

**The Impact of E-Commerce Enhanced Capabilities on Market Value of the Firm:
An Empirical Investigation on Banking Industry**

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ABSTRACT

Recently, concerns about the benefits of adopting e-channel to enhance firm performance have been the center of attention for both academia and the practice. The failing of dot.com firms ends the myth of granted success of Electronic Commerce (EC). We can't help but wonder "Is there no future for EC?" Quite the contrary: e-channel undoubtedly will become a must-have channel for most firms, and when implemented correctly, a firm's performance will improve. In other words, if a firm can strategically position themselves based on their current capabilities and match them with the market needs by adding web-enhanced capabilities, this firm is likely to perform better as oppose to not having any web-enhanced capabilities. Given the evolution of new technologies, firms that expand at the early stage face the risk of ending up having yet-to-be mature technology and must constantly update and/or upgrade the system. However, the trade-offs also exist, the firm is also likely to enjoy the benefit of leading technology alone with the perceived image of innovator.

This paper has empirically investigated the effect of introducing web-enhanced capabilities on the stock price of the firm by observing the average abnormal return change in the banking industry. Overall, the evidence generated from event analysis indicates that the market reacts positively to the announcements, even though sometimes the effects are not significant. The results also suggest that the timing of the introduction and the capability a firm is announcing also have impact on the market value, individually or aggregately.

Several important hypotheses were tested and the summary of the results is as follows: Hypothesis 1a and Hypothesis 1c are both supported, indicating that the market responds positively to stage 2 capabilities, which are online payment capabilities. We argue that when the stage 1 capabilities (different stages of capabilities are described in detail in the main article) were introduced, the investors had no significant response, suggesting that the investors did not seem to expect dramatic improvement on the business performance, and this is very different from what were commonly speculated at that introduction stage of E-Commerce. That is, even though all the practitioner and academic journals were advocating the magical benefits that EC could bring to a firm, investors really had reservations on the power of E-Commerce. Whichever the reason was, when stage 2 capabilities were introduced, mostly in 1999, most people have become more comfortable with the use of Internet, and moreover, people fell more secure conducting business online and, in the meantime, are more certain about the benefits of EC. When stage 3 capabilities were introduced, it was a time when more people start to realize that Internet and EC are not the solutions for everything, and somehow lose confidence in what e-channel can deliver. Moreover, any additional enhanced capabilities becomes so limitedly marginal that the investors no longer respond to it. Hypotheses 2a and 2b are both supported, as well as hypothesis 3. However, as discussed earlier, the timing of the introduction has an impact, but it is not always positive, nor always significant. Interestingly, it is only significant when introduced at the right time. The result lends support to the argument of Roth and Giffi (1995) on *strategic agility*, "the ability to produce the right products at the right time at the right place at the right cost". A firm may not always benefit by producing products/services when the timing is not right.

1. INTRODUCTION

Recently, concerns about the benefits of adopting e-channel to enhance firm performance have been the center of attention for both academia and the practice. The failing of dot.com firms ends the myth of granted success of Electronic Commerce (EC). Facts are Boston Consulting Group reported that 62 percents of retail sites failed to turn a profit in 1999. The Gartner Group CEO, Michael Fleisher, even made a bold prediction that believes that they will be few survivors and 95-98 percent of the dot.com companies will fail in the next two years. Roth (2001) points out seven myths of e-services, she argues that managers are so enamored by the promises of cost-effective, self-service channels, that they may unknowingly lose touch with customers. She argues that to ensure a firm's success on EC, a firm should fully understand what benefits e-channels can provide, and align them with a firm's business and operations strategies. We can't help but wonder "is there no future for EC?" Quite the contrary: e-channel undoubtedly will become a must-have channel for most firms, and when implemented correctly, a firm's performance will improve. In other words, if a firm can strategically position themselves based on their current capabilities and match them with the market needs by adding web-enhanced capabilities, this firm is likely to perform better as oppose to not having any web-enhanced capabilities. One other important consideration though is generally any improvement in a firm's capabilities typically may not show an instant impact on performance, therefore, it is also very important for a firm to seek continuous improvement and focus on long-term profit.

