

The Shareholder Wealth Effects of IT Investment Announcements on Australian Firms

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Abstract. The research presented in this paper studied the impact selected Information Technology (IT) investment announcements had on the market value of firms. It applies the event study method, to a list of publicly traded Australian firms. A total of 62 announcements related to the launching of new IT products or initiatives were selected over a period between 1996 to 2003. On a whole the research showed that these announcements yielded positive abnormal returns only just before and after the announcement (-1 to +2 days from the announcement date), the other days in the event window -15 to +15 yielded negative abnormal returns. The results indicate a possible market reaction, but they were not found to be statistically significant. This study makes a contribution not only in the notion of IT value but more broadly on how Event Studies could be conducted in future within the Australian market.

Introduction

Since the advent of Information Technology (IT) in the workplace, one question has lingered in the minds of most investors and users of this technology, exactly what value does IT provide?. A large portion of the literature focuses on the area of the realised 'value' and 'pay off' of IT. However as Im, Dow and Grover (2001) point out, "because many factors influence firm performance, it is difficult to establish causality between IT investments and firm level output performance" (pg. 104). To this effect there is growing interest in the relationship between IT and the value of firms (Kamssu, Reithel and Ziegelmayr 2003). Perhaps this

interest is growing because of the rapid rise in technological innovation over the years, and its importance to the smooth operation of organisations (Dos Santos, Peffers and Mauer 1993). Research has shown however, that IT has no imperative impact on firm performance (Dos Santos, Peffers and Mauer 1993). Nevertheless the area remains of interest to both industry and academia.

A robust, proven and interesting way in which one may be able to study the relationship between IT investments and firm performance is through event studies. It is defined as being “A methodology used to measure how a firm’s stock price reacts to new information” (Seiler 2004, pg. 424). In short, this is achieved by analysing a number of firm announcements to determine how the market reacts to such news. This is based on an understanding that if an investment yields a positive Net Present Value (NPV) (A measure of the benefits expected to generate a return greater than the required rate of return) resulting from net discounted cash flows, the market value of a firm should increase (Dos Santos, Peffers and Mauer 1993). If the firm is listed on an exchange and trading in an efficient market, the change in market value should be reflected in its stock price soon after such investment announcement is made (Dos Santos, Peffers and Mauer 1993; Hunter 2003). Furthermore, such changes to stock price returns allows it according to Dos Santos, Peffers and Mauer (1993) to be observed and measured.

If the market re-values a firm’s stock price based on an IT investment announcement, then it is reasonable to assume that there is an impact on the market value of a firm (Dos Santos, Peffers and Mauer 1993). The examination of stock price reactions to IT investment announcements is used to measure “the market’s assessment of the expected impact of IT investments on total firm value” (Dos Santos, Peffers and Mauer 1993, pg. 3). Subramani & Walden (2001) argue that if investors can foresee future benefits to firm performance from IT investment announcements, this would lead to positive returns.

There is however little research in the field and most existing studies have been conducted in the United States. To find out whether their results are also valid in other regions, research in other countries is needed. The main question which this paper seeks to answer therefore is, what impact do IT investment announcements have if any on the market value of Australian firms? The Australian market was chosen predominately because it is like the US market, developed and so the results would allow for some cross country comparison. Another point justifying the selection of the Australian market is that to the knowledge of the authors no other event study relating to IT investment announcements. Conducted in this country and so this further adds to the contribution of this paper as articulated below.

Contribution to Research, Knowledge and Literature and Practice

This study makes a number of contributions to both research, knowledge and literature as well as practice. In extension to the above mentioned comment, this paper as far as the authors are aware records the first such event study looking at IT investment announcements by a number of listed firms in the Australian market. This is the first such study, perhaps because of the relative difficulty in obtain good quality data. The authors faced this challenge and think that part of the problem was that the procedure for conducting the study for IT related announcements in Australia was missing in the literature. Another problem relates to the fact that IT related announcements are not categorised in any way by the Australian Stock Exchange (ASX). However, specific procedures which the authors created are articulated in detail which, coupled with the lessons learnt provide a framework for future research in this space and context. This makes up the contribution to research, being the first of three major contributions of this paper.

The outcomes of the research, is a further application of the event study method in examining the correlation between IT investments and firm value as dictated by the market. This the authors hope, will add some weight to the appropriateness of this method to study this phenomena. Considerable rigor and effort was spent to ensure quality of data and so future researchers may benefit from the approach taken to isolate a number of threatening ‘confounding factors’. An examination of the impact IT investment announcements had on a selection of publicly traded Australian firms revealed that while there was a positive market reaction it was not shown to be statistically significant, consistent with other studies in developed countries like the US. The close of the paper argues that a greater understanding of IT investment value can be attained perhaps by triangulating the results of event studies with the value Brokers, Analysts, Fund and Investment Mangers and as well others place on IT investments. In fact, a much broader study is proposed for future research, one that looks into the treatment of IT investments in the financial accounts of traded firms. This may present a richer picture of the realities of IT value as it is one way in which researchers can address a fundamental validity issue of event studies, that is the fact that traded firms may not announce failed, insignificant or risky IT investments. Interestingly the authors believe that this paper addresses this concern to some extent by focusing on actual launches of IT products and services, the fruit of firm’s investments. Having said that it may still prove useful to extend the event study to the treatment of these investments by traded firms, something these authors are presently working on. A final point on the contribution this paper makes to knowledge and research is the relative recency of the study. As far as the authors

are aware this is the most recent study with a unique time period, looking into IT investments between 1996 to 2003. The most recent study in terms of data points was by Subramani & Walden (2001) in which 251 announcements were analysed between October and December of 1998.

The third and final contribution is to practice. There is an ever-increasing need for managers to understand what the potential or realised value is for their IT investments. This has seen more attention and significant in not only in the media by IT management circles, especially since the Y2K and Tech Bubble periods of the turn of the century and the period that shortly followed. In fact, one of the primary sources of motivation for this study was a request made in late 2004 during a discussion with the group executive of technology development at a major Australia bank. This executive was interested in any study that showed how the market reacted generally to IT investment announcements post Y2K and the Tech Bubble to help share the bank's IT investment appetite going forward. This presentation, having visibility by the bank's board made the task of locating useful and appropriate research papers all the more important. Having not located any papers looking at IT investment announcements post 2000 in Australia and beyond, the authors were convinced of the need for such a study as well as the contribution it would make to practice. Other senior IT managers may benefit from this paper in helping to shape their investments in technology and if anything realise that perhaps more effort is required to convince the market of the real bottom line impact technology investments have had to the business. The market may benefit from more rigor and effort these traded firms place on trying to understand the realised value of IT investments to future cash flow. This could be achieved by clearly articulating the realised value as either being an increase in revenue or reduction to costs, as two quite effective ways of expressing the necessary level of impact these announcements have had to financial performance.

