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ECONOMIC RETURNS TO FIRMS FROM BUSINESS-TO-BUSINESS ELECTRONIC COMMERCE INITIATIVES: AN EMPIRICAL EXAMINATION

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Abstract

Do firms derive economic returns from business-to-business (B2B) initiatives? How do returns to startup firms compare to those for established firms in B2B initiatives? How do returns to B2B initiatives around digital goods compare to those involving tangible goods? We offer a rigorous definition of B2B then conduct an empirical test of incomplete contract theory to examine the returns to B2B electronic commerce (EC) initiatives focused on digital goods versus tangible goods, and the returns to Internet firms versus brick-and-mortar firms. While there seems to be little difference between digital and tangible initiatives, we find that the returns to Internet firms are significant while the returns to brick-and-mortar firms are not. We propose, based on the application of incomplete contract theory, that this result obtains because the addition of new partners in the EC channel undermines existing relationships in the conventional channel. At the same time, existing relationships in the conventional channel undermine the quality of new relationships in the EC channel. However, Internet firms, with their single channel focus, avoid this difficulty and thus experience significant returns from B2B EC initiatives.

Keywords: Economic theory, empirical research, strategic value, contract

1. INTRODUCTION

There can be little doubt that electronic commerce (EC) is the most significant business problem to arise in the last decade. Many industry and academic observers believe EC will transform the conduct and structure of business as we know it (Hagel and Armstrong 1997; Kalakota 1999; Kalakota and Whinston 1996; Leebaert 1998; Tapscott 1996). Early EC entrants have been rewarded with incredible market capitalizations, such as Yahoo's \$76 billion, Amazon's \$29 billion, eBay's \$22 billion, and AOL's \$90 billion (Quicken/Excite, December 17, 1999).¹ Moreover, initial public offerings (IPOs) of EC firm equity are now occurring at a rate of nearly one per day (Weisul 1999), and the market continues to demand even more. Overall, the market consensus is that EC will be a huge source of profits in the future.²

¹These market capitalizations are as of December 7, 1999, and were obtained from Quicken via the Excite search engine (quicken.excite.com/investments/quotes/).

²For a recent and authoritative overview of Internet economy trends, see Barua et al., "Measuring the Internet Economy" (1999); available online at: <http://www.internetindicators.com/>.

The EC world is traditionally divided into two pieces: business-to-consumer (**B2C**) and business-to-business (**B2B**). While the B2C market, typified by Amazon.com (www.amazon.com), is the most familiar to the population at large, analysts agree that the B2B market will be at least one order of magnitude greater by 2004. The estimates for the total volume of B2B transactions range from \$2.7 trillion to \$7.3 trillion (Junnarkar 2000). These incredible estimates of market size indicate that B2B EC will be the predominant means of doing business within the next five years. However, there is currently very little understanding of the financial implications of B2B EC. We propose to take a first look at the returns generated by firms engaging in B2B. To this end, we develop a theory based on incomplete contracts, propose hypotheses based on the nature of the B2B activities, and test these hypotheses via the event study methodology.

2. WHAT IS BUSINESS-TO-BUSINESS ELECTRONIC COMMERCE

Before proceeding, it is important to put the current estimates of B2B potential into context. The low estimate of \$2.7 trillion amounts to 31% of the current GDP, which was approximately \$8.8 trillion as of the first quarter of 1999 (Bureau of Economic Analysis 1999). This figure is 58% greater than housing expenditures and 57% greater than medical expenditures. The high estimate of \$7.3 trillion is 83% of current U.S. GDP,³ and 19% of 1997 gross world product.⁴

These fantastic predictions should prompt us to ask: what *exactly* is B2B EC? Interestingly, there does not seem to be an accepted definition of B2B. This is not particularly surprising considering that there is still not a single, agreed upon definition of EC. Further, it is not clear that the literature is developed enough to even propose a definition. However, it is important that researchers be clear about what they mean when they refer to B2B.

Our definition of B2B is based on the assumption that the fundamental difference between B2B and B2C is the nature of the relationship. In B2B EC, the idea is to form a close relationship between two firms that will make some sort of complementary investments to enable one another's EC strategy. This relation involves the adoption of similar standards, extensive inter-firm communication and collaboration, and joint information technology (**IT**) investment.