In many ways, introducing web-enhanced capabilities (e.g., on-line ordering for retailing industry, on-line statement and bill payment for banking industry) has the similar effect as capacity expansion which is an area that has been largely researched on. These two issues are similar that the impacts for either one may not show instantly and there are risks associated with both of them. Given the evolution of new technologies, firms that expand at the early stage face

the risk of ending up having yet-to-be mature technology and must constantly update and/or upgrade the system. However, the trade-off also exists, the firm is also likely to enjoy the benefit of leading technology along with the perceived image of innovator. There are also dissimilarities between capacity expansion and introduction web-enhanced capability mostly due to the characteristics of EC (Internet, WWW) and the fact that both industry and investors may not yet be certain about the impact and the full capabilities that EC can deliver depending on the time of introduction, and this uncertainty can be reflected on the market value, i.e., stock price. The research questions remain. Do web-enhanced capabilities really increase a firm's competitiveness? How do these capabilities influence the firm's performance, and how do we measure it? Does the timing of the introduction make a difference on the impact?

This research empirically examines banking industry on two major issues related to the market valuation of firms which introduce web-enhanced capability. First, it documents the stock market's reaction to the web-enhanced capability by estimating the abnormal change in the stock prices on the day of announcement. Second, it examines the impact of the timing of the introduction.

2. LITERATURE REVIEW

2.1 The significance of Electronic Commerce

Electronic Commerce has made an impact on virtually every business after years of exploration. Online booksellers and music stores such as Amazon, Barnes and Noble, and Borders, to name several, have connected with a significant consumer segment. Traditional retailers such as Wal-Mart have established an on-line presence, and the personal computer industry exemplifies a range of business models on the World Wide Web: from simple distributors-integrator-catalog models such as NECX, Microwarehouse, and PC Mall to make-to-

order PC manufacturers such as Dell and Gateway. Even on-line groceries shopping which was originally being thought of as not likely to bloom has become common enough to attract \$456 million in gross revenues for 1998 (Kirsner, 1999). And banking, taking full advantage of the information flow through the World Wide Web (WWW), has practically extended most of its function onto Internet. As a recent BusinessWeek article (Robert D Hof, 2000) predicts: buyers (of all corporations) using net marketplaces will grow from about 28% in 2000 to estimated 70% in 2002; and sellers (of all corporations) using net marketplaces will grow from about 8% in 2000 to estimated 72% in 2002.

However, conducting business on-line does not necessarily guarantee savings or better service, nor does it guarantee competitiveness. Rapid-growing technology and technology-adoption makes estimates understanding of the web-enhanced capabilities difficult. Fundamental changes in competition, strategy, information structure, and organizational design represent some of the probable changes this medium will inevitably bring. Moreover, there also exists urgent needs for greater speed and efficiency, corporate decentralization, incentives to control purchasing costs, and the growth in electronic commerce.

2.2 Web-enhanced capabilities

What indeed are the competitive advantages EC can provide that traditional firms don't have? Watson et al. (1998) offer five reasons to participate in electronic commerce: (1) to reduce search and transactions costs; (2) to promote the image of a leading-edge corporation and increase visibility; (3) to improve customer service; (4) to enable market expansion; (5) to lower stakeholder communication costs through on-line transactions and global information distribution. Ghosh (1998) identifies four opportunities created by electronic commerce. Each opportunity explains feasible and compelling uses of electronic commerce: (1) establishing direct

