THE VALUATION OF ECOMMERCE ANNOUNCEMENTS DURING FLUCTUATING FINANCIAL MARKETS

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ABSTRACT

If there are abnormal returns on an eCommerce initiative, and these returns are different during bull and bear markets, then we know that the markets value these investments with consideration of overall market health. This is reasonable, as market health, a proxy for the general economy, will affect cash flow benefits received through such things as the broadening of the customer base. If this is the case and the valuation is subjective, then stock volume and gains to the investor and the corporation itself will vary in sympathy with market movement. This study researches these aspects of returns due to eCommerce announcements. We use event study methodology to assess the cumulative abnormal returns (CARs) and cumulative abnormal volumes (CAVs) from eCommerce initiatives announced by firms in the S&P 100 Index between January 1999 and December 2000, a period of fluctuating financial markets.

Keywords: Signaling, Electronic Commerce Announcements, and Event Studies

1. Introduction

Many recent studies in financial economics of IT analyze abnormal corporate stock returns through the signaling mechanism of firms by their news announcements (e.g., Im et al., 2001; Subramani and Walden, 2001; Oh and Kim, 2001). Wide-ranging news announcements that have shown an impact on firms' stock prices include changes in dividend policy, stock splits, layoff announcements, key personnel changes, and even celebrity endorsements. This new and unpredicted information, received by the financial market, can be perceived as contributing positively or negatively (valuation) toward the future ongoing cash flows of the corporations involved and has been associated with a stock price reaction in the same direction. A widely accepted explanation for this well-established empirical finding, first suggested by Miller and Modigliani (1961), emphasizes the role of signaling asymmetric information. Recently, Stiglitz (2000) concurred and noted that the extent of information asymmetries is affected by the actions of firms. Because management is better informed than the market about future prospects of their firms, their actions may convey new information to investors. Within the IS literature, the impact of new unexpected IT investment information has been mixed. Im et al. (2001), replicating the study from Dos Santos et al. (1993), found no significant increases in the market valuation of firms from announced corporate IT investments. Furthermore, they found no significant reaction on firm trading volume to these announced IT investments. On the other hand, Subramani and Walden (2001) found significant increases in market valuation of firms from eCommerce announcements.

The intuitive purpose of this study is founded upon the meteoric rise in use of the Internet in the late 1990's and its' value (strategic and monetary) to corporations. Geyskens et al. (2002) found that eCommerce investments yielded value both on the demand and supply side strategies. We propose that the value found in both the demand side and the supply side will be affected by overall market health. We test for cumulative abnormal returns (CARs) of the firms that make up the Standard and Poor 100 index resulting from corporate announcements of IT investments in eCommerce. We test whether the CARs of firms announcing IT investments in eCommerce during bull and bear market phases are statistically different from the general market's return (S&P 500 Index) and whether the CARs during this bear market phase are consistent with those during the bull market. Following Im et al. (2001), we also test the cumulative abnormal volumes (CAVs) of firms announcing IT investments in eCommerce during the separate bull and bear market periods to identify whether investor's reactions to these types of IT investments were viewed positively by bidding up a firm's stock price with a corresponding increase in volume. Volume is an indication of variation in the individual investor's respective beliefs about the value of the firm. By including

volume in the study, we confirm the unexpected nature of the announcement as well as the effect eCommerce is expected (by investors) to have on the underlying attributes of the firm.

This paper measures the daily cumulative abnormal returns (standardized), consistent with literature following Brown and Warner (1985), McWilliams and Siegel (1997), and MacKinlay (1997) and the daily cumulative abnormal volumes (standardized), consistent with Bamber (1986), Karpoff (1987), Bamber and Cheon (1995), Kim et al. (1996), and Im et al. (2001).

2. Background

2.1 Signaling in Markets

The literature on signaling asymmetric information begins with the seminal work by Akerlof (1970). That study illuminated the elaborate concerns and incomplete information purchasers of a used car had against the certain and complete information the seller of the car maintained. In regards to the financial markets, asymmetric information can cause two significant problems with the efficient market hypothesis, adverse selection and moral hazard. A classic response in the presence of asymmetric information is signaling (Spence, 1973). Through the news announcement mechanism, corporations signal investors who infer information about a firm's future cash flow.

2.2 Electronic Commerce

The last half of the 1990's and early 2000's has seen a tremendous increase in interest and use of the Internet. The number of articles in newspapers as well as the specialized business press concerning the Internet attests to the considerable public and business interest. The number of web users is growing at a parabolic rate. For example, in the United States, Ipsos-Reid (2002) reports 72% of adult Americans have been online at least once during November 2002. This large number of users is an enormous market of potential consumers for eCommerce activities. The Census Bureau of the US Department of Commerce (2003) announced that eCommerce retail sales for the first three quarters for the year of 2003 were $37.68 million. Ecommerce is having a profound impact on businesses and society. (Shin, 2001) With only a small expense, many businesses can build a global storefront and have it operating very quickly (Fruhling and Dign, 2000).

In spite of anecdotal evidence, the value and benefits of eCommerce initiatives to corporations are not well known. Wise et al. (2000) has stated these as: the promise of greatly reduced costs, efficient and flexible transaction methods, improved market liquidity, and a greater access to buyers and sellers. Zhuang (2005) believes that it's the early adoption and creative use of e-business that benefits firm performance. What are the returns to shareholders from engaging in eCommerce activities? Past literature, such as Im et al. (2001) and Geyskens et al. (2002) find that there is positive financial gain for shareholders. We follow with the question, of whether this value is influenced by market health. Subsequently, is a change in shareholder value accompanied by a change in volume, thus signifying an expectation by investors of a significant shift in the underlying functional attributes of the company?