The remainder of the paper is structured as follows: The next section provides a brief overview of the research performed in the field and introduces our research hypothesis. We then describe our research design and method with a special emphasis on the selection of our sample and the calculation of the stock return. The paper concludes with the presentation and discussion of our findings.

Literature Review and Research Hypothesis

Despite the importance of the topic an extensive search for literature only uncovered six studies in the area. These are here briefly discussed in chronological order as the background for our study.

Dos Santos, Peffers and Mauer (1993) provide the first such study which used the event study method and aimed at evaluating IT investments making it the seminal paper for which all future work has referenced. The focus of this study was to address the question of ‘Do IT investments effect the market value of the firm?’ The study looked at a sample of 97 IT investments over the period of 1981 – 1988, and found that “stock price reactions to proposed IT investments are not significantly different from zero, either for the whole sample or for sub-samples in financial services and manufacturing” (Dos Santos, Peffers and Mauer 1993, pg. 4). Im, Dow and Grover (2001) comment that the results from the pioneering study did not show a significant effect of all IT investments on excess returns. In addition to this, industry classification has no effect on the value of IT investments. However an interesting discovery was that the IT investments that were classified as ‘innovative’ resulted in positive changes in firm value. The effect of other types of IT investments including follow-up investments has been shown to be negative. These results indicate more than anything that the market during the period of 1981 to 1988 expected future foreseeable positive returns higher than the required rate of return from firms who chose to invest in ‘innovative’ IT. A key limitation of their study was that it was based on an assumption that the announcements which were observed were disclosed voluntarily (Dos Santos, Peffers and Mauer 1993). As a result sample bias might be present given that only announcements which firms wanted to release were included (Dos Santos, Peffers and Mauer 1993).

Eight years after the first study by Dos Santos, Peffers and Mauer (1993), the second known study was performed by Im, Dow and Grover (2001). This study builds up on the previous in three ways:

- The sample size is larger and more recent.
- The examination of volume reactions is the first such study of its kind for this specific problem domain, and
- Confounding factors such as time lag effect, firm size (not tested by Dos Santos, Peffers and Mauer 1993) and industry are controlled for to enhance the internal validity of the findings.

The study found that on average “IT investment does not increase the market value of the firm. Similarly, trading volume was not higher than the expected trading volume over the event period”. (Im, Dow and Grover 2001, pg. 109). The results also indicate that “IT investments do not seem to exhibit the industry effect in the overall time period” (Im, Dow and Grover, 2001, pg. 110). Also consistent with the Dos Santos, Peffers and Mauer (1993) study, financial firms did not have a larger impact of IT Investments on their market value than non-financial firms. Overall, there was no price reaction by larger firms but surprisingly, positive price returns were present for smaller firms. In terms of price and volume reaction, the study has been able to show an increase over time.

In addition, the effects of both the industry and size of the firm strengthen over time. It was also discovered that the bigger the firm size the greater the dissemination of information (Im, Dow and Grover 2001).

Subramani & Walden (2001) focused on e-commerce announcements and the subsequent impact on the market value of firms. The focus on e-commerce announcements is quite interesting because these particular initiatives have been a way in which a firm projects an image of forward-looking management ready and not frightened to capitalise on technological advances to strengthen the business and adapt to a changing and competitive environment (Subramani & Walden 2001). The findings of the study were significant in that for the first time it was shown that “e-commerce announcements are associated with significant increases in market valuation in firms and, at least temporarily, create value for the firm’s stockholders” (Subramani & Walden 2001, pg 148). This shows that the market believes such announcements would yield future benefit streams for the firm. These results were found to hold true for a broad set of firms and product types. The obvious limitation of this study as with other similar event studies is that it was based on a short interval being the last quarter of 1998. This raises generalisability issues to other periods, and what is worse is that there may be cyclical and seasonal influences which have not been explicitly controlled for in the study.

Chatterjee, Pacini, and Sambamurthy (2002) study was slightly different in that IT ‘infrastructure’ investment announcements were analysed to determine whether they had a significant impact on the market value of firms. It found evidence that IT infrastructure investment announcements had a significant impact on price returns. Another finding showed significant increases in trading volumes associated with IT infrastructure investment announcements, and interestingly, the authors also found evidence to suggest that IT infrastructure investments are more closely associated with increases in market value than investments in IT applications. These results provide a strong foundation and justification for making substantial investments in IT infrastructure. However given the limited period of 1992 – 1995, does not allow for generalisability to other periods.

Dehning, Richardson and Zmud (2003) took a step forward in studying the problem by including all the announcements from the previous three major studies (Dos Santos, Peffer and Mauer 1993; Im, Dow and Grover 2001; Chatterjee, Pacini, and Sambamurthy 2002). A total number of 350 announcements covered a period between 1981 and 1996. The focus was on the impact that an investment’s strategic role has on the market value of a firm. The IT strategic role construct was conceptualised by Shein (1992) and Zuboff (1988) as being: (1) Automate, (2) Informate-up, (3) Informate-down, and (4) Transform. This construct is an important one because an IT investment’s strategic role may be “distinct from the firm’s overall IT strategy role”. (Dehning, Richardson and Zmud 2003, pg. 639). The study demonstrated that the IT strategic role can explain how IT investments in each of the IT strategic roles might effect the firm’s competitive position and ultimately firm value. These results provide support for the value of capturing the IT strategic role of a firm’s IT-related

competitive maneuvering in studies striving to understand the conditions under which IT investments are likely to produce out-of-the-ordinary, positive returns. The two limitations of the study are that it was possible that the results were driven by other ‘contemporaneous’ events, and that there could have been leakage for these announcements.

Hunter (2003) compares the mean and variance of stock price returns of two types of IT investment announcements: (1) Investments that utilise existing organisational capabilities; and (2) Investments that are made exploratory in acquiring new capabilities. In studying this area Hunter (2003) examined 150 announcements of IT investments between 1990 – 1997. The results indicate that as expected exploitative IT investments have the same mean as, yet lower variance than, abnormal returns associated with exploratory IT investments. The unexpected finding was that the two types of IT investments yielded a significantly negative impact to the market value of the firms under consideration. This is important because these findings according to Hunter (2003) suggest that “the characteristics of IT investments themselves, as well as the industry and strategic context within which they were made, are important determinants of the market value of the firm” (pg. 1).

All the previous research to date about this specific domain has been insightful and has indeed produced mixed results. Table 1 summaries the results of the literature study. Perhaps this could be attributed to the different periods of time being examined, or the different types of announcements under examination. Either way it is evident that a gap exists in the literature in that there is no precedent to studying this area in the Australian market. This has potential to uncover some interesting results, which could shed further light on the overall question of whether IT investment are value positive for firms. A question which has plagued IS academics and practitioners alike. The literature shows that on a whole IT investment announcements have not consistently resulted in significant positive abnormal returns. However these studies have been conducted primarily in the United States and a look at other developed countries is needed to determine whether these results are occurring exclusively in the US market or whether they apply in other developed, western countries such as Australia.