links with customers: sample activities include on-line ordering, providing new services; benefits for firms include lower interaction (operating) costs, developing loyalty; and benefits for customer include speed, lower cost, and availability of valuable information. (2) Circumventing other members of value chain: sample activities include ordering on-line from source with both physical and virtual resources; benefits for the firms includes reducing nodes in information and material flow in supply chain; and benefits for customers include lower cost, valuable information, and customization. (3) Developing new products and services: sample activities include creating new product/service by the aid of Internet; benefits for the firms include building loyalty, better use of resources; and benefits for customers include, again, lower cost, speed, valuable information, customization, and integrated offerings. (4) Becoming the dominant electronic presence within an industry: sample activities include becoming the pioneers in the industry to provide e-channels; benefits for the firms include superior competitive position from scale, scope, and integration; and benefits for customers include cost, speed, valuable information, and market dominance. Rayport and Sviokla (1995) develop a framework for thinking of *marketspace*, a “virtual realm” where products and services are delivered through information-based channels. The authors propose three sequential value-adding information processes created by EC: (1) visibility, referring to the easiness of managing existing operations efficiently, such as ERP; (2) mirroring capabilities, referring to substituting virtual activities for physical activities, particularly in enhancing speed, flexibility, cost, and quality; (3) customer relationships, referring to improving customer relationship through web-based advertising, service, knowledge base information, and ordering and fulfillment.

Integrating the concepts, we can see that EC can enhance traditional capabilities such as cost, quality, flexibility, and delivery, as well as innovation and technology, and more importantly, knowledge. EC also succeeds in shortening the distance between customers and the

firm through the use new information to tailor products/services to customers' needs and develops new, technology-based relationships with them.

Although electronic commerce offers new, exciting, and potentially revolutionary strategic choices, forms, and implementations, it does not transcend extant frameworks and conceptions. Extensive literature review indicates that the implications for electronic commerce comprise many of the concepts of competitive capabilities found in operations strategy literature such as neo-operations strategy (Roth, 1996), and the Service Factory (Chase, 1989). However, how do these similarities and differences influence business performance? Naturally, our first step is to search answers from different traditional Operations Management literature.

2.3 Evolution of competitive capabilities

Since Skinner's (1969) seminal article, "Manufacturing – Missing link in Corporate Strategy," researchers have developed increasingly complex and robust models of manufacturing strategy to fit within the broader domain of corporate strategy. A decade later, Wheelwright (1978) identifies the following manufacturing performance criteria as critical to contributing to corporate strategy: (cost) efficiency, dependability, quality, and flexibility. Swamidass and Newell (1987) claim strategy is a major determinant of business performance, and the environment in turn is a determinant of strategy. Thus, there exists a sequential relationship among the variables, external environment, strategy, and business performance. Roth (1989) succeeds in providing an empirical test of the link between manufacturing strategy and performance and identifies strong correlations among manufacturing capabilities, manufacturing strategy, and performance outcome. Fine (1998) contends, "No capability is unassailable." Cohen and Levinthal (1990) introduce and develop *absorptive capacity* to describe this knowledge component. They define the term as "the ability of a firm to recognize the value of

new, external information, assimilate it, and apply it to commercial ends.” Strategic agility and combinative competitive capabilities require absorptive capacity. Roth (1996) describes “neo-operations strategy” based on competitive progression theory, strategic agility, combinative capabilities, and the knowledge and information-based competencies necessary to build these. Roth and Jackson (1995) extend the notion of generic operations capabilities to service setting and suggest that generic operations capabilities affect service quality and performance and service quality know-how and innovations can be directly observed and imitated. To push the concepts of competitive capabilities further, Teece, Pisano, and Shuen (1997) develop a *dynamic capabilities* framework for firms facing rapid technological change and development. In such an environment, the firm’s competitive advantage resides in speed and adaptability, or, simply speaking, a firm’s competitive advantage is its ability to identify and implement new advantages within a rapidly changing competitive environment. These new characteristics require a “knowledge” capability within the firm. Integrating all notions discussed above, we can better demonstrate the relationship between competitive capabilities and business performance by the conceptual model in Figure 1.