2.3 Abnormal Returns

The semi-strong form of the efficient market hypothesis (EMH) states that securities are priced in an unbiased fashion, cannot be anticipated in advance at any given time, and fully reflect all publicly available information. Investors then assess the potential future cash flow changes associated with the new policy announcements given by firms. By acting on this new information, a firm's stock price should move in the same direction as investors view the new policy actions (see Kalay and Lowenstein, 1985). It is intuitively thought that eCommerce activities of firms will increase the future cash flow streams of those firms. If this is the case, the financial markets should acknowledge this fact favorably and increase their stock price. This paper builds on previous event studies in IT by Im et al. (2001) on abnormal volume and Subramani and Walden (2001) who examined eCommerce announcements during the period between October and December 1998.

2.4 Abnormal Volume

For over two decades, empirical research has documented similarities between price and volume reactions to new information. Beaver (1968) found that earnings announcements generate both abnormal price changes and abnormally high trading. Subsequent research in this area has shown that both price and volume reactions increase with unexpected earnings, and decrease with firm size. The focus on similarities between price and volume reactions has naturally led researchers to view price and volume as substitute measures of "market reaction". Significant conceptual differences exist, however, between price and volume reactions to unanticipated news events. Research by Kim and Verrecchia (1991) has formalized the perception that price changes reflect the change in the aggregate market's average beliefs, while trading volume is the sum of all individual investors' trades. Therefore, trading volume preserves differences among individual investors that are "averaged" in the share exchange process that determines equilibrium prices (Kim and Verrecchia, 1991). Given these differences, it is possible that some earnings announcements will generate heavy trading but small price changes, and vice versa.

Surprisingly, there is little empirical evidence concerning differences between the general market environment, as viewed as either a bull or bear market trend, and the cumulative abnormal volumes (CAVs) of firms' reactions to news announcements, even though research has acknowledged the possibility of differential price and volume reactions to earnings announcements (Beaver, 1968), differential price and volume reactions to IT announcements (Im et al., 2001), and differential price reactions to eCommerce announcements (Subramani and Walden, 2001). We address this issue by researching the existence of differential reactions and providing evidence on the question: Are there abnormal volumes associated with eCommerce announcements, and are those volumes affected by market health? Our empirical investigation is based on a sample of price and volume reactions to 349 eCommerce announcements by the firms who comprise the S&P 100 index from 1/1999 to 12/2000.

Consistent with the previous arguments, this paper utilizes event study methodology to ascertain the impact of eCommerce initiatives announced by firms on the U.S. financial markets. Subject to the markets' reaction to these announcements, this study will examine the extent of this effect, controlling for confounding events, upon different subgroups of the sample. That the equity markets in the U.S. have recently experienced a very strong (historically) bear market (used throughout our study figuratively, not technically) should not be overlooked. Therefore, this paper examines any difference in effects this may have caused upon our overall results. Since the eCommerce revolution has just recently begun in the 1990s, and with only a handful of economic or financial analyses of this subject, this investigation can increase our understanding of the issue. We examine several hypotheses using data on eCommerce announcements by the S&P 100 firms between January 1999 and December 2000. Since these firms are deemed the most valuable, market capitalization not withstanding, and are leaders in their industries, what actions they collective take may well impact the direction and structure of eCommerce's future.

3. Hypotheses
3.1 eCommerce Announcements Lead to Value

It has been stated that the U.S. economy has fundamentally changed its structure with the widespread use of the computer and the information it manipulates (Porter, 2001). This change has been called the information revolution, and it has dramatically reduced the cost of obtaining, processing, and transmitting the information firms and individuals conduct business with (Porter and Millar, 1985; Hall, 2000). The transmission of this information through the Internet (a communication channel) has transformed the conventional transmission process and allowed businesses to distinguish themselves through strategy (Geyskens, 2002). As stated by Porter (2001), the firms that view the Internet as a complement to their traditional ways of competing will be the winners.

The Internet is able to take advantage of this connected system to speed business along at a faster pace than previous envisioned. Yoffie and Cusumano (1999) called this fast paced action of businesses the 'clock speed' of the firm. They also argue that the phrase 'Internet time' describes the speed at which business operations need to take place now for an organization to maintain its competitive advantage. The ability to exploit a competitive advantage has shortened decision and implementation cycles. Today, customers expect overnight delivery of their orders or the just-in-time (JIT) delivery of inventory assets in their supply chain. Therefore, as the information economy transforms into an electronic business environment, firms posed to take advantage of this shift will prosper. Thus, when firms announce eCommerce initiatives, it indicates the functional commitment of management to develop the resources and capabilities for this new communication channel for their firms (Peteraf, 1993).

These announcements represent implications to the organizations expected by the financial community to position the firms advantageously for the future; to enable them to take advantage of the many opportunities created by the growth in eCommerce. If they choose the right initiatives, these actions can help create cash flow streams to the firm in future years. Moreover, these actions imply that businesses are reorganizing their processes to lower costs and gain organizational efficiencies. Hamel and Sampler (1998) suggested that the firm is announcing its intent to acquire corporate strategic advantages through the deployment and structural change from IT investments. Therefore, the announcements of eCommerce initiatives, consistent with the signaling hypothesis of Fama et al. (1969), are a process for organizations to communicate constructive information to the financial markets. This would convey to these markets that this organization's management team is actively engaged in addressing its' future profit stream requirements. Moreover, with this organizational team, they plan on gaining strategic advantages with new technologies and procuring the corporate abilities to profit from this increasing electronic environment.