Table 1. Summary of Previous Research		
Paper	Research Design	Findings
Dos Santos, Peffers and Mauer 1993	Sample of 97 IT investments from the Finance and Manufacturing industries from 1981 to 1988	<ul style="list-style-type: none"> - No excess returns for either the full sample or for any one of the industry sub-samples - The market reacts differently to announcements of innovative IT investments (than to follow-up, or non-innovative investments in IT) - Innovation IT investments increase firm value
Im, Dow and Grover 2001	Included 97 IT announcements of Dos Santos, Peffers and Mauer 1993	<ul style="list-style-type: none"> - Size and time lags effects were found for all IT investment announcements - Reactions of price and volume were negatively

	<p>study, plus 141 additional IT investment announcements over the period from 1989 to 1996.</p> <p>Also examined trading volume to announcements</p>	<p>related to firm size and became more positive over time.</p> <ul style="list-style-type: none"> - The positive excess return for smaller firms shows that smaller firms can leverage the lower price/performance ratio of new IT and reap greater rewards from IT investments than larger firms - The result of time lag effect demonstrates that the stock market has recently begun to identify both tangible and intangible benefits of IT investments - For recent IT investment announcements, industry classification and firm size also effected the reactions of stock price to the announcements.
Subramani & Walden 2001	<p>251 e-commerce initiatives announced by firms between October and December 1998.</p>	<ul style="list-style-type: none"> - E-commerce initiatives do indeed lead to significant positive abnormal returns for firms' stockholders - While the Abnormal Returns for conventional firms are not significantly different from those for net firms, the Abnormal Returns for B2C announcements are higher than those for B2B announcements. - The Abnormal Returns with respect to e-commerce initiatives involving tangible goods are higher than for those involving digital goods.
Chatterjee, Pacini, and Sambamurthy 2002	<p>112 announcements between 1992 – 1995</p>	<ul style="list-style-type: none"> - IT infrastructure investments are more closely associated with positive abnormal returns than applications investments - Found significant increases in trading volume associated with IT infrastructure investment disclosures.
Dehning, Richardson and Zmud 2003	<p>Used 355 IT investment announcements from 3 earlier studies during the period 1981 to 1996.</p>	<ul style="list-style-type: none"> - Found positive, abnormal returns to announcements of IT investments, and with membership in industries with transform IT strategic roles - The results of previous research are not found to be significant when IT strategic role is included as an explanatory variable.
Hunter 2003	<p>150 announcements of IT investments between 1990 - 1997</p>	<ul style="list-style-type: none"> - On average, financial markets considered IT investments more likely to destroy value than to increase it - Found significantly negative cumulative abnormal returns – highlighting the importance of industry conditions as a critical contingency or determinant of the returns to IT - While IT investments are positively associated

		with financial performance, industry conditions may be important mitigating factors.
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Therefore, the main hypothesis which was tested by our research is:

IT investment announcements (specifically the launch of new IT products and initiatives) made by listed Australian firms will not result in significant positive abnormal returns, consistent with other US based studies and will not therefore be value adding.

Such a hypothesis is crucial not only because it have never been tested in this context but because it could help support a future ‘general’ claim that IT investment announcements in developed countries do not consistently lead to statistically significant positive abnormal returns. The testing goal therefore focuses on how important the average announcement is, and as a result equal weights will be given to all announcements.

Being central to this research the notion ‘IT Investments’ is defined as being, an intent to or actual investment either by commitment to develop a technology internally, acquire the technology from a provider either by an alliance, outsourcing, or partnership deal or by acquiring the IT provider’s firm through partial or full acquisition. This definition is imperative as it influences the criteria used to filter announcements when deciding which announcements are excluded and which are included in this study. This will be discussed further in the sampling strategies and data collection areas of the paper, along with the specific type of IT investment announcements captured within the scope of the research, making up the discussion on the materiality of these announcements.

Research Design and Method

The research follows the positively methodology primarily because the intent is to answer questions about the causal relationship between IT investment announcements and market value of firms. It is also selected given the objective, value-free nature of the study. The approach taken is quantitative because that the data used to answer the research question and the hypothesis are value-free, historical, objective and numerical in its raw state (being stock price/returns) and transformed state in the form of calculated Abnormal Returns.

The Event Study Method

The underlying method governing the research is Event Studies. Event Studies in short allow a researcher to determine whether unanticipated announcements have

a significant impact, whether positive or negative on a list of publicly traded firms.

An examination of the literature has revealed that the main method which is used to investigate the impact IT investment announcements have on the market value of a firm is 'Event Studies'. In fact from the six studies captured in the literature review all of them have used Event Studies to carry out their research (Chatterjee, Pacini, and Sambamurthy 2002); Dehning, Richardson and Zmud 2003; Dos Santos, Peffer and Mauer 1993; Hunter 2003; Im, Dow and Grover 2001; Subramani & Walden 2001). The event study method features prominently in financial research as a valuable analytical tool to detect the wealth effect of an event (Binder 1998; MacKinlay 1997; McWilliams & Siegel 1997; Peterson 1989; Subramani & Walden 2001). In fact the event study method has become the "standard method of measuring security price reaction to some announcement or event" (Binder 1998, pg. 111). This has been supported by Seiler (2004) who states that "In order to measure how a firm's stock price reacts to new information, an event study methodology is used" (pg. 217).

The event study method has been used extensively because it prevents the need to analyse and rely on "accounting-based measures of profit, which have been criticised because they are often not very good indicators of the true performance of firms" (McWilliams & Siegel 1997, pg. 626). The main benefit of an Event Study is that it is "relatively easy to implement because the only data necessary are the publicly traded firm's name, event dates, stock prices and volume" (Im, Dow and Grover 2001, pg. 105). The other strength comes from its reliance on data which cannot easily be manipulated by inside the organisation (Mc Williams & Siegel 1997).

Event Studies in short aim to determine the abnormal returns in stock prices (Wells, 2004, pg. 61), resulting from an unanticipated event (Peterson 1989; Mc Williams & Siegel 1997). The underlying basis here is that prices of stocks are determined by investors' reaction to new information of these unanticipated events (Fama, Fisher, Jensen and Roll 1969). This new information is what investors believe they can attain in firm announcements. In other words event studies allow researchers to determine the nature of the stock market's reaction to strategic moves (Chatterjee, Pacini, and Sambamurthy 2002; Im, Dow and Grover 2001), among other types of announcements. This 'reaction' is important because it is based on whether investors believe an announcement will bring future expected cash flows (McWilliams & Siegel 1997; Wells, 2004, pg. 61). If the release of this information is perceived to be good news, an increase in abnormal returns should be expected (Im, Dow and Grover 2001), because of the positive impact brought about by the good sentiment of such good news.