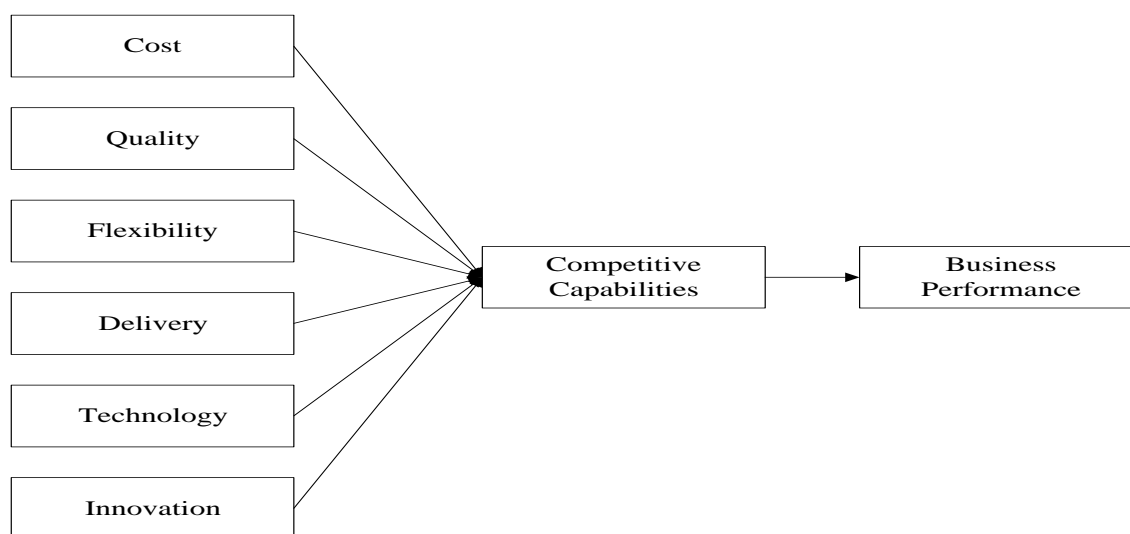


Figure 1. The Influence of Competitive Capabilities on Business Performance

Based on that the evidences both from literature and empirical studies, now we do understand the influence of capabilities on business performance. Again, the question remains, whether and how does web-enhanced capabilities influence the business performance of the firms which adopt e-channels? By examining the stock price reaction to announcements of introducing web-enhanced capabilities and the stock price behavior on different introduction time surrounding the announcement of introducing a web-enhanced capability (e.g. on-line transaction for fast delivery and flexibility), we provide evidence as to the impact of introducing a web-enhanced capability on the market value of the firm, a widely accepted measure of the firm performance (Hendricks et al. 1995; Hendricks and Singhal, 1996). The relationship between announcement of introducing a web-enhanced capability and market value can be best explain by the model in Figure 2.