The previous arguments promote the theory that organizations that announce eCommerce initiatives will likely achieve substantial future strategic, operational, and revenue advantages. If this is the case, the financial markets should respond positively to eCommerce announcements. This should also create a positive abnormal (greater than the general market's) stock return about the date of the eCommerce announcement. However, this also implies that these eCommerce announcements are unexpected and that the financial markets did not previously anticipate this

new information concerning these initiatives. As a result, the abnormal returns can be assumed (with no confounding events) to be the consequence of the stock market's reaction to this new information. This leads to the first hypothesis, that eCommerce initiatives are associated with improved future benefit streams to the organization and consequently to its' increased market valuation.

H1: The abnormal returns attributable to eCommerce announcements are positive and significantly different from zero.

3.2 CARs During Bull and Bear Markets

The second and third hypotheses involve CARs found during bull and bear markets. As discussed previously, abnormal returns following an announcement of an IT investment are affected by such factors as the stock investor's perception and assessment of the economy's health, and the ability of the technology investment to be successful (Asquith and Mullins; 1986). The expectation of poor economic health is found in stock market behavior, as the investors buy and sell stocks based on their belief of the economy's impact on the revenues and costs of those companies. The new equilibrium of stocks in general, which is falling in a bear market, reflects the generally negative sentiment of the health of the economy on future revenues and costs for the companies being traded. Thus, we expect that the future expectations of positive IT impacts will differ when the financial investors perceive a state of poor economic health in the economy (as reflected by a falling market).

Therefore, the abnormal returns during the bull market would intuitively be different than those found during the period of a bear market. In this study the term is used figuratively and not necessarily technically. We examine these diverse markets and note any significance of the CARs of these two groups

H2: The abnormal returns of firms making eCommerce announcements during a bull market are significantly different from zero.
H3: The abnormal returns of firms making eCommerce announcements during a bear market are significantly different from zero.

3.3 CAVs During Bull and Bear Markets

Recent studies have shown that trading volume has risen on the days firms have announced their earnings (Morse, 1980; Bamber, 1986; Wang, 1994). This indicates that earnings announcements have relevant informational content to investors. Moreover, Lobo and Tung (1997) have reported that the new information causes investors to revise their expectations about the future of the firm, its assets, market share, and earning potential. Therefore, if it is true that IT investments have a positive impact on the future abilities of the firm and IT investment announcements convey this information to the stock market, then the unexpected release of this new information can additionally cause investors to revise their prior beliefs and lead to increased stock trading and greater share volatility. This implies that trading volume conveys important information about how a firm's shares are priced in the market. Increasing trading volume indicates variances in individual investors' respective beliefs about the value-relevant attributes of a firm. Nevertheless, recent studies by Bamber (1986), Karpoff (1986), Kim and Verrecchia (1991), Lobo and Tung (1997), Im et al. (2001) have revealed that the interpretation of trading volume is ambiguous. As noted by Karpoff (1986), an increase in volume may designate that investors process the informational content of the news differently. However, they may also process the informational content in the same fashion, but start with disparate expectations. We explore this issue by examining the abnormal volumes of firms announcing eCommerce initiatives.

H4: The cumulative abnormal volumes attributable to eCommerce announcements are positive and significantly different from zero.

4. Methodology

4.1 Data Set

This study examined the firms of the S&P 100 index for announcements of eCommerce activities. We searched all news sources (e.g., PR Newswire and Business Wire) included in the Lexis/Nexis search engine for announcements containing the words *(launch OR announce) AND (online OR commerce) AND (.com) AND (NYSE OR NASDAQ OR AMEX OR OTC) AND (S&P firm name or ticker symbol)*. The data was collected from the period January 1999 through December 2000, inclusive. This search yielded 349 news announcements that met our search criteria. The daily returns of the individual S&P 100 firms were compiled from the University of Chicago's Center for Research in Security Prices (CRSP) tapes and confirmed using Commodity Systems, Inc.

(CSI) data.[1] The index used for the market return regression was the S&P 500 (SPX). Since all the firms under study are the backbone of this index it was thought most appropriate.[2] These firms are the largest capitalized corporations in the U.S. equity markets and use of any other indices such as the CRSP's Value Weighted Index or Equal Weighted Index would have exaggerated the variance and significance of the abnormal returns and thus would have negated the insight (Mackinlay, 1997).

4.2 Coding

In classifying a news announcement as an eCommerce activity event, the news announcements were first sorted by who initiated the announcement. Only the announcements by the firms of the S&P 100 were included in this study and not those announcements initiated by other firms. If the corporation did not make the announcement, then this new information was reasoned insignificant by the firm itself and thus not included within the data set. Furthermore, if the announcement was reported after 4:00 PM EST, the event was classified as taking place on the next business day. If the announcement was reported on the weekend, then it was recorded as taking place on Monday (or the next day the financial markets were opened). Of the 349 announcements by 57 of the S&P 100 firms, 147 occurred during the bull market (in this study from January 1, 1999 through March 24, 2000, inclusive) and 202 occurred during the bear market (from March 25, 2000 through December 31, 2000, inclusive). Our definition of a Bear market follows traditional finance as being a period of 20% decline in market value. There was no signaling through news announcements of eCommerce initiatives by 43 of the 100 firms that comprise the S&P 100. Some firms have yet to incorporate an eCommerce business policy into their business model. On the other hand, if a firm does not announce its' eCommerce investments, the financial markets can not react upon this asymmetric information. There were no announcements of failed investments included in this study.

4.3 Methodology

Event-study methodology was used in this study to examine the reaction of investors to news announcements by firms of eCommerce activities. This methodology is based on the assumption that capital markets are sufficiently efficient to evaluate the impact of new information (events) on expected future profits of the firms. MacKinlay (1997) outlined an event study methodology involving the following steps:(1) identification of the events of interest and definition of the event window; (2) selection of the sample set of firms to be included in the analysis; (3) prediction of a "normal" return during the event window in the absence of the event; (4) estimation of the abnormal return within the event window, where the abnormal return is defined as the difference between the actual and predicted returns; and (5) testing whether the abnormal return is statistically different from zero. These steps are described below.