The theoretical foundation of Event Studies comes from the notion of efficient markets (Brown & Warner 1985; Fama, Fisher, Jensen and Roll 1969) that is, given the rationality of investors the effects of an event (announcement for example) should be ‘priced in’ to the stock immediately after such an event (MacKinlay 1997; Seiler 2004). In an efficient capital market “investors are assumed to collectively recognise future benefit streams accruing from initiatives announced by firms, a judgment subsequently reflected in the stock price of the firm” (Subramani & Walden 2001, pg. 136).

The efficient market hypothesis (EMH) dictates that “capital markets are efficient mechanisms to process information on firms” (Subramani & Walden 2001, pg. 140-141), and that stock prices incorporate all relevant information about the value-creation and growth prospects of a firm (Chatterjee, Pacini, and Sambamurthy 2002; Subramani & Walden 2001), and as MacKinlay (1997) states “a measure of the event’s economic impact can be constructed using security prices observed over a relatively short time period” (pg. 13).

The Sample Technique

The sampling technique is based on a pre-defined set of criteria and is therefore selective rather than being random. This set of criteria was formed to control for a number of key confounding factors that impose limitations on Event Studies if not adequately addressed. It also seeks to strengthen the validity and integrity of the study and prevent selective bias and other validity threats.

The following procedure was adopted in sampling the list of announcements:

(1) **Announcement Search:**

Before the event study could take place, relevant events were sourced from the list of announcements provided by SIRCA (SIRCA is a group that provides data services to individuals interested in academic research in financial markets). This list collated in an Microsoft Access database containing approximately 900,000 records (or individual announcements) from 1991 to 2005. Searching for relevant announcements from this extensive list was conducted based on the ‘Message Header’ field or the details of the announcement. The following key words were used to perform the search for all years, including:

Technology, Information System (IS), Information Technology (IT), Network, Hardware, Software, Tech, Computer, System, Internet, E-Commerce, E-Business, B2B, B2C, Alliance, Partnership, Website, PC, Award, and Outsource

This search resulted in 4, 325 announcements.

(2) **Exclusion of Announcements:**

Any announcement which might be confounded by any other announcements such as dividends, earnings, M&A etc around the event date was excluded. For this reason and to further improve data integrity and thereby strengthen the validity of this research by reducing this 'noise' the list of 4,325 was filtered to exclude a number of factors. This is to ensure that the market reaction relates to the event of interest. The obvious problem of controlling for confounding events is that it decreases the sample size significantly. The following factors were excluded from the original list of 4,325:

- **Similar Announcements – Same Firm:**
Exclusion of all events from the study where other IT Announcements are made by the same firm during the event window.
- **Other Announcements – Same Firm:**
Exclusion of all events from the study where other similar announcements for example updates to the original announcement that occur during the event window recommended by Oh & Gallivan (2004).
- **Duplicate Announcements:**
Exclusion of all duplicate announcements.
- **Irrelevant Announcements – by Criteria:**
Exclusion of all irrelevant announcements for example by searching for announcements that match the keyword 'Alliance', this may not be an IT Investment related Alliance and therefore is excluded from the list.
- **Irrelevant Announcements – by Research Topic:**
Exclusion of all events that were not relevant to the topic under research.
- **Announcements with Insufficient data – Historical Stock Data:**
Exclusion of all events that met the criteria and definition of IT Investments based on the keyword search but did not fall in any one of the above mentioned exclusion criteria and did not have sufficient historical data prior to the Event Date (Announcement Date) to fulfill at-least 115 days of the Estimation Period.
- **Announcements with Insufficient Data – Historical (corresponding) Index Data:**
Exclusion of all events that met the criteria and definition of IT Investments (based on the keyword search) but did not fall in any one of the above mentioned exclusion criteria and did not have sufficient

‘corresponding’ data in the All Ordinaries Accumulation Index to cover the Estimation Period of -115 and/or the event window of -15 to + 15 from the event date (see subsection ‘Data Collection and Analysis’).

Materiality is an important concept in event studies; it is an accounting term denoting the relative weight a particular item has. In financial economics the term more suitable to describe this concept is ‘economic significance’. Materiality or economic significance of announcements is influenced by what the objectives of the Event Study are. Given that the testing goal focuses on how important the average event is to the stockholders of the firm making the announcements, the conclusions were weighted equally.

The Firm Announcements (Signal G) - A database maintained by SIRCA that contains information on Firm Announcements. This database includes a price sensitive flag for each announcement. It could have been possible to include this indicator as a basis for the decision on how to deal with the notion of materiality. However, announcements are marked as price sensitive based primarily on what type of announcement they are. For example an announcement relating to an acquisition of an asset may be price sensitive, whereas an intention to make a takeover bid is seen as always price sensitive. Most of the categories relate to standard financial reporting and therefore the majority of the announcements in this study are not deemed price sensitive. For this reason, and the points mentioned above it was decided that a more appropriate course of action was required in dealing with the notion of materiality.

From the 4,325 initial announcements, only 2,563 remained after controlling for the first, second and third factor listed above. After controlling for the fourth and fifth exclusion factor listed above, the number of announcements reduced to 2,281. The remaining list of 2,281 announcements were a combination of announcements that met both the above exclusion factors and the initial search criteria. The literature has shown quite clearly that investors react differently to different announcements. Perhaps because of varying levels of materiality each announcement holds. For this reason it was imperative to normalise the list of 2,281 announcements by categorising them into various investment types as depicted in Table 2.

Table 2. List of Investment Types	
Acquisition of Firm	Launch of New IT Product or Service
Alliance	Launch of New E-Product or Service
Alliance Agreement	New/Change of Management
Award	New Business (Contract, Tender)
E-Strategy	Outsourcing Deal
Investment in E-Product or Service	Partial Acquisition
Investment in IT Product or Service	Sale of System

IT Strategy	System Purchase
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Although it would make for an interesting study to conduct a cross sectional analysis to compare individual materiality levels, the focus of this study is primarily on the investment type relating to the launch of a new Information System or Technology product internally or externally to the market. Essentially this type of announcement represents the fruit of any IT investment and may be of particular interest to investors which is why it was chosen. From a market perspective particularly, the bottom line is whether the IT event is a value increasing or decreasing investment.

The announcements which were categorized into this group were initially 124 in number. These announcements were then analyzed further to determine their suitability for the event study. All announcements that matched the fifth, sixth and seventh exclusion factor were controlled for by being removed from the list of 124. This reduced the number of relevant announcements from 124 to 62. Where the sample size is 50 or more, other announcements might be considered 'random events' the effects of which can be expected to cancel out across firms. Either way they were controlled for to improve the integrity and validity of the study.

This reduced list of 62 (see Table 5 in Appendix) made up the final collection of announcements to be used for the event study sorted by announcement date then by stock code. Figure 1 shows the distribution of events per year for the whole period. Not surprisingly years 1999 and 2000 resulted in the highest number of events, attributed to the period of IT hype or the 'tech bubble' as popularly known at the time. Accounting for the three years before and after the tech bubble contributed considerably towards normalizing the data points. Focusing solely on the 27 data points in year 1999 and 2000 would have raised data quality issues, given the nature of the market and market sentiment of IT firms on a whole.