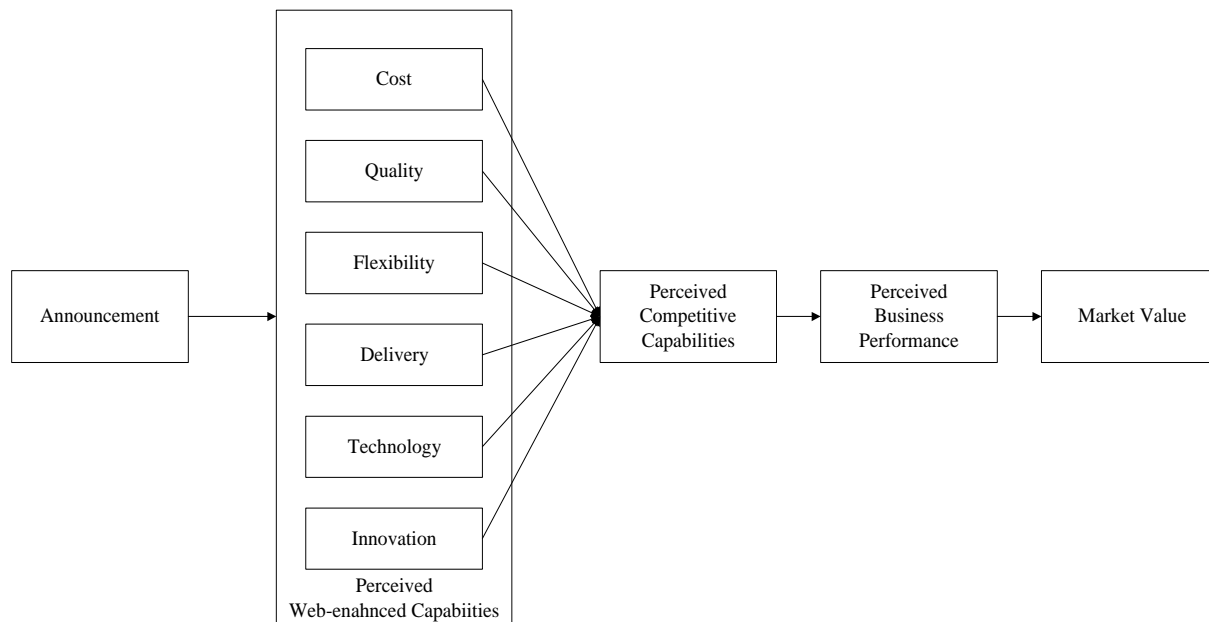


Figure 2. The Influence of Announcement on Market Value

We argue that the announcement of any web-enhanced capability has direct impact on the perceived integrated competitive capabilities of the firm by enhancing the generic operations capabilities, which in turns, influences perceived business performance, and is reflected on

market value, which can be measured by the change in market prices (measured by abnormal return, an indicator of significant stock price change). The theory proposed leads to our first proposition:

Proposition 1: the announcement of a web-enhanced capability has a direct impact on the market value.

This proposition can be tested by event study whose details will be discussed in the later section. Therefore, we modified our proposition into our first hypothesis:

Hypothesis 1: The abnormal return on the day of announcement will be significant.

2.4 Timing of the innovation

The timing of introducing an event, a capacity expansion, and an enhanced capability also has significant impact on the success of the integrating the event with the growth of the firm, which, in turn, has impact on the firm's performance. Menor, Roth, and Lee (2001) indicate that a firm's survival depends on a firm's ability to innovate and service firms that invest in or cultivate resources, routines, values, and beliefs in order to innovate and learn, create, as a consequence, an absorptive capacity that facilitates the acquisition and assimilation of information which the organization can hopefully exploit towards commercial ends. The insight we can draw from this research is that a successful firms will have the knowledge and the drive to innovate, that is, to acquire certain capability at the right time, which is often earlier than its competitors. As speculated, a firm that acquires web-enhanced capabilities early should benefit from the knowledge acquired so as to create an absorptive capability, and as a result, obtain agility and competitive advantages. The competitive advantages created to a firm by being agile can be seen in Menor, Roth, and Mason (2000). They argue that an agile firm will have higher

personalization, more rapid response, lower price, and more delivery options, and will survive a highly competitive environment, and will meet or exceed the performance of the other non-agile counterparts. Roth and Giffi (1995) define *strategic agility*, necessary quality to meet the needs of demanding customers, as “the ability to produce the right products at the right time at the right place at the right cost” and such agility arises from a firm’s development of *combinative competitive capabilities* or a combined set of traditional operations strategy capabilities: “quality, delivery, flexibility, and price leadership.” Therefore, timing determines and reflects a firm’s agility and absorptive capacity and in turn, influences a firm’s performance.

Proposition 2: the timing of the announcement of a web-enhanced capability has a direct impact on the market value.

The proposition is again transferred into a testable hypothesis:

Hypothesis 2a: the abnormal returns of the announcements will be different by the timing of the introduction.

Hypothesis 2b: the earlier a firm announces a web-enhanced capability, the more likely it will have a significant impact on abnormal returns.