4.4 Identification

An eCommerce announcement was identified as an announcement made by a company relating to the introduction of or changes in their web site, a web site alliance, or other news pertaining specifically to that company's web site. For example, an announcement made by Company "A" regarding the introduction of their new eCommerce venue would be included, but the announcement made by Company "B" of Company "A's" actions would not. Likewise, announcements made by Company "A" of a new technology or an upgrading of content added to enhance their web site would be included, but the company's announcement of an unrelated software or hardware addition (such as accounting software) would not.

We defined the event window as the period from 1 day prior to the event (day 0) to 1 day after the event. There are three reasons we chose a three-day event window. First, by narrowing the event window we reduce the likelihood of confounding events impacting the data set. As noted by McWilliams and Siegel (1997), the longer the event window, the more difficult it is to control for confounding effects. Many of the firms worth studying on the stock exchanges are likely to have frequent significant news announcements. Using a short versus long event window assures the researcher of capturing an abnormal return due to an event versus some other event's effect on the stock in question. Failing to control for these other effects would call into question the validity of the empirical results and conclusions drawn from them.

Secondly, Brown and Warner (1985) demonstrated the use of longer event windows reducing the power of the test statistic, Z_t. As a result, the inferences and significance of an observation with a longer event window would be in question. Finally, it has been shown (Ryngaert and Netter, 1990) that a short event window will, on average, capture the significant effects of an event. Dann et al. (1977) established that the stock price of a firm would completely adjust within 15 minutes of the release of their firm-specific information. This study, following the

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[1] Raytheon had one eCommerce announcement on Nov. 18, 1999 that was not included in this study due to CRSP data retrieval error and failure to collect this firm's daily returns through another source.

[2] The greater degree of correlation between the index and returns, the greater the precision of the estimated parameters; thus, the abnormal returns are more easily detectable (Dann et al. 1984).

example of Im et al. (2001), used a short (± 1 day) window to capture the significant effects of an eCommerce initiative.[3] Some other studies (e.g., Subramani and Walden, 2001) have used longer event windows (± 5 and ± 10 days) in the hopes of capturing information leakage that does accrue with asymmetrical information.[4]

4.5 Sample Set Selection

The 100 firms investigated in this study (S&P 100) are all traded in the United States equity markets, which are acknowledged as being among the most efficient in the world. The market capitalization of these firms is high and increasing over the long run. Additionally, the breath and depth of these firms assures meaningful conclusions can be inferred from the results. These 100 firms are the drivers of the U.S. economy and their procurement and utilization of any new technology should have profound effect.

The sample size is important because the test statistics used in the event study are based on the normality assumptions associated with large numbers. This is not a concern in this study. This study examined the daily abnormal returns (AR) for a sample of 100 firms over a 200-day estimation period (the period before the event that is used to estimate the regression parameters α, β, and ε). Therefore, since 349 eCommerce announcements were observed over the sample set and time period, 349 sets of 200 daily excess returns have been generated. Thus, one excess return from each of these 349 distributions is used during the event window.

4.6 Prediction of a Normal Return

In this study, the market model was used to estimate the parameter coefficients. This model assumes a linear relationship between the return of any security to the return of the market portfolio (Normal Return). As previously noted, the market model was chosen over the constant mean return model because the variance of the abnormal return is reduced (MacKinlay, 1997). This should lead to an increased ability to detect the event's effects. However, this assertion depends upon the R^2 of the market model regression. The higher the R^2 **value,** the lower the variance of the abnormal return. Therefore, this methodology will improve the researcher's insight into the event's impact upon firm valuation.

4.7 Estimation of the Abnormal Return

Several methods may be used to obtain the estimated abnormal returns: the single-index model (constant mean return model), the capital asset pricing model (CAPM), and the market model are the most widely used. MacKinlay (1997) noted the superiority of the market model over the constant mean return model in reducing the variance of the abnormal return. Furthermore, the validity of the restrictions imposed by the CAPM on the market model is in question. Moreover, under the general conditions associated with ordinary least squares (OLS), it is a consistent estimation procedure for the market model parameters α, β, and ε. Furthermore, ε captures any omitted variables that are not included in the model to explain abnormal returns. Given the assumptions of the market model, OLS is efficient. Furthermore, the use of the OLS estimators to measure abnormal returns is widely accepted in the literature (see MacKinlay, 1997 or McWilliams and Siegel, 1997). These arguments were sufficient for the authors and thus the market model was used in this study as follows.

The market model assumes a linear relationship between the return of any security to the return of the market portfolio:

$$(1) \quad R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ = the rate of return on the share price of firm i on day t, $R_{m,t}$ = the rate of return on a market portfolio of stocks (S&P 500 index) on day t, α_i = the intercept term, β_i = the systematic risk of stock i, and ε_i = the error term, with $E(\varepsilon_{i,t})=0$.

Using equation (1) and following McWilliams and Siegel (1997), the abnormal returns (*AR*) for the ith firm follow are:

$$(2) \quad AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}),$$

where α_i and β_i are the ordinary least squares (OLS) parameter estimates obtained from the regression of $R_{i,t}$ on $R_{m,t}$ over an estimation period (*T*) preceding the event. The abnormal returns ($AR_{i,t}$) represent stock returns after the event's effect on equity prices has been adjusted for the normal return process. If the difference is statistically significant, then there is an abnormal or excess return. The standardized abnormal return (*SAR*), where the abnormal return is standardized by its standard deviation (Dodd and Warner, 1983), follows:

$$(3) \quad SAR_{i,t} = AR_{i,t} / SD_{i,t},$$

$$\text{where (4)} \quad SD_{i,t} = \{S^2 \times [\, 1 + 1/T \, (R_{m,t} - R_m)^2 / \sum_{t=1} (R_{m,t} - R_m)^2]\}^{1/2},$$

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[3] The use of a short event window is based on the underlying assumption of this model: that the parameters of the market model remain constant during the event window (McWilliams and Siegel 1997).