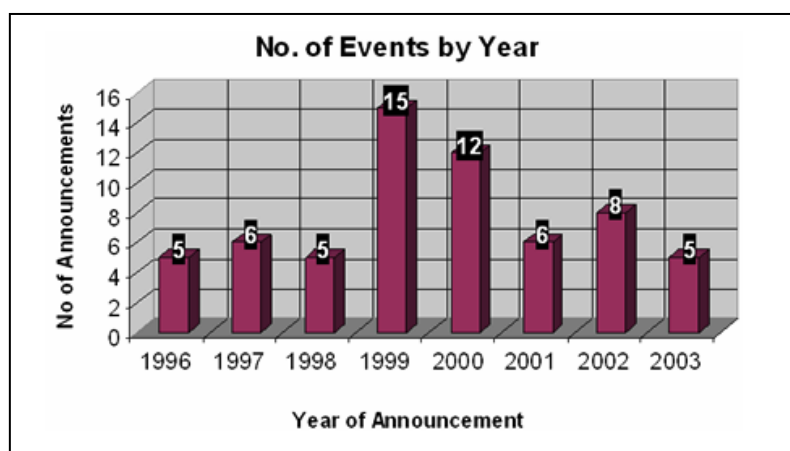
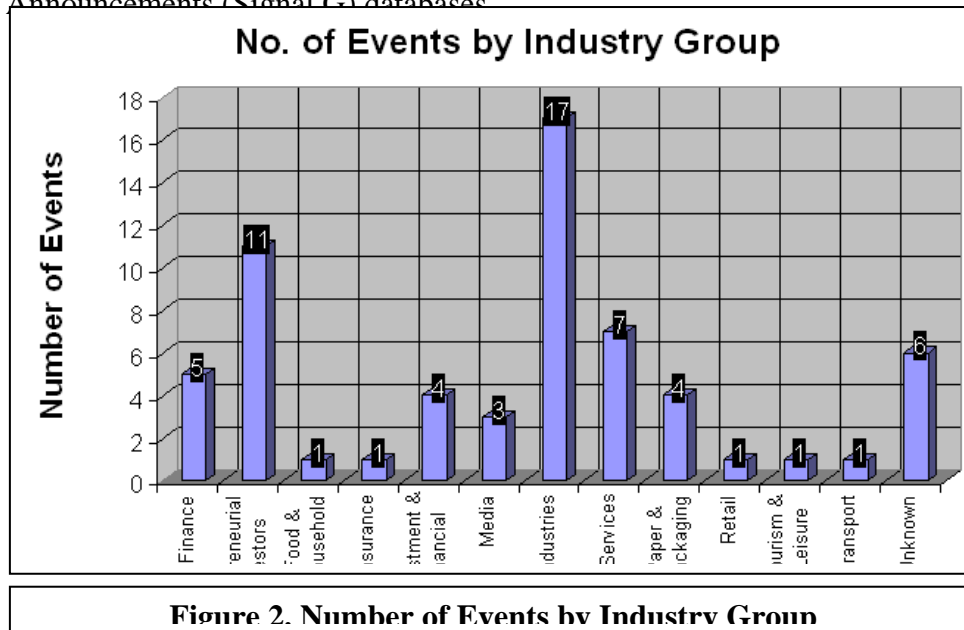


Figure 1. Number of Events by Year

The announcements over 1996 – 2003 were made by an adequate mix of industries. Figure 2 illustrates this point by grouping all 62 announcements by relevant industry sector. The industry groups are ones which SIRCA use to categorize each firm on the ASX (Australian Stock Exchange) Daily Data and Firm Announcements (Signal G) databases.



Data Collection and Analysis

The daily firm and index prices, and announcements data from 1996 to 2003 were collected from three databases held by SIRCA:

- ASX Daily Data Database: holds the daily price and volume data for each stock listed on the ASX
- All Ordinaries Accumulation Index Database (An index which measures movements in the value of the major stocks listed on the Australian Stock Exchange, (factors in reinvestment of dividends), and generally provides a better measure of investment performance than a straight price index like the All Ordinaries index (<http://www.superannuation.asn.au/dictionary/a/All%20Ordinaries%20accumulation%20index.htm>). This database holds the daily price and volume data for the All Ordinaries Accumulation Index, and
- Firm Announcements (Signal G) Database: holds the details of all firm announcements lodged with the ASX as per ASX Listing Rules

The data collection phase is very important in Event Studies and should be carried out carefully. The following steps were taken:

- Access to Databases: Access to these databases was organized through SIRCA who provided the required data in the form of a series of CSV files.
- Creation of Central Database: These CSV files were imported into a Microsoft Access database, to allow for centralized querying. This not only improved efficiency but also validity because of the level of data integrity, and reduction in human error.

The final sample was analyzed using Microsoft Excel based on the text by Seiler (2004) to determine the Firm Stock Returns, Predicted Returns, Abnormal Returns (positive or negative from predicted returns), and the statistical significance of results through z-statistic and p-value test. Other data analysis tools such as Eventus were not compatible with the non US data being used for this study.

The theoretical part of the statistical method governing this study was based on MacKinlay (1997), whereas the application part was based on Seiler (2004). Announcements detailing a new launch of an Information System or Technology product internally or externally to the market were selected because of their suitability to the topic.

There are a few different frequencies of data which can be used in Event Studies the two most common being Daily and Month. The Daily data frequency was selected for four main reasons:

- (1) More Observation Points: Monthly observations are far too infrequent to isolate the event from the period before and after the event (Seiler 2004).
- (2) Accessibility: The data provider (SIRCA) only provides Daily ASX Data,
- (3) Reliability: Peterson (1989) argues that “Tests using daily returns are more powerful than those using monthly returns” (pg. 55), and
- (4) Commonly Used: It is the most commonly used frequency according to Seiler (2004).

The concepts of Event Window, Event Date and Estimation Period are depicted in the proceeding figure and discussed below:

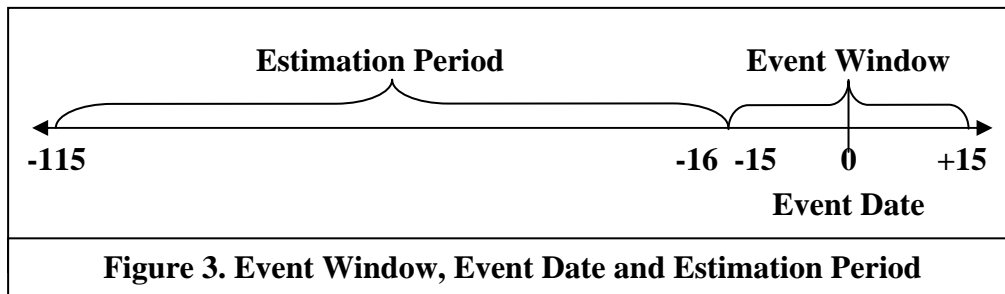


Figure 3. Event Window, Event Date and Estimation Period

Seiler (2004) defines the Event Window as being “the number of trading periods examined preceding and following the event date” (pg. 424). He states that an event window of -15 to +15 days from the event date was selected predominately because the event date can be identified with a high degree of certainty, and therefore an excessively large event window is not necessary. He continues by arguing that this makes the measurement of the event’s significance on the firm’s stock prices more powerful. An event window of -15 to +15 days from the event date is also consistent with recommendations in the literature (Peterson 1989).