The origins of B2B EC lie in electronic data interchange (**EDI**) (Kauffman and Walden 2000). A key characteristic of EDI is the extensive joint investments required, as firms must specify standards and purchase IT specific to the EDI relationship. (Iacovou et al. 1995). One of the main advantages of Internet EDI is the reduction in costs associated with using an Internet standard rather than a proprietary standard (Riggins and Mukhopadhyay 1999). However, even with Internet EDI, there are still considerable joint costs to implementing the system and redefining processes on each side of the relation to take advantage of the long-term gains of EDI.

Even at the far end of the B2B spectrum, where firms like Ariba (www.ariba.com) and Enron (www.enron.com) are working to build B2B marketplaces, there is still considerable complementary IT investment. Individual firms must spend great effort to configure business processes to take advantage of these markets and to learn the best bidding procedures. Further, the firms participating in the market must pay a fee to the market maker for that privilege, which should be considered as a B2B investment in IT. A firm paying Enron for the use of the marketplace is conceptually the same as a firm outsourcing its EDI development to IBM.

In contrast, B2C EC is characterized by arms-length relationships. While there may be elements of branding, customer relationships, and personalization, there is no mutual investment in standards, IT, or communication. The only investments required by the customer are a PC and an Internet connection, which are both completely general tools. Likewise the firm's investment is in servers and software that can be used equally well by any potential customer.

A student of semantics might ask the question, "*If a manager at Dell orders a book for use in the Dell business context from Amazon, would that be B2B or B2C?*" After all the product is going from one business to another business, so semantically we might want to consider that to be business-to-business electronic commerce. The answer is that B2B and B2C are concepts that are more than their component words. They are terms describing *ways of doing business*, not simply descriptions of the participants in the process. The transaction described above is not a B2B transaction, but a B2C transaction because the transaction is carried out in the B2C mode, which does not require the joint action of multiple participants. Thus, our definition

³Presumably this is an estimate of the *worldwide* B2B market.

⁴GWP of \$38 trillion. Source: Infoplease.com (available online at: <http://www.infoplease.com/ipa/A0004376.html>).

of B2B is based on joint action, so that if an EC initiative requires the participation of multiple firms, we consider it B2B, and this is the definition we use throughout.

3. LITERATURE REVIEW

While it is widely held that EC is a source of strategic advantage, it is not clear exactly where that advantage comes from, or how valuable it is. The question of the value of IT was expressed most strongly in the productivity paradox literature (Brynjolfsson 1993; Brynjolfsson and Hitt 1998), which tried to answer the criticism that there were no observable effects of IT on productivity at the macroeconomic level. One of the outcomes of this stream of literature was that questions of IT impacts are best addressed at the level of the individual firm (Brynjolfsson and Hitt 1998) and that financial markets are an appropriate data source for such investigation (Brynjolfsson and Yang 1997).

Recent empirical studies have attempted to provide a clear picture of the individual value drivers of IT value in the EC context (Brynjolfsson and Hitt 1998; Subramani and Walden 1999). This research stream is motivated by the mixed findings on the sources of strategic advantage derived from IT in the EC context. For example, Hitt and Brynjolfsson (1996) find that the primary source of value in online banking stems from the increased ability that banks obtain to retain their customers. This leads them to conclude that rather than acting as a means of increasing firm value, EC capabilities already have become a competitive necessity in some industries. A similar perspective is shared by Chircu et al. (2000), who write that having Internet-based travel and hospitality reservation systems has rapidly become a competitive necessity among the leading travel agencies in the United States. Thus, it is important to understand exactly how IT related investments influence EC value. This work attempts to provide some measure of the impacts of firm characteristics on the value derived from EC initiatives to help managers and academics better understand how IT benefits firms.

4. HYPOTHESIS

4.1 Returns to Firms Engaging in Business-to-Business Electronic Commerce

With the recent growth of the Internet, and the coming of the XML standard, the costs associated with B2B data exchange are expected to decrease dramatically. This decrease in cost translates directly into savings for both firms already involved in electronic B2B relations and potential adopters. As current B2B relations migrate to less expensive Internet-based platforms, we expect to see increased profits for the firms in those relationships. At the same time, these less expensive Internet-based platforms will allow new entrants into the B2B space, thus lowering cost for new adopters and thereby generating profits.

More importantly, the relational nature of this market is a source of sustainable advantage for participants. Because relational business allows firms to specialize more, we expect this will be a boon for firms. As this specialization is in a specific relationship, members on both sides are able to develop skills complementary to the partner, so that a relationship can respond more efficiently than a non-relationship based business.