[4] See Asquith and Mullins (1983) or MacKinlay (1997).

where S_i is the residual variance from the market model as computed for firm i, R_m is the mean return on the market portfolio calculated during the estimation period, and T is the number of days in the estimation period. This procedure controls for multicollinearity (Dodd and Warner, 1983).

The standardized abnormal returns can then be cumulated over a number of days, or the event window, to derive a measure of the cumulative abnormal return (CAR) for each firm. This equation is shown as:

$$(5) \qquad CAR_i = (1/k^{1/2}) \sum\nolimits_{t=1} SAR_{i,t} ,$$

The values of CAR_i are assumed to be independent, normal, and identically distributed (Dodd and Warner, 1983). As a result, these values are identically distributed variables when dividing CAR_i by its standard deviation, which is equal to $[(T\text{-}2)/(T\text{-}4)]^{1/2}$.

It follows that the average standardized cumulative abnormal returns across n firms (ASCAR) over the event window can be shown as:

$$(6) \qquad ASCAR_i = 1/n \times 1/[(T\text{-}2)/(T\text{-}4)]^{1/2} \sum\nolimits_{i=1} CAR_{i,t} ,$$

and the Z-value for the average standardized cumulative abnormal return is:

$$(7) \qquad Z = ASCAR_t \times n^{1/2}$$

The Z-value test statistic, if significant, will represent the cumulative abnormal return of the investment into ecommerce.

4.8 Additional Methodological Considerations

Testing abnormal returns and volumes. As in previous IT event study literature, standard techniques were used for aggregating the individual firm abnormal returns and volumes.

Confounding events. The assumption that CARs measure the effect of an event is based upon the pureness of the data (a news announcement) with no other associated events against the relationship with the normal returns (the market model) of the firm making the announcement. If there are confounding events taking place within the event window, the purity of this relationship is questionable. These may include but are not limited to earnings announcements, the declaration of dividends, announcements of impending mergers, filing of large damage suits, announcement of a new product, and a change in key personnel. Any of these events may have an impact on the share price of a firm during an event window. Additionally, the longer the window, the more difficult it is to claim control for confounding effects.

The consistency of the CARs. To study the effects on abnormal returns due to an unanticipated event, one must consider the structural stability of the regression model before proceeding to find any abnormal returns of a security. This paper uses the market model to predict the normal returns for the firms of the Standard and Poor 100 index. This assumes a linear relationship between the return of any security and the return of the market portfolio. This study runs a regression on stock and a market index return versus price and an index level to correct for first order autocorrelation and size effects. This process of standardizing the abnormal returns corrects for any multicollinearity (MacKinlay, 1997). The assumption that the CARs remain constant over time is lost in the recent literature. Therefore, this study tests this assumption by dividing the CARs into two groups. The first are firm announcements that occurred prior to the financial market's peak (bull market phase), and the second group is announcements taking place after the peak (bear market phase).

The assumptions of abnormal returns. There are three assumptions (McWilliams and Siegel, 1997) regarding the validity of abnormal returns: (1) the financial markets are efficient, (2) the event was a surprise to the financial markets, and (3) the effects of confounding events during the event window were controlled for.

The first assumption concerns the efficient market hypothesis. It is widely assumed that the U.S. equity markets are efficient (EMH; see Bromiley et al., 1988 for a précis). The EMH is a necessary condition, for it supplies the foundation for the use of event study methodology. The second assumption implies that the news event was unanticipated, thus the financial markets did not previously have this information, and that the new information is relevant in the eyes of investors. The third assumption centers on controlling for confounding events. That assumption is critical because, by definition, the method attributes the abnormal return to the event under consideration. If other equity market relevant events are occurring during the event widow, it is impossible to isolate the impact of one particular event. Our study's criteria utilized only the first news announcement within an event window and did not consider any that followed within this window, with the expressed expectation of isolating these eCommerce events following the procedure employed by other researchers such as Meznar et al. (1994). Moreover, the choice of a shortened event window is based upon the possible effects of not controlling for confounding events.

Explaining the abnormal returns. The final issue faced in this study is explaining the abnormal returns found during this study. Consistent with McWilliams and Siegel (1997), this study endeavors to show that the cross-sectional variation in the abnormal returns across the firms of the S&P 100 is consistent with this paper's theory that there is a positive correlation between the cumulative abnormal returns generated by an eCommerce announcement

and the general trend of the financial markets the firm is facing. The resolution of the above methodological issues is summarized in Table 1.

Table 1 - Methodological Issues and Controls

Issues	Control Method
Confounding events impacting firm valuations.	Many of the 100 firms in the study had other news announcements in addition to the eCommerce announcements during the event window date. The criteria for an observation of an eCommerce announcement without other material news announcements within an event window minimize the confounding effects of contemporaneous information. Utilizing only the first news announcement within an event window and not considering any that followed within this window also contributes towards this.
Examining the consistency of the CARs and CAVs.	The sample is divided into two groups (before market peak – after market peak) and CARs and CAVs of the two groups are examined.
Sample size.	A sample of 100 firms over a 200-day estimation period (the period before the event window that is used to estimate the regression parameters). Therefore, with 349 observations of the 100 firms 349 sets of 200 daily excess returns have been generated.
Event window justification.	The choice of a short event window is supported empirically by Dann et al. (1977), Mitchell et al. (1989), and Ryngaert et al. (1990).
First order auto correlation and size effect.	Regressions on firm stock and S&P 500 index returns are used versus price and index level.