The estimation period of 115 days to -16 days before the event date (0), was chosen for this study and is consistent with recommendations in the literature (Peterson 1989). It is defined as being “the period of time over which no event has occurred. It is used to establish how the returns on the stock should behave in the absence of the event” (Seiler 2004, pg. 424). Care has to be taken with this estimation because as Peterson (1989) states “The greater the precision in determining the event date the more powerful the test” (pg. 54).

It is interesting to note that the estimation period is not standard for all studies (Seiler 2004). A general recommendation by Seiler (2004) on defining estimation periods is that one should try to “make the interval wide enough to capture the relationship between the stock and the market, but not so wide that the estimated relationship no longer applies to the firm today” (pg. 219).

Following Seiler (2004), who puts forward that it is imperative that the criteria used to screen the final sample are defined and documented thoroughly to support the reliability of a study the sample selection and analysis strategies are discussed further.

Seiler (2004) underlines the importance of identifying the event date: The event date is defined as “the time when the market first learns of the relevant new information (the event)” (Seiler 2004, pg. 217). He points out that “Studies have shown that discrepancies and reporting delays exist among providers. The less accurate you are in identifying the event date, the less powerful the test, and therefore, the less able you are to accurately measure the impact of the event on

the firm” (pg. 218). The event date is captured as a field within each announcement record provided by SIRCA.

Calculating Returns

To perform a reliable event study a number of items have to be computed:

First the stock and index returns are determined as the movement in price from one day to the next expressed as opposed to using just the average or raw price. If the raw price was used it would be very difficult to compare and use them together in calculations seeing that each firm has different prices.

Then, the normal and abnormal returns are calculated using the risk-adjusted return approach. According to Gallagher & Looi (2005) the risk-adjusted return “for a particular stock ‘s’ is, therefore, the return on stock ‘s’ less the value-weighted benchmark return on the characteristic-matched portfolio for which stock ‘s’ belongs” (pg. 131). Abnormal returns are the difference between the estimated and actual stock returns, hence the word abnormal because it is anything above or below the normal return.

Subsequently, the abnormal returns are standardized (called standardized abnormal returns) by the standard deviation of the risk, these are then totaled for each day in the event window to get the total standardized abnormal returns. The total standardized abnormal returns are then collected for all events to determine the total cumulative standardized abnormal returns, which is needed to represent all the abnormal returns in the data set.

Finally the statistical significance of the results has to be tested. For this purpose the z-statistic is used to calculate the number of standard deviations from the actual mean (zero) to the value of importance, following a standard deviation of 1.0. The p-value is a measure of the probability of observing a value that is radically different from the actual value observed where there is a null hypothesis. The smaller the p-value the greater is the confidence level of the results.

For a better understanding of the computations used in the study, the following mathematical formulae are explained in some more detail.

Stock and Index Returns are significant for our study stock returns are known to follow a log normal distribution (Seiler 2004) and is therefore calculated as:

$$\text{Stock Return} = \text{Log} \left(\frac{P_t}{P_{t-1}} \right)$$

Where P = Daily Stock Price

t = Price at time (t)

This formula returns the natural logarithm of each day's stock price. Natural logarithms are based on the constant 2.71828182845904. This was repeated for the stock prices of all firms including the estimation period (-115 to -16 days) and the Event Window (-15 to + 15 days). It is also repeated for all the daily closing prices of the All Ordinaries Accumulation Index including both the estimation period and the event window.

In order to determine whether IT investment announcements have had an impact on their firm's stock price it is important to estimate what the stock price would have been had there been no announcement (Peterson 1989). This is called normal returns and "can be calculated by four different methods: mean return, market return, proxy (or control) portfolio return and risk-adjusted return" (Seiler 2004, pg. 220).

For this study the risk-adjusted return approach was used, predominately because it is the most commonly used method to generate expected returns over the event window. Seiler (2004) states that with this method Abnormal Returns "defined as the difference between the actual return and the expected return, where the expected return for each of the days in the event window is predicted using a regression" (pg. 221). More specifically he states that the return on the stock is regressed against the return on the market. He continues by stating that the next step required is to subtract the predicted value for each day from the actual return in the event window to determine the abnormal return (Seiler 2004).

The regression was determined using the All Ordinaries Accumulation Index as opposed to the All Ordinaries Index primarily because it allows for reinvestment of dividends which is in line with the set of prices being used for individual firm stock prices which also factors into account dividends and splits among other items.

The Capital Assets Pricing Model (CAPM) (A valuation model meant to describe the relationship between risk and return (www.kayne.com/glossary.shtml) It is the most frequently used way to determine a firm's stock return (Dos Santos, Peffer and Mauer 1993; Kamssu, Reithel & Ziegelmayer 2003), and has been used by the following related studies (Dos Santos, Peffer and Mauer 1993; Im, Dow and Grover 2001; Subramani & Weldon 2001). It was calculated as follows:

$$R_{jt} = \alpha_j + \beta_j R_{mt}$$

R_{jt} = rate of return for firm j on day t

R_{mt} = rate of return on the market portfolio on day t

α_j β_j = market model intercept and slope parameters for firm j (The intercept is the point at which two lines meet, where as the slope indicates the steepness of a line as measured by two point on the line).

The relationship between the stock return and market return in the absence of an event was measured by performing a regression between the two series within the estimation period. This regression is done by calculating the intercept or alpha (regression intercept) and slope.

The abnormal return is derived by calculating the difference between the estimated and actual returns for each stock with the sample for each event day in the event window (Peterson 1989, Seiler 2004). Abnormal returns according to Subramani & Walden (2001) are “created by the consensual estimates of the large number of investors in the capital markets of the expected future benefit streams associated with firm initiatives” (pg. 140).