We believe that investors understand the power of relational business and the potential of the market and that they will incorporate this into their valuation of firms engaged in these sorts of initiatives. Thus, hypothesis 1 is:

Hypothesis 1: For firms engaging in e-commerce initiatives in the B2B arena, the abnormal returns attributable to e-commerce announcements are positive.

4.2 Incomplete Contract Theory

The remainder of the hypothesis is based on incomplete contract theory. It is the express purpose of this work to evaluate and test the implications of incomplete contract theory. Because of this, and due to space limitations, we do not propose any other explanation for our hypothesis. This should not be construed as an indication that there are not other factors at work here, such as economies of scale in digital goods.⁵ Clearly there are; we simply do not discuss them.

⁵We thank an anonymous reviewer for pointing out this potential confounding effect.

Incomplete contract theory characterizes firm relations as a two period game (Grossman and Hart 1986; Hart and Moore 1988). In the first period, firms independently make investments that influence the value of a jointly produced product. In the second period, the firms jointly produce the product such that the value of that product depends on the investments made in the first period.

The important insight to incomplete contract theory is that the initial investments are non-contractible, and thus the ending value is not contractible *ex ante*. Therefore, the two firms must bargain over the *ex post* value resulting from the relationship. This means that a firm's investment decision depends on its *ex post* bargaining power. In general, this implies that there will be under-investment by firms who perceive that they will have little *ex post* bargaining power (Bakos and Brynjolfsson 1993; Hart and Moore 1990).

Simply stated, the business problem is that firms under-invest because they know they will have to share the profits in the future. For example, consider a buyer and a supplier in an EDI environment where the supplier is EDI enabled, but the buyer is not. The buyer's adoption decision is based on the fact that implementing EDI will cost \$1 million to specify standards, purchase software, and hardware (i.e., one side of the joint investment), and the fact that EDI will reduce paperwork costs, lost time costs, and error costs by \$600,000 for each firm. Thus, the dyadic benefit of EDI is \$1.2 million while the cost is only \$1 million, making EDI adoption a clear choice. However, the buyer only receives half of the dyadic benefit, so it is not in his best interest to adopt EDI. Thus, underinvestment occurs relative to the dyadic optimal because each member must share the gains of the investment with the other member. This problem with sharing the benefits of EDI among multiple firms is a focal theme in the EDI literature (Iacovou et al. 1995; Seidmann and Sundararajan 1997; Truman 1998) and will continue to be important as firms switch to B2B EC (Kauffman and Walden 2000; Riggins and Mukhopadhyay 1999).

One way to mitigate the problem of incomplete contracts is to give the firm whose investment is more important more bargaining power (Bakos and Nault 1997; Hart and Moore 1988, 1990). In fact this is the thesis of Bakos and Brynjolfsson, who propose that incomplete contracting should lead to a smaller number of suppliers because having a larger number of suppliers reduces the bargaining power of each supplier thereby reducing their investment level. Dealing with a smaller number of suppliers gives the remaining suppliers more bargaining power and they find it economically rational to increase investments in the relation.

The incomplete contracting idea has been extended in a variety of ways to inform management practices. Brynjolfsson (1994) extends the incomplete contract framework to include information assets and derives a variety of propositions about the impact of IT on industrial organization. Van Alstyne et al. (1995) apply incomplete contract theory to database ownership to make the case for distributed databases, so that the parties to which the data is most important own the data and thus will make the greatest investment in the data. The general insight offered in this work is that the parties who are most important to making an asset should own the asset.

4.3 Returns to Internet Firms Engaging in Business-to-Business Electronic Commerce

The majority of Internet firms in our sample were *pure-play* Internet firms, such as eBay (www.ebay.com), Amazon.com (www.amazon.com), and America Online (www.aol.com). These firms exist only in the Internet space in the sense that they have no physical stores or outlets. Thus, the majority of these firms have only one distribution channel. In addition, even an ancient Internet firm is only a few years old, and because of this they have fewer established relationships, or often no relationships at all in a given area, such as television advertising.

Because of their young age and their focus on a single channel, Internet firms have less depth (number of relations in an area) and less width (number of areas with relationships) of relationships.⁶ Thus, a new partner is likely to be either the only partner in an area or one of a select few. Incomplete contract theory implies that this gives the new partner more bargaining power and greater incentive to invest (Bakos and Brynjolfsson 1993; Bakos and Nault 1997; Hart and Moore 1988, 1990). The greater investment of the partner firms generates a more valuable output.

We propose that the market realizes this greater value generated by the increase in partner investment and rewards firms with greater market valuations. This results in hypothesis 2.