5. Results

5.1 Effects of eCommerce Announcements on Returns

Average standardized cumulative abnormal returns (ASCARs) and average standardized cumulative volumes (ASCAVs), herein referred to as CARs and CAVs, are presented in Table 2. With regards to *H1,* the sample of 349 observations for the 57 firms of the S&P 100 who announced eCommerce initiatives demonstrated that these initiatives, through the announcement signaling process, are related to an increase in the market value of the firm. This result is consistent with that of Subramani and Walden (2001). Furthermore, this empirical finding gives support to the theory that, on average, shareholders place additional value on firms that invest in eCommerce activities. However, while the significance of the empirical findings is consistent with other studies, the size of the CARs is not. We hypothesize that the difference in findings is due largely to the difference in time periods studied. That is, because this study incorporated both the market upswing and downswing, the findings were moderated. Subramani and Walden (2001) found CARs of 16.2 % in their study of firms that announced an eCommerce initiative from October 01, 1998 through December 31, 1998, inclusive, which was solely a period of market upswing. Our research reports CARs of 0.8091 **%**. With a Z-value of 6.1083, standard error of 0.3173, and standard deviation of 2.3956, the null hypothesis that firms announcing eCommerce initiatives have no impact on share returns is rejected. Table 3 lists examples of other event studies and their associated results.

Table 2 - Statistical Results

Panel A - ASCARs and ASCAVs

	BULL MARKET	BEAR MARKET	COMBINED MARKETS	BULL MARKET	BEAR MARKET	COMBINED MARKETS
ASCARs[a] & ASCAVs[a]	1.3955	-0.1440	0.8091	1.5660	1.6644	2.4458
Z-value	8.6025***	-0.9977	6.1083***	9.6535***	11.5311***	18.4637***
Number of Firms	38	48	57	38	48	57

[a] *Average Standardized Cumulative Abnormal Returns and Volumes (%) over the event period.*

Note: ASCARs, ASCAVs, and Z-values are based upon N = number of firms. *p < 0.10, **p < 0.05, ***p < 0.01

Panel B - Summary Statistics

	CAR BULL	CAR BEAR	CAR COMBINED	CAV BULL	CAV BEAR	CAV COMBINED
Mean[b]	1.4026	-0.1447	0.8132	1.5740	1.6728	2.4580
Standard Error	0.3171	0.2646	0.3173	0.5534	1.5653	1.2585
Standard Deviation	1.9546	1.8329	2.3956	3.4115	10.8449	9.5014
Kurtosis	1.7831	3.1864	8.7151	6.4395	6.5087	4.4791
Skewness	1.2228	0.5153	1.9251	2.1235	0.1659	1.3473
Range	9.1543	10.9202	17.2919	18.4131	76.8291	61.7464
Minimum	-2.1094	-5.0581	-5.0581	-2.9602	-40.0183	-24.5655
Maximum	7.0448	5.8620	12.2338	15.4528	36.8108	37.1809
# of Observations	147	202	349	147	202	349

[b] *Average Standardized Cumulative Abnormal Returns (%) over the event period.*
Note: (1) The mean of CARs and CAVs are different than ASCARs and ASCAVs from using observations versus firms.   (2) These values are based upon N = number of observations.

Table 3 - CARs reported in prior event studies

Recent Prior Studies in IT Investment	
This study: Effects of eCommerce Announcements	0.81 %
This study: Effects of eCommerce Announcements (bull market only)	1.40 %
This study: Effects of eCommerce Announcements (bear market only)	-0.14 %
Oh and Kim (2001): Effects of Firm Characteristics to IT Investment	1.36 %
Im, Dow, and Grover (2001): Effects of IT Investment	0.02 %
Subramani and Walden (2001): Effects of eCommerce Announcements	16.2 %

The distribution of the combined CAR grouping was a positive (1.9251), and thus left skewed. This skewness is abnormally distributed about its' mean of zero (0.0). Moreover, with a large positive kurtosis value greater than (3) of (8.7151), this distribution is strongly leptokurtic (slim or long-tailed).

To examine industry effects and make associations with other studies (Dos Santos et al., 1993; Im et al., 2001; and Subramani and Walden, 2001) we divided the sample set into financial and non-financial firms as well as technology and non-technology firm sub-groupings. We employed the Standard Industrial Classification (SIC) codes of the Bureau of Labor Statistics 4-digit code to divide the subgroup industries. Dos Santos et al. (1993) and Im et al. (2001) used SIC codes 40-43 and we concurred using the same coding for the financial group. This choice of industrial groupings can be supported by the widely held belief that IT investments have a greater effect on firm performance in the financial services industry over and above the manufacturing industry. Furthermore, we examined whether or not there a 'bubble' created in the firms associated within the technology sector regarding IT investment activities. We utilized the (SIC) 4-digit code to group the technology sector into one diverse technology group comprised of SIC codes 3572-3675 and 7371-7379 for the technology subgroup. This grouping combined firms from EMC Corporation to Texas Instruments (computer storage & peripherals to semiconductors) and International Business Machines to Computer Sciences Corporation (computer hardware to IT consulting & services). The results for the financial and technology subgroupings are presented in Table 4. Panel A indicates **CARs for the financial group of 1.3101 % versus CARs of 0.7273 % for the non-financial group**. This result does indicate that investors agreed with financial firms' choice to invest in eCommerce systems. Furthermore, but to a lesser extent, Panel B shows investors bid up the stocks (returns) of technology firms over the general markets' and therefore we found **CARs of 1.1674 % for the technology group versus CARs of 0.7234 % for the non-technology group**.

