related to business-to-business e-commerce are significantly more than those for business-to-consumer e-commerce initiatives is not supported.

(4) A post-hoc test suggests that the cumulative abnormal returns related to B2C commerce are significantly more than those for B2B commerce initiatives. Business-to-consumer e-commerce initiatives leads to a CAR of 12% on the day of the event and 10.5% over the 11 day time window. For B2B initiatives, the CAR on the day of the event is 5.9% and over the 11 day window is 3.3%.

The finding that CARs to non-net firm overall do not exceed CARs to net firms is revealing. In effect, the data suggest that non-net firms, in spite of the considerable experience, knowledge, and resources accumulated in operating in their markets, achieve only parity in competing with newer Internet startups in online commerce. There are several possible explanations. It may be that the e-commerce efforts of non-net firms in our data were tentative attempts to establish a web presence providing brochure type information such as store location and information to investors. In contrast, e-commerce initiatives are clearly central to the strategies of net firms and, on average, are linked to higher future benefit streams than the announcements of non-net firms.[8]

Another likely explanation is that the resources created by firms to compete in conventional markets, in some cases, may be ill suited or even constraining in e-commerce environments, leaving non-net firms at a disadvantage in comparison with newer net firms without these constraining asset bases. For instance, the longstanding distribution channel relationships and the retail presence established by Toys "R" Us that enabled it to become the leading supplier of toys are viewed as constraining them from emulating the successful model of an Internet startup like e-toys that lets customers order toys online (Pareira 1999). Our results thus suggest that some resources valuable in conventional operations are highly context bound and may lose value or even be dysfunctional in e-commerce contexts. That certain components of the resource stock of the firm developed in one environment may turn into serious limitations in another parallels the observation that core rigidities often have their roots in core competencies (Leonard-Barton 1992). Understanding the nature of firm resources in conventional contexts that become liabilities in e-commerce operations is an important issue with considerable research and practical implications that needs further research.

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[8]We are grateful to a reviewer for this suggestion.

A related explanation for our result that non-net firms achieve only parity with net-firms in our sample is the *dinosaur effect* (Greenwood and Jovanovic 1999): the view that established non-net firms face a changed context just as the large land mammals that were structurally ill suited to changed environmental conditions. This view emphasizes that the context of conventional operation and those of e-commerce are quite different and the organizational characteristics associated with success in these two contexts may be quite different. For instance, one key difference between net and non-net firms is the pacing of action, colloquially termed the *clockspeed* of the firm. The competitive e-commerce environment is fundamentally shaped by the leveraging of advantages derived from developments in hardware, software, and networking technologies and, therefore, inextricably linked to the rapid cycles of change in these enabling technologies. The speeding up of the pace of firm activities in e-commerce environments to exploit extremely short windows of opportunity to gain competitive advantages has led to the coining of the phrase *Internet time* to describe the heightened pace of operations at net firms (Yoffie and Cusumano 1999). Anecdotal accounts seem to suggest that operating in Internet time requires a considerably different orientation toward planning, coordination, control, and operational processes than the orientation associated with success in conventional businesses. As organizational processes—the routines established over time within non-net firms—are relatively inflexible and require considerable effort to modify (Davenport 1992; Nelson and Winter 1982), it is likely that non-net firms embarking on e-commerce initiatives face a daunting challenge in rethinking their processes. Additionally, this is complicated by the challenge of having to unlearn the lessons learned in conventional environments before effective learning can occur (Starbuck 1996): popular accounts describe the e-commerce context as a "parallel universe" where the "rules" for success differ considerably from the management wisdom applicable in conventional contexts (Fox 1999). If this view has any credence, it suggests that non-net firms need to initiate radical transformations to compete effectively in the new context. This has considerable implication for a wide range of organizational phenomena, a subject that is relatively unexplored in management research.

Further, the lack of support for the hypothesis that B2B commerce initiatives are linked to greater abnormal returns than B2C (B2B > B2C) commerce, while the reverse, that B2B < B2C is supported, is also interesting. It may be that the high level of integration between partners required for B2B interactions and difficulties in establishing effective management processes in interorganizational relationships observed by prior researchers (Hart and Saunders 1997; Subramani and Henderson 1999) might lead B2B initiatives to be viewed as being inherently complex and fraught with risk. This is clearly an issue that requires more examination by organizational researchers to enable the promise of high performance in seamlessly integrated organizational networks to be realized.

This study highlights an alternative approach for examining the thorny issue of payoffs to firms from IT investments. If announcements of e-commerce initiatives are signals of the considerable investments in information technologies supporting these initiatives, our results suggest that these investments are associated with significant enhancement of future profitability and consequent increases in the market value of firms.

We would also like to draw attention to the magnitude of the influence of e-commerce announcements on market value: these announcements are several times greater than the effect of events that have been studied in prior research. Prior event studies in the U.S. stock market observe CAR magnitudes ranging from -2% to 2.3%, with the majority of studies finding less than 1% CAR, as shown in Table 3. Our results thus provide the first empirical test of the extremely positive market response to e-commerce announcements and confirm the validity of what is informally termed the *dot com effect*. E-commerce announcements are clearly extremely influential in influencing the market value of firms.

While the results of this study of a sample of 305 events are robust to changes in statistical parameters such as the length of the event window, the elimination of outliers,] and the reference index used, the results of our study need to be interpreted with caution. Our results are based on linkages between e-commerce announcements and market valuations in a three-month period at the end of 1998. Outcomes in individual instances are extremely dependent on firm, market, and product characteristics, factors not included in our analysis. Further, the coding scheme adopted to classify announcements into those by net and non-net firms and belonging to B2B and B2C categories clearly influence our results. Further research with more refined coding schemes would elaborate the understanding of phenomena afforded by our work. The event study is a powerful technique well suited to examining a range of issues central to IS research and we hope this study will spur greater application of this methodology.

Table 3. CAR Reported in Prior Event Studies

Study	CAR
This Study: Effects of B2C e-commerce announcement	10.5%
This Study: Effects of B2B e-commerce announcement	3.3%
MacKinlay (1997): Effect of Earnings Announcements	2.3%
Menzar, Nigh, and Kwok (1994): Effects of Withdrawal from South Africa*	-2.0%
Wright et al. (1995): Effects of Affirmative Action Awards*	1.6%
Das, Sen, and Sengupta (1998): Effects of Strategic Alliances	1.6%
Dos Santos, Peffers, and Mauer (1993) Effects of IT Investments	1.0%
Horsky and Swyngedouw (1985): Effects of Change in Firm Name**	0.64%
Lane and Jacobson (1995): Effects of Announcements of Brand Leveraging**	0.32%
Wright et al. (1995): Effects of Being Found Guilty of Discrimination*	-0.3%
Chaney, DeVinney, and Winer (1991): Effects of New Product Announcements**	0.25%
Agrawal and Kamakura (1995): Effect of Celebrity Endorsement	0.2%

  *As reported in McWilliams and Siegal (1997).
**As reported in Agarwal and Kamakura (1995).

Note: Studies in the table are sorted by magnitude of CARS observed.

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