⁶Of course, there may be some Internet firms with a large number of partners and some brick-and-mortar firms with very few partners. However, our questions are at a higher level of aggregation than the individual firm. We are concerned with overall effects and only require that, in general, an Internet firm will have fewer partners than a brick-and-mortar firm.

Hypothesis 2: For Internet firms engaging in e-commerce initiatives in the B2B arena, the abnormal returns attributable to e-commerce announcements are positive.

4.4 Returns to Brick-and-Mortar Firms Engaging in Business-to-Business Electronic Commerce

In contrast to Internet firms, brick-and-mortar firms pursuing EC initiatives are firms that operate in two channels. Often, these firms face both a traditional channel partner and an EC only channel partner. There is often confusion about which channel they should *be nice to* because it is not clear whether the EC channel partner will be successful in the long term or if the traditional channel partner will be able to re-establish itself (Chircu and Kauffman 1999, 2000). Thus, the brick-and-mortar firm finds itself adding new relationships in areas where they already have relationships.

Because the number of relationships is increasing, the new partner lacks bargaining power. Having both a traditional and EC partner allows the brick-and-mortar firm to play one partner off against the other, with the result that the new partner will not have the same level of incentive to invest in the relation as he would otherwise.

In addition, the bargaining power of the old partner is reduced by the introduction of the new partner. Not only does the new partner invest less than he otherwise would, but the old partner also finds it economically rational to reduce his investment in the relationship.

Both new partners and established partners have greater incentive to under-invest in a productive relationship. This leads us to believe that the gains to brick-and-mortar firms from B2B initiatives will not be significant. Thus hypothesis 3 is:

Hypothesis 3: For brick-and-mortar firms engaging in e-commerce initiatives in the B2B arena, the abnormal returns attributable to e-commerce announcements are not significantly different than zero.

4.5 Returns to Firms Engaging in Tangible Business-to-Business Electronic Commerce Initiatives

Relative to incomplete contract theory, the unknown cost structure of tangible product manufacture provides the manufacturing firm with bargaining power.⁷ Because the partner firm does not know the true cost structure of the manufacturing process, they cannot have good estimates of how far to *push* in negotiations. Further, a truly efficient firm will have excess bargaining power because they can actually produce the product more cheaply, so the second best alternative is relatively expensive. We postulate that the focal firms' uncertainty of the cost structure of production gives the partner firm increased bargaining power. Thus, hypothesis 4 is:

Hypothesis 4: For firms engaging in tangible e-commerce initiatives in the B2B arena, the abnormal returns attributable to e-commerce announcements are positive.

4.6 Returns to Firms Engaging in Digital Business-to-Business Electronic Commerce Initiatives

Digital products are a relatively new type of product and are particularly well suited to Internet delivery. At first glance, this marriage of product and medium seems to indicate that digital EC initiatives would be particularly successful. However, incomplete contract theory suggests otherwise.

One of the primary economic characteristics of digital products is zero marginal cost (Shapiro and Varian 1999). Knowing that marginal cost is zero removes some of the uncertainty from the bargaining position, thus reducing bargaining power. More importantly, firms have an incentive to sell digital products at any positive price. This means that competing firms are always willing and able to undersell partner firms. This is a severe blow to bargaining power.

⁷There are other causes of bargaining power, but we focus only on those brought about by the nature of digital vs. tangible goods. As long as there is no systematic bias, which makes these other causes highly correlated with digital vs. tangible, then these other causes should enter the error term. A more lengthy exposition would require identifying and controlling for these other factors, but space constraints make that unfeasible in this paper.

Because firms producing digital products are known to have incentive to sell the product at any positive price, they have considerably reduced bargaining power. This leads to considerable under-investment at the development stage, which, in turn, leads to less value being created. Thus, hypothesis 5 is:

Hypothesis 5: For firms engaging in digital e-commerce initiatives in the B2B arena, the abnormal returns attributable to e-commerce announcements are not significantly different than zero.