Table 4 – Industry Effects
Panel A - Financial versus Non-Financial

Sub-Groupings	SIC	# of Firms	CARs	CAVs
Financial*	40-43	8	1.3101	2.0589
Non-Financial	All others	49	0.7273	2.5087

- *Note: This grouping included AXP, AIG, BAC, ONE, C, MER, MWD, and WFC. We found no observations for AGC, JPM, LEH, and USB.*

Panel B - Technology versus Non-Technology

Sub-Groupings	SIC	# of Firms	CARs	CAVs
Technology*	3572-3675 and 7371-7379	11	1.1674	4.6420
Non-Technology	All others	46	0.7234	1.9204

- *Note: This grouping included CSCO, CSC, EMC, HWP, IBM, INTC, MSFT, NT, ORCL, TXN, and XRX. We found no observations for NSM and UIS.*

Panel B - Analysis-of-variance (ANOVA)

	CAR*	CAV*
α (intercept):	-0.1447	1.6728
(S.E.):	0.2724	1.2156
t-statistic	-0.5313	1.3761
β (coefficient):	1.5474	-0.0989
(S.E.):	0.4098	1.8288
t-statistic	3.7755	-0.0541
F:	14.2544	0.0029
Adj. R^2:	0.1349	-0.0119
ρ	0.0003	0.9570
Number of observations	86	86

Based on firm i versus market of Standard & Poor 500 and NYSE volume indices and both are standardized.

5.2 Effects of Announcements During Bull Market

To explore the relationship between the abnormal returns of firms and the type of financial market the firm faces, the market's reaction to an eCommerce announcement (as measured by the CARs of each firm) was regressed against a dummy variable representing bull and bear market conditions. The first sub-sample grouping (dated from January 01, 1999 through March 24, 2000 inclusive) was designated a bull market group. With regards to *H2*, the results listed in Panel B of Table 2 show the bull sample subgroup comprised of 147 observations for 38 firms of the S&P 100 who announced eCommerce initiatives did increase the market value of the firm. We report **CARs of the bull subgroup at 1.3955 %.** With a Z-value of 8.6025, standard error of 0.3171, and standard deviation of 1.9546, the null hypothesis is rejected. This subgroup was found to be significantly different from its' mean at the 0.01 level of significance. There is a negative slope (-0.1447) of the alpha coefficient. The relationship between the CARs of firms making eCommerce announcements and the general trend in the financial markets as viewed as a bull or bear market was found to be not significantly different from zero. The positive slope (1.5474) of the beta coefficient (dummy variable), which captures the effects of abnormal returns above the markets' (S&P 500), demonstrates that the firms' eCommerce initiatives were regarded positively and statistically significant by investors of these firms, no matter what type of market condition the firm encountered. This indicates that the mean CARs values during bull and bear markets are different. The average CAR during a bear market is –0.1447 (alpha coefficient) and the average CAR during a bull market jumps by 1.5474 (beta coefficient) to 1.4026. Thus, if eCommerce announcements are good news and largely unexpected, then these announcements would be expected to produce only positive market reactions. The distribution of the bull subgroup is a positive (1.2228) showing the right tail is thicker than the left tail and is left skewed. Furthermore, with a positive kurtosis (1.7831) less than (3), this distribution is platykurtic (fat or short-tailed).

5.3 Effects of Announcements During Bear Market

The relationship between a firm's eCommerce announcement and that firm's abnormal returns against the bear market environment they faced (from March 25, 2000 through December 31, 2000) is examined by the CARs of each firm of the S&P 100. With regards to *H3*, the results listed in Panel B of Table 2 show the bear sample subgroup comprised of 202 observations for 48 firms of the S&P 100 who announced eCommerce initiatives did

decrease the market value of the firm. We report **CARs of the bear market subgroup as -0.1440 %.** With a Z-value of –0.9977, standard error of 0.2646, and standard deviation of 1.8329, the null hypothesis cannot be rejected. Interestingly, this group was not found to be statistically significant different from its' mean (zero) at any of the levels of significance tested. The intercept term measures the effect of CARs separate from the general market conditions. The results indicate a small and insignificantly different from zero negative intercept term (-0.1447) and suggest that, on average, investors were disappointed by bear market conditions. However, with the statistically significant beta term (1.5474) and t-Stat (3.7755), investors value this asset allocation for eCommerce activity no matter the contraction of the general financial markets. Finally, the regression also suggests that the CARs' impact may be large enough to offset any type of investor reaction to bear market conditions (one of the strongest and deepest bear market since the great depression of the 1930s)[5].

The distribution of the bear subgroup was positively skewed (0.5153), and therefore left skewed. This skewness is abnormally distributed about its' mean, but blandly so. Moreover, with a positive kurtosis value greater than (3) of (3.1864), this distribution is slightly leptokurtic (slim or long-tailed).

5.4 Effects of eCommerce Announcements on Volume

With regards to H4, the relationship between the volatility of firms stock trading (abnormal volumes) and the market's reaction to an eCommerce announcement (as measured by the CAVs of each firm) are presented in Table 2. We find that there are abnormal volumes associated with eCommerce announcements. These results are in contrast with the study by Im et al. (2001), which did not find higher than expected trading volume resulting from IT announcements. We report CAVs over a combined bull and bear market environment as 2.4458 % versus CAVs of –0.052 % as reported in Im et al. (2001). With a Z-value of 18.4637, standard error of 1.2585, and standard deviation of 9.5014, the null hypothesis that the event had no impact on share trading can be rejected at all levels of significance tested. Moreover, the significance of our empirical findings does support the theory that, on average, trading volume was higher than the expected trading volume over the event period. This indicates that investors revised their previously held beliefs regarding their expectations of these firms and the trading ensued increased their volatility.

