Stock Price Reaction to Investments in Information Technology: the Relevance of Cost Management Systems

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Abstract: The identification of conditions and factors under which investments in Information Technology (IT) can be expected to yield tangible returns is the subject of many productivity studies. Event study methodology, which examines the reaction in the stock price to announcements of different types of IT investments, is one approach to this kind of research. In the research presented in this paper, we use event study methodology to investigate the effect of cost management systems on payoffs from IT investments. The motivation for our research is based on the assumption that companies possessing reliable cost management systems, such as Activity-Based Costing (ABC), are less likely to make expensive mistakes when investing in IT. Furthermore, the companies that use ABC and thus know the costs of their operation, are better able to single out those IT projects which positively impact the bottom line and competitiveness. In our study, we use a sample of three companies that are adopters of ABC, to examine the impact of 81 IT investment announcements on stock prices.

Keywords: Activity-based costing, cost management systems, event study methodology, information technology productivity paradox

1. Introduction

Information Technology (IT) plays a crucial role in today's business environment, and a substantial portion of corporate budgets is dedicated to IT (Weill *et al.* 2002). However, investments in IT do not always produce the desired pay-offs; companies often do not experience the expected tangible benefits from their investments. This lack of tangible benefits derived from IT investments, also called the Productivity Paradox of IT (Brynjolfsson 1993), has been widely discussed.

Many published studies related to the productivity of IT focus on the identification of conditions and attributes under which investments are most likely to result in tangible benefits. For example, investments which cannot easily be duplicated are seen as promising to increase competitiveness and profitability (Clemson & Row 1991). But surprisingly few publications deal with the issue of quality of data needed for cost analysis.

In many organizations, a proper estimation of costs needed for cost benefit analysis represents a major challenge, as traditional cost management systems are still widely used (Ness & Cucuzza 1995). Distorted cost estimates in turn often lead to poor strategic decision making (Johnson 1987, Johnson & Kaplan 1987). Activity-based costing (ABC), a more modern cost management method, produces more reliable cost estimates by looking at activities and multiple cost drivers when tracing overhead (Cooper 1987a, 1987b, 1988, 1989). In many instances, companies using ABC were able to achieve substantial improvements in their cost structures and show higher profits (Cooper & Kaplan 1991). In addition, ABC implementation resulted in better decision-making processes (Cooper & Kaplan 1988).

For all these reasons, it may be assumed that companies extensively using ABC will make different investment decisions than those relying on traditional accounting methods. It others words, firms using ABC can be expected to follow different strategies, when investing in IT, from those not using ABC. Firms using ABC may prefer IT investments which better support their cost reduction effort and therefore produce more tangible benefits.

The objective of the research presented in this paper is to gain an understanding of the effects of cost management systems, such as ABC, on IT-related investments. The remainder of our paper is structured as follows: First, we briefly review prior event studies dealing with the impact of IT investments. Next we present our research hypotheses and the motivation and background leading to these, followed by an explanation of our data collection and analysis methodology. We conclude with a discussion of our results and possible directions for future research.

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2. Previous event studies of IT investment announcements

A fundamental assumption in the field of finance is that in an efficient market, stock prices fully reflect all available information. Thus, when new, unexpected investment information is released, the stock prices adjust accordingly. If the content and implication of the released information are perceived as adding business value to the shareholders, the stock prices are expected to increase (Fama 1970, 1991, Fama *et al.* 1969). Recently, several studies of stock price reaction to IT investment announcements have been conducted, to investigate the fundamental question: "*does IT matter?*" (Carr 2003).

Dos Santos *et al.* (1993) examined stock price reaction in the context of industry and innovation. With respect to industry, the expectation was that IT would have a larger impact on financial firms than manufacturing firms, due to the information intensity of the financial industry. However their results could not confirm this. With respect to innovation, the assumption is that the introduction of new technology or technology enabled products will result in a competitive edge until the technology becomes routine within the industry. The results of the study did show positive excessive stock price returns for innovative IT investments. Im *et al.* (2001) examined stock price reaction in the context of industry, firm size and time period. They found no price reaction for larger firms, and positive price reactions for smaller firms. They also found that prices reacted more positively to newer announcements of IT investments than to older announcements. Chatterjee *et al.* (2002) investigated whether investments that target IT infrastructure rather than applications induce positive price reactions, which seemed to be confirmed by their analysis. Dehning *et al.* (2003) found positive, excessive returns to announcements of IT investments by firms making transformative investments.

3. Hypotheses and motivation

No previous event study has looked at the effect of cost management systems on excessive stock price reaction to IT investment announcements. Whereas traditional cost accounting systems lump costs into a few overhead pools or categories, with Activity-Based Costing (ABC), these categories are divided into scores of activities, and costs are allocated to each of these activities. While this approach requires more data collection, it also results in more accurate cost estimation. Our argument is that organizations possessing reliable cost managements systems, such as ABC, are less likely to make expensive mistakes when investing in IT, and that this is recognized by the market:

> *H1: Announcements of IT-related investments in companies using ABC will result in positive reactions in stock price.*

As previous studies have shown, the stock market generally tends to react positively to innovative or transform IT investments, i.e. investments that do more than merely automate existing processes and thus increasing efficiency. Automate IT investments tend not to lead to excessive stock price reaction, as these are easily duplicated and thus provide only short-term competitive advantage. However, companies using efficient cost management systems could longer enjoy cost benefits since their cost reduction efforts are less likely to be duplicated by companies using inefficient traditional cost allocation systems. Thus our assumption is that with companies using ABC, there will be a positive reaction in the stock market following automate IT investment announcements:

> *H2: Announcements of automate IT-related investments in companies using ABC will result in positive reactions in stock price.*

Though generally, innovative transform investments are seen as positive by the stock market, such investments also are seen as more risky, and in companies using ABC will result in a less favorable stock market reaction than automate investments:

> *H3: Announcements of transform IT-related investments in companies using ABC will result in a less positive reactions in stock price than announcements of automate investments.*

4. Methodology

4.1 Data collection

We started our selection of firms with a published list of early adopters of ABC (Gordon & Silvester 1999). In order to assure that these companies are still using ABC, we searched the Internet for press reports and other references about these companies and their usage of ABC. We then selected three companies where we can reliably assume that they still use ABC.

Next, for this selected group of ABC users we searched Lexis-Nexis database for announcements about IT-related investments. Each announcement was examined for its relevance and coded as "automate or "transform", using the coding rule developed by Dehning *et al.* (2003). Six announcements did not fit into either category. Table 1 shows the number of announcements for each of the three companies,

and the number that were considered to refer to "automate" and to "transform" investments.

Table 1: Number of Announcements

	Total Events	Total "Automate"	Total "Transform"
Parker Hannifin	20	12	7
Honeywell	34	18	16
United Technologies	27	13	9
Overall	81	43	32

4.2 Data analysis

Similarly to earlier event studies of IT investment announcements (see for example Dos Santos *et al.* (1993)), we calculated the *cumulative standardized excess return (CSAR)* for the company stock for each IT investment announcement over two days, day 0 and day -1. The day of releasing the news about a given IT investment is defined as day 0; however, if the news is released on a day when stock markets are closed, the first following business day is defined as day 0 while the day -1 is the business day before the announcement day. The reason that the day before the announcement is included is that generally the stock market receives the investment information the day before the official public announcement. We used a 200 days (day –201 through –2) estimation period in calculating the CSARs.

5. Results

Table 2 shows the results of our investigation. The overall average CSAR is -.09729, (not significantly different from zero) thus not supporting our Hypothesis 1. However, the average CSARs for each company for automate investments is positive, supporting our Hypothesis 2. Also, both the average CSAR and the number of positive CSARs are larger for automate investments than for transform investments for all three companies, supporting our Hypothesis 3.

Table 2: Average cumulative standardized excess returns

	Average CSAR	Average CSAR "Automate"	Average CSAR "Transform"	Percentage Positive	Percentage Positive "Automate"	Percentage Positive "Transform"
Parker Hannifin	-0.15774	0.29390	-0.91587*	45 %	67 %	14 %
Honeywell	-0.14443	0.32015	-0.66708**	41 %	72 %	6 %
United Technologies	0.00685	0.41395	-0.17694	41 %	54 %	33 %
Overall	-0.09729	0.34117*	-0.58365**	42 %	65 %	16 %

* Significant at the 5 % level
** Significant at the 1 % level

6. Conclusions and discussion

In this study, in order to examine the possible effect of cost management systems on investments in IT, we investigated the change in stock price of three companies known as early adopters of ABC. Analysis of our data suggests that even for companies using ABC, overall, investors do not associate IT investments with a substantial change in future cash flows, which is manifested in a lack of abnormal returns in the full sample. In other words, our findings indicate that the mere adoption of ABC in a company will not necessarily convince the investors that most investments in IT will generate business value.

However, our results also suggest that for companies using ABC, investors do associate automate IT investments with higher future cash flows, which can be seen in the positive abnormal returns for this kind of IT investments. In contrast, investors seem to expect transform IT investments, in companies using ABC, to have no positive effect on future cash flows.

Though we hypothesized that the stock price reaction to transform IT investments, in companies using ABC, would be less positive than to automate IT investments, the negative stock price reaction is surprising, since it is generally assumed that such transform IT investments do increase business value.

Our findings do indicate that accounting practices in a company may have a substantial effect on the success rate of IT investments. Regarding the evaluation process of the automate IT investments, the use of a more reliable cost management system, such as ABC, appears to significantly increase confidence in these investment decisions. The negative reaction to transform investments implicates that the evaluation of IT investments is a complicated

issue and much more research in this area is needed.

The results of our study also provide further evidence that event study methodology, a common research tool in corporate finance and strategic management, is also very promising in the field of IT.

7. Limitations and directions for future research

One limitation related to our methodology is the lack of accounting for confounding news, which are not related to the IT investments but may have impact on stock prices. In spite of our efforts to identify and to exclude possibly contaminated announcements, it is always possible that such news did exist. In addition, we did not extensively study the timing of the announcements. It is, for example, possible that some of the announcements would receive a different investors' reaction if a major competitor also just implemented a similar IT system.

Another limitation, of-course, is the limited number of data studied; we only looked at three companies using ABC. A future study may look at a larger number of companies using ABC as well as companies using traditional accounting systems, and compare the results between the two over the same time period.

Finally, as in earlier event studies, we examined the stock market reaction to announcements related to IT investments and not to the outcomes of the projects which were announced. It is well known and documented that some investments will be realized and some are intended but not realized (Minzberg 1978). A future study could examine this issue.

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