5. METHODOLOGY

Linking EC activities and the economic returns to evaluate the payoff to firms from investments in information technologies, investments in human capital, and investments in creating organizational structures geared to EC to firms is an extremely complex task. Prior approaches to measure returns from IT and complementary investments have used return on assets (Barua et al. 1995), cost savings (Mukhopadhyay et al. 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 and have been criticized as being insensitive to the strategic nature of IT investments, which 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 (Brynjolfsson and Hitt 1998), evaluating the value of IT and complementary investments related to specific firm initiatives is problematic. The use of forward-looking measures is suggested as one way to overcome these deficiencies (Bharadwaj et al. 1999). Consistent with this view, we examine the impact of individual firms' EC initiatives on the stream of future benefits by focusing on the *abnormal returns* to the firms. Abnormal returns to a firm are determined by the consensual estimates of a large number of investors in the capital markets of the expected future benefit streams associated with firm initiatives. If the consensus of investors regarding firm announcements, e.g., EC initiatives, is that they create value for firms in future periods, investors would react favorably to these announcements by firms. This would be reflected in a positive abnormal stock market return for the firm's stock—a risk-adjusted return in excess of the average stock market return—around the date of the EC 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 Siegel 1997).

Event study methodology draws on the efficient market hypothesis that capital markets are efficient mechanisms to process firm relevant information (Fama et al. 1969). 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 is reflected in the stock price and the market value of the firm (for a detailed review, see McWilliams and Siegel 1997).

The event study methodology provides management researchers a powerful technique to explore the strength of the link between managerial actions and the creation of value for the firm⁸ (McWilliams and Siegel 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 et al. 1992), corporate acquisitions (Chatterjee 1986), CEO succession (Davidson et al. 1993), joint venture formations (Koh and Venkatraman 1991), celebrity endorsements (Agrawal and Kamakura 1995) and new product introductions (Chaney et al. Winer 1991). For a complete review, see Campbell et al. (1997).

6. DATA

We define the event as a public announcement of a firm's EC initiative in the media. We collected the data from a full text search of company announcements related to EC 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

⁸As 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.

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*⁹ **and** *.com*. The search yielded 536 announcements.¹⁰

The criterion we used to identify an announcement as an event was that the news item be an announcement of a new EC related initiative or the extension or expansion of an existing initiative. Miscellaneous announcements such as estimates of expected earnings, news about personnel changes, and site traffic volumes were discarded. In cases where the announcements contained news about multiple companies jointly engaged in EC initiatives as in the case of firms establishing strategic partnerships or marketing partnerships related to EC, we counted the announcement as multiple events, one relating to each of the firms involved. Overall, from the set of 536 announcements derived from the text search, we identified 190 B2B EC events relating to publicly traded companies with enough trading history to be retained for analysis.

In this paper, we employ data on daily returns to study the effect of specific events. While daily returns have a variety of properties that are different from monthly returns (e.g., more non-normality and conditional variance), it has been shown that “methodologies based on the OLS market model using standard parametric tests are well-specified under a verity of conditions” (Brown and Warner 1985, p. 25). The main concern in the present data is that the variance of returns might change in response to the event. However, we do not feel that a variance correction is needed in the present case as the gains from such a correction “are small, and only apply in special cases” (Brown and Warner 1985, p. 26).

In classifying firms as net or brick-and-mortar firms, we followed the classification system devised for the Dow Jones Internet Index classifying firms as net firms if they derived more than 50% of revenue from Internet activities. Of the 190 events, 115 were Internet firms and 75 were brick-and-mortar firms. The coding of events as B2B and involving digital or tangible goods was based on the analysis of the full text of the announcement. 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

We classified initiatives where the goods or services were made available online for use or downloaded for use by customers as involving digital goods. For instance, announcements of firms offering products or services such as rock concerts on demand, online trading, signup for telecom services and purchase of insurance services were coded as involving digital goods. Announcements by firms of online forums for exchange or trade were coded as involving digital goods. Announcements of online availability of products such as sports merchandize or books were classified as involving tangible goods. Of the 190 events, 108 events were coded as involving digital goods and 82 as involving tangible goods.

The breakdown of this sample into events for net and brick-and-mortar firms and involving digital and tangible goods is provided in Table 1.

Table 1. Types of Firms in Sample

	Brick-and-Mortar (n = 75)	Internet (n = 115)
Digital (n = 108)	36	72
Tangible (n = 82)	39	43

One problematic question that must be addressed is the length of time used to estimate α_s and β_s . The purpose of estimating these parameters is to control for movements in the market as a whole. For example, interest rate increases might make the entire market move down, thus our α_s and β_s control for these systematic market movements. In selecting the amount of time to use to estimate these parameters, the focus should be on how well the parameters are estimated. We contend that EC moves faster than the typical business world and thus we should use a shorter estimation time frame. Typically, event studies use 270 days worth of returns. We argue that a firm's performance, a year ago is a not good predictor of its current performance and thus propose a 45 day prediction interval. Examining both intervals reveals that the average R^2 for the 270 day interval is 0.15, while it is 0.21

⁹We 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*.