The distribution of the combined CAVs grouping is a positive (1.3473), showing the right tail is thicker than the left and thus is left skewed. Furthermore, with a positive kurtosis value of 4.4791, this distribution is leptokurtic (slim or long-tailed).

6. Discussion

The results of this event study indicate that on average eCommerce announcements are associated with statistically significant increases in the market valuation of firms and that, at least temporarily, these activities create value for the firm's stockholders. Therefore, this indicates recognition by the firm's investors that the announced eCommerce initiatives are likely to be associated with significant future benefit streams. This effect was shown to hold over a broad set of firms and fluctuating financial market conditions.

Although our results are statistically robust, recent event studies have shown that firms' valuations of IT investments are still regarded ambiguously. We find our results to be in contrast with other IT studies, most notable Dos Santos et al. (1993) and Im et al. (2001). On the other hand, our results support the conclusions reported by Subramani and Walden (2001) and Oh and Kim (2001) on the value of IT investment by firms. We found a statistically significant reaction by investors around an announced eCommerce investment event from firms. Further, we found statistically significant stock trading volatility around eCommerce investment announcements by firms. We speculate that investors revised their prior expectations of future prospects of these firms and increased the trading of their stock shares.

A note of caution needs to be addressed at this time. Not all of the observed CARs' impact can be attributed to the expected additional value from the announced news action. The event study method makes an assumption that stock prices accurately reflect expected future earnings, and that deviation from expectations will be arbitraged away. As these results also indicate, the CARs associated with an eCommerce announcement during a bull market are remarkably different from those during a bear market, and intuitively so. The expectations of investors concerning the outlook of the firms' future cash flows have been altered by the onset of bear market conditions. Investor expectations, as Ikenberry and Vermaelen (1997) established in a study examining stock splits, may not be grounded upon rational behavior.

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[5] The major market indicators: DJIA, S&P 500, S&P 100, and NASDAQ 100 composite reached local bottoms on October 10, 2002. Their percentage losses were approximately 38, 50, 54, and 78, respectively.

While the results from this sample of eCommerce announcements are robust to changes in their statistical parameters, these parameters (the length of observable events, the estimation period, the length of the event window and the elimination of confounding events) need to be interpreted in the light of the limitations of the study. The imputation of abnormal returns to events is based on the assumption that markets are efficient and that the events were surprises and therefore unanticipated by investors.

7. Conclusion

This study has examined the responses of abnormal stock returns to firm announcements of eCommerce actions and whether a firm's eCommerce activity increases the market value of the firm over time. Also investigated, in addition to the general financial market conditions (bull or bear markets), were the abnormal volumes associated with these news events. In analyzing the full sample of eCommerce announcements, the results indicate a small but significant valuation effect. However, this valuation of CARs is smaller than those reported by Subramani and Walden (2001). Our empirical findings have CAR values similar to other recent IT studies (Im et al., 2001) (see Table 3).

The primary findings, that the stock price increases in response to an eCommerce announcement and that this effect is concentrated in firms during an increasing market trend with high market capitalization, are consistent with the predictions of the signaling hypothesis and with the efficient market theory. This empirical evidence leads to the conclusion that shareholders believe eCommerce activity increases the intrinsic value of the firm and the need for higher expenditures in eCommerce related initiatives as a means of increasing future revenue streams.

These results have implications for corporate researchers and policymakers who consider market reactions as evidence of a news announcement's usefulness to investors. Our empirical finding, that eCommerce announcements often generate high price *and* trading volume, suggests that it is important for corporate managers and researchers to consider both price and volume reactions to eCommerce announcements in order to avoid drawing unwarranted conclusions. For example, it would be premature to conclude that a news announcement is not useful to individual investors based solely on the evidence of a small or limited price reaction, because that news event could have stimulated considerable trading among investors.

Care must be exercised in generalizing these results. The sample under study is drawn from the 100 largest U.S. firms. It is not surprising that efficient market theory dominates information concerns for large, closely followed companies. It is possible that information apprehensions would overshadow in a sample of smaller capitalized firms. It is also worth consideration that it is possible that the difference between Bull and Bear market findings were affected by the stock market 'bubble' bursting rather than an intrinsic change in economic issues associated with a Bear market.

In conclusion, this study builds upon the prior IT and financial economic research. This study's empirical findings using event study methodology serve to complement other case studies and quantitative work. These findings illustrate that IT spending by firms on eCommerce initiatives is of value to the investor. This provides further insight into the notion of a resource-based view of a firm and its' IT effectiveness, and investor optimism in the positive impacts of IT investments in recent years.

Limitations of this Study

The parameters used to predict abnormal returns are based on OLS regressions. These parameter estimators are highly sensitive to outliers (Jacobson, 1994). We did not identify outliers in this study. The issues of confounding events and clustering (a non-event related news item included within a data observation and event windows overlapping in time series, respectively) were addressed by accepting the first event observation in time series (one event per event window) before another observation would be accepted. This procedure forced two days between observations (+1 and –1) and therefore removed any overlap in event windows (clustering within firm *i*) from occurring. Unfortunately, this procedure does not eliminate clustering between firms. The problem of clustering between firms was not dealt with in this study. Nor has it been addressed in other recent IT studies (Im et al., 2001; Oh and Kim, 2001; and Subramani and Walden, 2001). We encourage further study to understand the full effects of the Bear market versus the 'Bubble' bursting in the stock market.

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