If investors feel the event will be of value to the firm they will react favorably and this “will be reflected in a positive abnormal return for the firm’s stock – a risk adjusted return in excess of the average stock market return” around the date of the IT investment announcement (Subramani & Walden 2001, pg. 140). In other words, stock returns are subject to some degree of ‘noise’ or random statistical fluctuation, but the event study is looking for returns that exceed this normal level of variation. This was calculated as follows:

$$AR_{jt} = R_{jt} - (\alpha_j + \beta_j R_{mt})$$

AR_{jt} = Abnormal Return on stock j for each day in the event window

R_{jt} = return on stock j for each day in the event window

α_j = intercept slope for stock j measure over the estimation period

β_j = slope term for stock j measured over the estimation period

R_{mt} = return on the market for each day in the event window

The Standardized Abnormal Return (SAR) is then calculated. The AR is divided by the standard deviation of the risk. The SAR must be calculated for all firms (j) over all days in the event window (t). The Standardized Abnormal Returns were calculated as follows:

$$SAR_{jt} = \frac{AR_{jt}}{\sqrt{s^2 AR_{jt}}}$$

SAR_{jt} = standardized abnormal return for firm j at time t

AR_{jt} = abnormal return for firm j at time t

$\sqrt{s^2 AR_{jt}}$ = square root of the variance of the abnormal return for firm j at time t
 = standard deviation of the abnormal return for firm j at time t

The next step is to aggregate the SARs for each separate day in the event window and determine if the results are significant as a Total Standardized Abnormal Return (TSAR). To determine the statistical significance of the TSAR Results, the Z-Statistic is calculated. It is used as a pre-cursor to calculating the p-value in order to determine the statistical significance of each TSAR for each day in event window (-15 to +15) in the event window. The Z-statistic follows a standard normal distribution which means it has a mean of zero and a standard deviation of 1.0, it was calculated for each event window day's TSAR as follows:

$$Z\text{-statistic} = \frac{AR}{\sqrt{\frac{\sum_{j=1}^N D_j - 2}{D_j - 4}}}$$

The p-value was computed in Excel using the NORMSDIT function as recommended by Seiler (2004) to return the standard normal cumulative distribution function with a mean of zero and a standard deviation of one. The formula looks as follows:

$$p\text{-value} = 2 \times (1 - \text{NORMDIT}(\text{ABS}(\{z\text{-statistic}\})))$$

This is a standard normal distribution, and since the p-value is calculated using the cross-sectional standard deviation of abnormal returns it would be expected to correlate with the mean abnormal returns.

The cumulative total standardized abnormal returns (Cumulative TSAR) to be computed next are the sum of the abnormal returns according to Seiler (2004) and are calculated as follows:

$$\text{CumulativeTSAR}_{T_1, T_2} = \sum_{t=T_1}^{T_2} \text{TSAR}_t$$

Where

Cumulative TSAR_{T_1, T_2} = cumulative TSAR for each day in the event window

TSAR_t = TSAR for each day in the event window

T_1 = earliest date in the event window (-15)

T_2 = later date in the event window (ranges from -15 through +15)

Finally the statistical significance of the Cumulative TSAR Results is calculated as follows: The Z-statistic was used as a pre-cursor to calculating the p-value in order to determine the statistic significance of each Cumulative TSAR for each day in event window (-15 to +15) in the event window. The Z-statistic follows a standard normal distribution which means it has a mean of zero and a standard deviation of 1.0, it was calculated for each event window day's Cumulative TSAR as follows:

$$\text{Z-statistic} = Z_t = \left(\frac{1}{\sqrt{N}} \right) \left(\frac{\left(\sum_{T_1}^{T_2} SAR_{jt} \right)}{\sqrt{(T_2 - T_1 + 1) \left(\frac{D_j - 2}{D_j - 4} \right)}} \right)$$

Where

Z_t = Cumulative TSAR Z-Statistic for each day in the event window

N = number of firms in the sample (62)

SAR_{jt} = SAR for firm j for each day in the event window

T_1 = earliest date in the event window (-15)

T_2 = later date in the event window (ranges from -15 through +15)

D_j = number of observed trading day returns for firm j over the estimation period

The p-value was computed in exactly the same manner as previously discussed.

Validity and Reliability Issues

In any piece of research the question of ‘validity’ arises, primarily because of the trade-off that the researcher is often presented with, in selecting the relevant research method coupled with the reality that not all research is perfect. A number of threats to the validity of this research are present. What they are and how they were dealt with are discussed below.

The threat to face validity is one which focuses on whether the measure appears to be measuring what it is supposed to measure on the face value (Neumann 2003). It is rather significant and does not rely on previous established theories. This threat was mitigated by having three senior academics in three universities with extensive experience in carrying out Event Studies review the research design thoroughly. The accuracy of the Event Study method has been discussed in various areas of the paper including but not limited to the sampling, data collection and analysis sections.

Internal validity is perhaps the most important item, because of the nature of the study and need for accuracy in the design of the research. Internal validity refers to the level of rigor taken to perform measurements, the research design, the inclusion of alternative views, and explanations for the causal relationships between factors (independent and dependant) being examined (Neumann 2003). This threat was mitigated through careful research design and rigor in measurement. This has been discussed where appropriate in the Data Collection, Sampling, Data Analysis and other areas of the paper.

External validity refers to the extent to which the results of the research can be generalized (Neumann 2003). This is a positivist, quantitative based study and one of the aims is to be able to generalize findings if possible. This form of validity is imperative because of the need for the study to be repeatable in order for the results to be reliable, accurate and accepted. In a normal sense, random sampling strengthens the ability to generalize, however where it is not practical to draw a random sample – generalization must then be done on a theoretical basis (Hoyle, Harris & Judd 2002). Therefore replicating research in other settings and with other samples strengthens external validity. The ability to generalize is improved given that:

- A relatively lengthy period of study was taken over years 1996 to 2003.
- There was clear delineation marking those investment types within and outside the scope of the study.
- The search and statistical method utilized was based on precedent clearly substantiated in the literature review.

The results of this research are limited by the following points:

- Length of Study:

The study focused on IT investment announcements between the year 1996 and 2003. This means the results are only applicable to this period and may not be generalized over other periods of time being before 1996 and after 2003.

- Hidden initiatives not captured:

The research is only based on announcements which firms chose to disclose. This is somewhat problematic because firms undergo a larger number of IT investments (perhaps on a smaller scale) internally which investors are not privy to but may or may not end up being significant in terms of influencing either directly or indirectly the firm's ability to generate future cash flows.

- No Leakages:

It is assumed that no leakages occurred prior to the announcement date.

- Insufficient Data by SIRCA:

The research was not able to extend passed 2004 because SIRCA does not publish the All Ordinaries Accumulation Index prices beyond 2004. This led to a reduction in the sample size.