¹⁰Space limitations prevent inclusion of a detailed data appendix. However, the entire dataset is available online at (<http://eric.akindofmagic.com/wip.html>).

for the 45 day window, indicating that the more recent returns are more exemplary of current returns.¹¹ Further, we find that we lose a number of observations. The results are not grossly different, the same general trends hold, but our estimates are more precise with the 45-day prediction interval and thus we adopt that window throughout the paper.

7. TEST RESULTS

The results of the hypothesis tests are presented in Table 2. We present two sided tests of the null hypothesis that the CAR is equal to zero, for both the day of the event and the $-5,5$ window. The results show that there is a significant return on the day of the event for all categories. The longer window seems to indicate that overall there is a significant return for B2B EC initiatives in general, which are driven primarily by significant returns to Internet firms. While neither tangible nor digital products show significant returns, we do note that the returns to tangible products are slightly higher. We investigate the results for each sub-category in more detail below.

Table 2. Hypothesis Tests for Two Different Windows

	WINDOW			
	[-1,0]	P-Val	[-5,5]	P-Val
All	5.6%	0.00	3.7%	0.06
Internet	4.9%	0.00	4.5%	0.06
Brick-and-Mortar	6.7%	0.00	2.4%	0.47
Tangible	5.7%	0.00	4.0%	0.22
Digital	5.6%	0.00	3.4%	0.16

7.1 Returns to Firms Engaging in Business-to-Business Electronic Commerce

Figure 1 presents the CAR over the $-5,+5$ window. To provide perspective, a one standard deviation shaded region is presented in each figure. The figure shows that the aggregate pattern for firms engaging in B2B EC initiatives is to experience considerable abnormal returns on the day of the announcement. On the days following the announcement, the market revises its estimate of the value of the initiative down slightly, so that by day 5 the CAR is 3.7%, and from Table 2 we find this is significant at the 6% level. Thus, in the overall sample, we find support for hypothesis 1.

7.2 Returns to Internet Firms Engaging in Business-to-Business Electronic Commerce

As hypothesized, the returns to Internet firms were significant. While there was a correction after the initial announcement, the CAR on day 5 was 4.5%, which we find to be significant at the 6% level. This would indicate that the market values B2B initiative undertaken by Internet firms. Thus, we find support for hypothesis 2.

7.3 Returns to Brick-and-Mortar Firms Engaging in Business-to-Business Electronic Commerce

While there is a significant jump in CAR on the day of the event, by the end of the window the market seems to have revised its estimate of the value back to zero. This pattern supports hypothesis 3. Further, we see that the returns for Internet firms are roughly twice that for Brick-and-Mortar firms.

¹¹Note that this statistical result is by no mean obvious. If a firm's stock return was relatively stable in the past, but has experienced recent turbulence, then the R^2 for the longer window would be higher than for the shorter window.

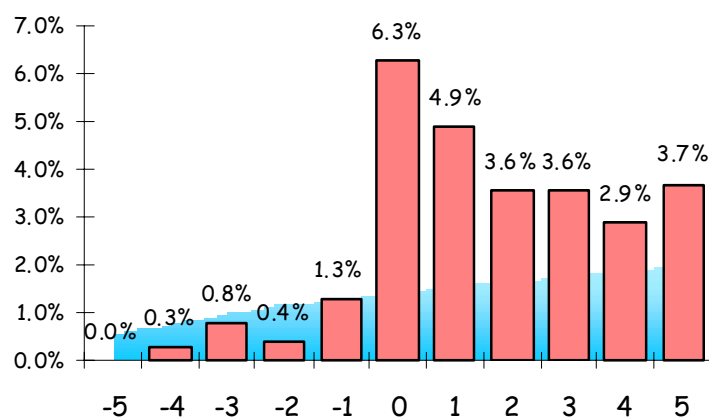


Figure 1. CAR for All Firms (Shaded Area Is One Standard Deviation)