The above hypotheses are fundamentally from our speculation that when a firm introduces a web-enhanced capability, the investors will respond to it more when it’s relatively early compared to the similar announcement by its competitors at a later time. Finally, we argue that different web-enhanced capabilities introduced at different time will have different market response. Therefore, the proposition and its corresponding hypothesis are as follows:

Proposition 3: the announcement of different web-enhanced capabilities has a direct impact on the market value depending on the timing and the firm’s current capability.

Hypothesis 3: the abnormal returns of the announcements will differ based on the timing and on the firm's announced capability.

3. SAMPLE SELECTION AND METHODOLOGY

3.1 Sample Selection

The results of this paper are based on a sample of banks that announced decisions to increase their on-line banking capabilities. These announcements are typically reported by PR Newswire, Business Wire, Wall street Journal, and/or by the news release on the web sites of the firms. For this analysis, 58 announcements are collected from 4 large commercial banks. Total of 9 announcements were deleted from the data due to the closeness in time of two announcements which normally would be create noises because the earlier announcement may still have lingering effect on the later announcements. All of the stock returns information used was obtained from CRSP, Center for Research in Security Prices available from CompuStat database at University of Pennsylvania, Wharton Business School. The descriptive statistics for the 4 banks in this study are shown in Table 1.

Table 1. Total Assets and Net incomes of the Banks

Bank Name	Total Assets (in billions)*	Net income (in billions)**	Number of Announcements (1995-2000)
Bank of America	584.2	6.51	24
Mellon Bank	41.9	1.01	10
PNC Bank	63.1	0.83	7
Wachovia	69.2	0.78	8

*Total assets information is as of December 31, 2000, and only 33 institutions in the U.S. had total assets greater or equal to 35 billions.

** Total incomes information is as of December 31, 2000, and only 32 institutions in the U.S. had total income greater or equal to 0.5 billions.

The announcements are grouped into three stages of introducing web-enhanced capabilities to examine the effect of introducing different capabilities. Our speculation is that the

early-stage may be perceived as more of a break-through technology, especially when introduced relatively early (in our study, 1995 or 1996, when banks were just starting to adopt e-channels). And the effect of introducing later-stage capabilities may only have marginal effects on the market value due to the fact that either investors think these capabilities should be necessarily equipped, and therefore do not create any impact on the market value, or the investor no longer perceive that any of the added capabilities will significantly improve performance, and therefore, no price increase on the stocks will be reflected. These stages are defined as follows:

Stage 1: When one of the following web-enhanced capabilities is introduced: bank-by-web, online statement information, online balance checking, and online transferring between accounts.

Stage 2: Online bill payment is made available.

Stage 3: All other capability introduction, such as stock trading, net worth calculating, loan application, etc.

Based on the new categories created, the proposed hypotheses are modified to test these capabilities in detail. Hypothesis 1 is transferred into 4 hypotheses:

Hypothesis 1a: The abnormal returns on the days of all announcements will be significant.

Hypothesis 1b: The abnormal returns on the days of stage 1 capability announcement will be significant.

Hypothesis 1c: The abnormal returns on the days of stage 2 capability announcement will be significant.

Hypothesis 1d: The abnormal returns on the days of stage 3 capability announcement will be significant.

3.2 Methodology

We used event study methodology to measure the stock price effects of the introduction of a web-enhanced capability. Event study is a technique of empirical analysis to isolate the component of price change due to firm-specific events by adjusting the return by other factors, such as market-wide movements proposed by Brown and Warner (1980, 1985). It is argued that when the market is an efficient market, the prices reflect all available information. And an event study can capture this reflection by estimating the price impact of occurrences such as mergers and earnings announcement. Studies have shown that stock prices react quickly to the arrival of new information, often within a matter of minutes. Event study involves the identification of an event that causes investors to change their expectations about share value. The researchers applying event analysis compare a stock price movement contemporaneous with the event to measure of the expected stock price movement (regressed from past stock prices) if the event had not taken places. The price change due to an event is referred to as the “abnormal return”. The abnormal return is interpreted as capturing the valuation impact of that event (Hendricks and Singhal, 1996). This technique typically uses an estimation period of 200 trading days that ended 10 trading days prior to the event. Although longer estimation period and the end day can vary, typically they yield very similar results. By regression, we can obtain parameters to capture the movement of a firm-specific stock and the parameters then can be used to compute the abnormal return on the event day. For each of the event, the announcement event day is denoted as day 0, the next trading day is denoted as day +1 in event time, whereas the day prior to the announcement event day is denoted as day -1. The Event Analysis model can be described as:

$$A_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (1)$$

Where A_{it} is the abnormal return from stock i at day t , R_{it} is the return from stock i at day t , R_{mt} is the market return at day t , and α_i and β_i are estimated by ordinary least squares regression on data from the 200 day estimation period.

4. EMPIRICAL RESULTS

Table 2 summarizes the event study results for the announcements. The table presents the mean and the percentage of abnormal returns for all announcements together, stage 1 capabilities, stage 2 capabilities, and stage 3 capabilities.

	Day -1	Day 0	Day +1
All Announcement			
Mean abnormal Return	0.1279	**0.2518	-0.2377
Percent greater than zero	51.0	53.1	46.9
Stage 1 Capabilities (11 announcements)			
Mean abnormal Return	0.1299	-0.2408	-1.5536
Percent greater than zero	45.5	36.4	36.4
Stage 2 Capabilities (5 announcements)			
Mean abnormal Return	-1.8194	**0.7681	-1.3161
Percent greater than zero	0.0	60.0	20.0
Stage 3 Capabilities (33 announcements)			
Mean abnormal Return	0.4223	0.3378	0.3643
Percent greater than zero	60.6	57.6	54.5

** indicates statistical significance

As we can see from table 2, H1a is supported, that is, the abnormal returns on the days of announcements are significant when taking the impact of all capabilities together. This result is the same as what we have predicted. However, surprisingly, H1b and H1d are not supported but H1c is supported, which suggest that, the market is not responding to the announcements of the stage 1 and stage 3 web-enhanced capabilities. One possible explanation is that when a firm acquires stage 1 capabilities, the investors were not certain if it will indeed improve the business performance, therefore, were not responding accordingly to the announcements. However, when stage 2 web-enhanced capabilities were introduced, the investors were aware of the potential improvement these capabilities would bring to the firm, and as a result, raise their expectation, and projects this expectation on the market value. However, when stage 3 capabilities were

introduced, the investors might no longer have the same high expectation on these web-enhanced capabilities, and as a result, do not respond to the announcements.

The table 3 presents the mean and the percentage of abnormal returns for announcements at different time for years 1995, 1996, 1997, there are only stage 1 capabilities and there aren't any statistical significance among these announcements, therefore, there are presented aggregately in the table.

Table 3. Abnormal Returns for 49 announcements of web-enhanced capabilities (in percentage)			
	Day -1	Day 0	Day +1
Announcements in 1995-97 (n = 5; all stage 1 Capabilities)			
Mean abnormal Return	0.0047	-0.5524	-1.1772
Percent greater than zero	40.0	0.0	20.0
Announcements in 1998 (n = 6; all stage 1 Capabilities)			
Mean abnormal Return	0.7567	**1.0786	-1.8672
Percent greater than zero	0.500	0.833	0.500
Announcements in 1999 (n = 13; mix of Stage 2 and 3 Capabilities)			
Mean abnormal Return	-0.4996	**0.0229	-0.6815
Percent greater than zero	46.2	38.5	30.8
Announcements in 2000 (n = 13; all Stage 3 Capabilities)			
Mean abnormal Return	0.4534	0.5876	0.5721
Percent greater than zero	56.0	68.0	60.0