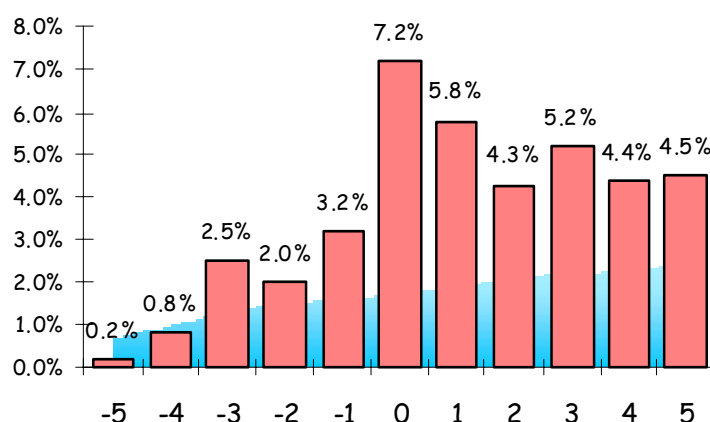


Figure 2. CAR for Internet Firms (Shaded Area Is One Standard Deviation)

7.4 Returns to Tangible Firms Engaging in Business-to-Business Electronic Commerce

Figure 4 reports the CAR for firms engaging in B2B initiatives centered on tangible products. We find the typical spike on the day of the announcement, but the market quickly re-adjusts its estimate of the value of the initiative back to zero, so that by day 5 the CAR is not significantly different from zero. Thus, the data do not support hypothesis 4.

7.5 Returns to Digital Firms Engaging in Business-to-Business Electronic Commerce

Figure 5 presents the results of the final hypothesis test. This test exhibits perfect properties for the event study methodology; there is a large increase in CAR on the day of the event, which is fairly persistent through day five. However, the magnitude of the effect is not large enough on day five to overcome the increased variance introduced by the longer window. Thus we find support for the hypothesis that the value of digital product initiatives is not significantly different from zero. A comparison of tangible and digital product initiatives indicates very little difference, although the market's valuation of tangible product initiative may be slightly greater (note scale).

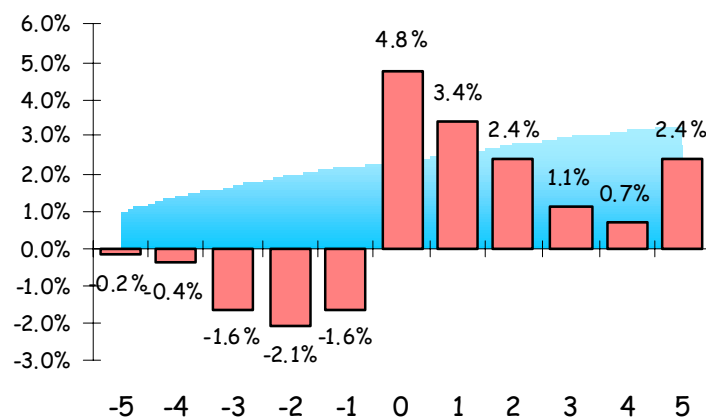


Figure 3. CAR for Brick-and-Mortar Firms (Shaded Area Is One Standard Deviation)

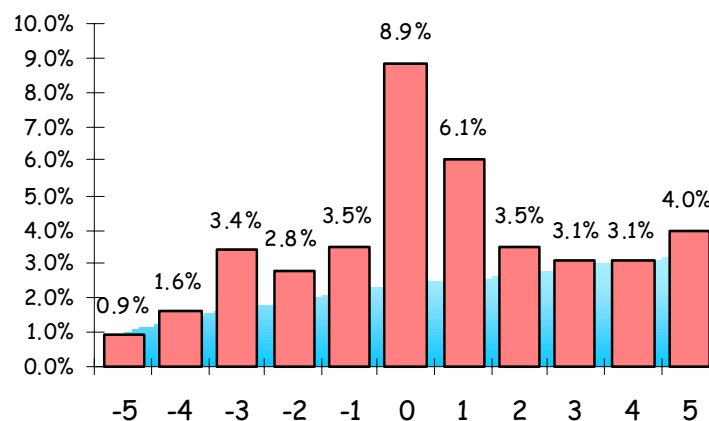


Figure 4. CAR for Tangible Firms (Shaded Area Is One Standard Deviation)

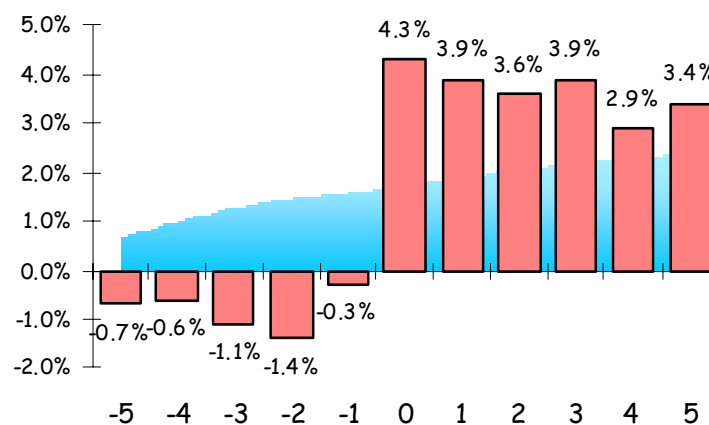


Figure 5. CAR for Digital Firms (Shaded Area Is One Standard Deviation)

8. LIMITATIONS

While the market's estimate of the value of an initiative is the best estimate available, it is still an estimate, and may be wrong. Future research will be required to evaluate how close these value estimates are to the true value generated by the initiative. Further, the methodology looks only at the average value of an initiative. More research at a finer level of granularity will help shed additional light on the predictions of incomplete contract theory.

The most severe limitation of the paper is the time frame over which data was gathered. The number of observations is sufficiently high for the event study methodology, but the time window is only three months, so there are questions of generalizability. Specifically, some criticisms of the time window might involve the actual place in history of the measurement period, the idea that the period might have represented a stock market *bubble*, and the applicability to future periods.

At first glance, it might seem like there was tremendous hype in EC during this time frame. The term bubble has been used numerous times to describe this bidding-up phenomenon of the value of Internet stock. However, on closer examination we find that this was not a bubble, or if it was, it is an enduring bubble. We can consider that the AMEX Internet index closed at \$198.32 on the last day of 1998. On August 28, 2000, the same index closed at \$545.24.¹² Thus, the bubble has persisted for over one year and the value ascribed to Internet stocks within our sample is robust to a market correction, which erases 60% of current value. We argue that a market phenomena which persists for 20 months and, in fact, increases nearly three fold during that time is not a passing fad.

9. DISCUSSION AND CONCLUSIONS

We find support for four of our five hypotheses. More importantly, we find that the returns to Internet firms are greater than the returns to brick-and-mortar firms, as consistent with our arguments. However, we failed to find support for the conjecture that the returns to tangible product initiatives were greater than the returns to digital product initiatives.

One possible explanation of this is that our coding scheme failed to take into account which of the firms was more important to the development of the digital product. It seems that if each firm developed a piece of a digital product, for example, one firm designed the interface while the other designed the application, then there would be relatively similar bargaining power. That is to say, if both firms have very little bargaining power, one would expect a distribution of value similar to a situation in which both firms had very great bargaining power. Only when one firm has more bargaining power relative to the other would we expect to see significant problems. Our coding labels both firms in an initiative the same relative to the digital/tangible distinction; future examination of the subject will have to allow for each firm to be coded differently to properly test hypotheses 4 and 5.

We examine the returns to B2B EC initiatives focused on digital goods versus tangible goods and the returns to Internet firms versus brick-and-mortar firms. While there seems to be little difference between digital and tangible initiatives, we find that the returns to Internet firms are significant while the returns to brick-and-mortar firms are not different from zero. We propose, based on the application of incomplete contract theory, that this result obtains because the addition of new partners in the EC channel undermines existing relationships in the conventional channel. At the same time existing relationships in the conventional channel undermine the quality of new relationships in the EC channel. However, Internet firms, with their single channel focus, avoid this difficulty and thus experience significant returns from B2B EC initiatives.

In addition to the stated purpose of examining B2B value, this paper provides two additional contributions to the IS literature. First, it provides the only academically rigorous definition of B2B EC of which the authors are aware. This should prove to be a valuable tool for directing research aimed at a better understanding of the B2B EC environment. The second contribution is that this paper provides the first empirical evaluation of incomplete contract theory in the IS literature. As interorganizational relationships become more important to business success, we can expect that theories of relations will become ever more valuable for understanding firm behavior and joint surplus maximization.

¹²Data gathered on March 28, 2000, from Bigcharts historical quotes (available online at: http://www.bigcharts.com/historical/default.asp?detect=1&symbol=iix&close_date=12%2F31%2F98&x=0&y=0).

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¹³This paper and the following reference list contain URLs for World Wide Web pages. These links existed as of the date of submission but are not guaranteed to be working thereafter. The contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced. The author(s) of the Web pages, not ICIS, is (are) responsible for the accuracy of their content. The author(s) of this article, not ICIS, is (are) responsible for the accuracy of the URL and version information.

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