** indicates statistical significance

As we can see from the results presented in table 3, the capabilities introduced from 1995 to 1997, surprisingly do not create an impact, it is likely due to the fact that the capabilities introduced in this period are all stage 1 capabilities, which do not seem to create an impact on market value as seen in hypothesis 1. However, announcements made in 1998 and 1999 both have a strong positive impact on the market value. It is worth nothing that in 2000, all the capabilities introduced were stage 3 capabilities, and no bank is behind and yet the

announcements do not have a strong significant impact on abnormal returns. These results lend support, although not very strong to H2a that the abnormal returns of the announcements will be different by the timing of the introduction. Counterintuitively, these results do not lend support to H2b, which states that the earlier a firm announces a web-enhanced capability, the more likely it will have a significant impact on abnormal returns. In sum, we can conclude that even though the timing of the introduction of the web-enhanced capabilities do have different impact on the market value depending on the timing of the introduction; however, introducing these capabilities earlier do not guarantee high expectation from investors, and therefore, the market does not respond to the announcements.

The data presented in table 3 can also be used to test the hypothesis 3, which states that the abnormal returns of the announcements will differ based both on the timing and on the firm's announced capability. As we can see when stage 1 capabilities are introduced in 1998, the impacts are positively significant as opposed to those introduced in 1995 to 1997. By the same token, stage 2 and stage 3 capabilities introduced in 1999 have strong positive impacts on market value, but when stage 3 capabilities are introduced in 2000, the impacts are no longer significant. As a result, we conclude hypothesis 3 is supported.

5. SUMMARY

This paper has empirically investigated the effect of introducing web-enhanced capabilities on the stock price of the firm by observing the average abnormal return change in the banking industry. Overall, the evidence generated from event analysis indicates that the market reacts positively to the announcements, even though sometimes the effects are not significant. The results also suggest that the timing of the introduction and the capability a firm is announcing also have impact on the market value, individually or aggregately. Hypothesis 1a and Hypothesis 1c are both supported, indicating that the market responds positively to stage 2 capabilities, which are online payment capabilities. This result is interesting, one can argue that when the stage 1 capabilities were introduced, the investors had no significant response, suggesting that the investors did not seem to expect dramatic improvement on the business performance, and this is very different from what were commonly speculated at that introduction stage of E-Commerce. That is, even though all the practitioner and academic journals were advocating the magical benefits that EC could bring to a firm, investors really had reservations

on the power of E-Commerce. On other possible explanation is, the investors simply did not see the benefits of e-channel on banking, this may be the outcome of security concerns on the Internet, or the fact that people were still more used to conducting banking business on a face-to-face environments or through an ATM. Whichever the reason was, when stage 2 capabilities were introduced, mostly in 1999, most people have become more comfortable with the use of Internet, and moreover, people fell more secure conducting business online and, in the meantime, are more certain about the benefits of EC. When stage 3 capabilities were introduced, it was a time when more people start to realize that Internet and EC are not the solutions for everything, and somehow lose confidence in what e-channel can deliver. Moreover, any additional enhanced capabilities becomes so limitedly marginal that the investors no longer respond to it.

Hypotheses 2a and 2b are both supported, as well as hypothesis 3. However, as discussed earlier, the timing of the introduction has an impact, but it is not always positive, nor always significant. Interestingly, it is only significant when introduced at the right time. The result lends support to the argument of Roth and Giffi (1995) on *strategic agility*, “the ability to produce the right products at the right time at the right place at the right cost”. A firm may not always benefit by producing products/services when the timing is not right.

6. DISCUSSION AND FUTURE RESEARCH DIRECTIONS

This paper has adopted event analysis as the major tool in understanding the impact of introducing web-enhanced capabilities. However, we can also apply other objective measures such as ROE and ROA along with the long-term impact of any capabilities introduced. Examining stock price is only one of the many ways to understanding of the phenomenon of E-Commerce. However, since the sample size is not large, the statistical power can be limited. Larger sample size can be obtained and the analyses can be conducted for validation of the results. In our sample, all four banks are large banks, both from total assets and net income perspectives. Medium and small banks can also be examined to seek the possibilities of obtaining different results. The same techniques can also be applied to different industries, such as fashion business, to examine the impact of introducing on-line ordering capability.

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