The research was conducted based on a number of assumptions, they are:

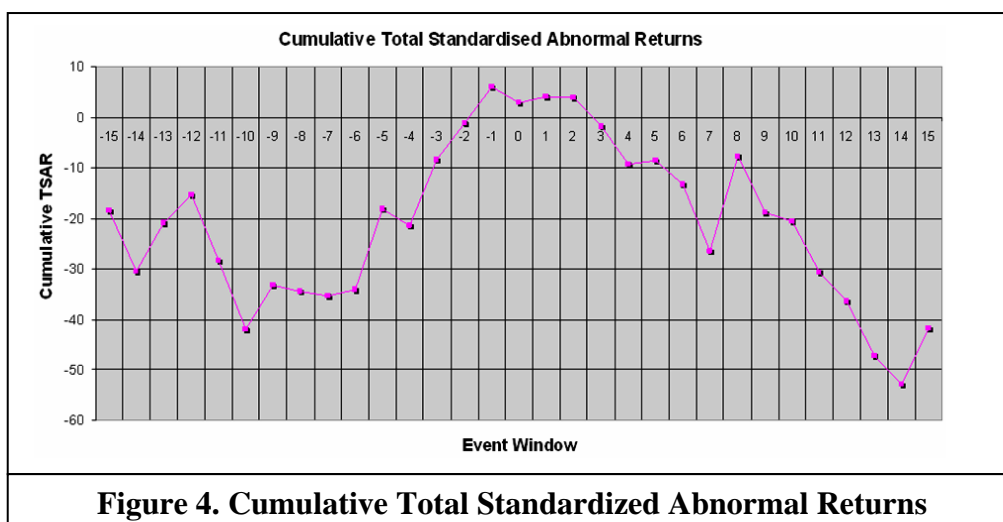
- The information contained in the IT investment announcements is not anticipated by the market forces before the first public announcements.
- Markets are efficient in that stocks reflect all relevant information (Fama, Fisher, Jensen and Roll 1969; McWilliams & Seigel 1997).
- Any new information relevant to pricing those stocks is impounded in an unbiased manner into the market price.
- Events are unanticipated in that Abnormal Returns are a result of investor reaction (Dos Santos, Peffers and Mauer 1993; McWilliams & Siegel 1997).
- Individual stock returns over time can be predicted to some degree, based on historical stock returns.
- Events are not confounded by eliminating other factors (McWilliams & Siegel 1997).
- Stock prices reflect expected future earnings, and deviations from that will be arbitrated away.

Findings and Discussion

The research has revealed the cumulative total standardized abnormal returns for all 62 announcements in this study as presented in Figure 4.

The results indicate that where Australian firms have made IT investment announcements to the market from 1996 to 2003, there has been substantial negative abnormal returns from -15 to -2 days prior to the announcement and +3 to +15 days after the announcement. The interesting finding is that there seems to be an unprecedented positive abnormal return around the days of the actual announcement itself. This clearly shows that the announcements have yielded a positive return in excess of what was predicted given historical price returns.

However merely returning a positive or negative return is not enough, because the amount needs to be statistically significant to be accepted academically as providing empirical support for the relevant hypothesis.



The statistical significance of the abnormal returns was determined using the p-statistic. The p-values for each of the event dates have been calculated. p-values that fall below .05 were deemed to be statistically significant at a 95 % level. If the p-value is .01 the results are significant at the 99% level.

The only statistically significant days were 15, 14 and 10 days prior to the event dates for all announcements studied with the following confidence levels:

Table 3. Statistically Significant Results		
Event Days	Cumulative TSAR p-value	Confidence levels
-15	0.018812107	95%
-14	0.006365646	99%
-10	0.029797733	95%

Since they are not relatively close to the event date they do not reveal anything interesting.

The results for the crucial period within and around the announcement are captured below:

Event Days	Cumulative TSAR	Cumulative TSAR Z-Stat	Cumulative TSAR p-value
-1	6.01500465	0.19681038	0.843975928
0	2.843371806	0.090080611	0.928223157
1	4.105978786	0.126197253	0.899575786
2	3.853988681	0.11511498	0.908353986

Table 4. Positive Abnormal Returns

As can be seen in the Table 4 as well as in Figure 4, while there was clearly an abnormal return for the period just before (-1) to just after (+2) the announcement date, the results were not statistically significant as shown by the p-values being greater than 0.05.

These results are interesting firstly because they show that there was an unprecedented positive abnormal return around the event dates however not large enough to merit their statistical significance. The results are also in line with previous findings in the literature and more work is required perhaps in analysing other IT investment types to determine whether there is any discrepancy or consistency in findings so far.

This data and subsequent analysis show that the hypothesis made in this paper is supported. The results further support previous studies in their findings that IT

investments on a whole do not result in positive significant abnormal returns (Dos Santos, Peffer and Mauer 1993; Hunter 2003; Im, Dow and Grover 2001).

Ultimately it is very difficult to assess the NPV of an IT investment and even harder to expect capital markets to do a better job, perhaps that is why we do not observe significant positive abnormal returns with IT investment related announcements. Certainly more work is required to reach some consensus on the value IT investments have on firms.

Stock market investors consider the trade-off of both risk and return in assessing the viability of firm investments and their ability to contribute to growth opportunities to the firm going forward (Chatterjee, Pacini & Sambamurthy 2002). For this reason the Event Study method was used to look into the problem of whether IT investments impact the market value of firms.

The study showed clearly that for the sample firms in Australia, over the time period 1996 to 2003 investors did see future income potential greater than the rate of return for IT investments and therefore when they were announced all resulted in positive abnormal returns until 2 days after the announcement, despite the fact that they were statistically insignificant. It still showed that the market is yet to be sure of firms making IT investments. In the past the Dos Santos, Peffer and Mauer (1993) study showed that a particular type of IT investment that is, investments in innovative Information Technologies result in positive abnormal returns.

Either way the results of this study were consistent with previous studies, which is interesting because it will contribute considerably towards supporting the claim in future that IT investments have not resulted in increased market value for publicly traded firms in the United States, the United Kingdom and now Australia.

The above mentioned limitations are in fact opportunities for further research on this problem area in Australia. The results are the first of its kind focusing on Australian firms. Other possible research questions could focus on the other types of IT investment announcements discussed previously in determining whether there is a difference in the Abnormal Returns of those announcements compared with the ones which have been studied in this paper. Another interesting piece of research would be to conduct a series of interviews with Equity Analysts, Brokers and Fund Managers across Australia to gauge what importance they have placed on IT Announcements in making their judgments and technical reports on firms. The insight gained from such study should assist researchers in future whether academic or practitioner to shed some more light on this problem.

In fact a much broader study of IT value is needed, one that investigates how IT investments are actually treated in the financial accounts of publicly traded firms. This could perhaps shed some light on one of the most critical issues of event studies, in that firms chose which investments to announce to the market. The means that potentially risky, failed or insignificant investments in IT may be hidden from the view of the market.

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Appendix:

Sample list of Announcements		
Stock Code	Ann.Date	Short description/message header
ISR	19960417	Samsung to bundle software with digital camera/director app.
ANZ	19960703	ANZ launches ANZ direct
DAT	19961213	Datacraft Asia to bring Malaysia On-line
CRI	19961230	Launches new platform technology for Helisal test
MMD	19970501	Press release re launches a world first - Biolog 3000 system
ERG	19970902	Creative Star opens multi-role contactless smart card system
ISR	19971002	To Bundle Software with Teco`s Products
FNC	19971117	Releases MindWizard - PC Program
GMF	19971117	Media Release: New IT & Computer Systems for future growth
BEN	19971125	Media Release - Bendigo Bank delivery system on world show
QAN	19980212	To introduce New Revenue Accounting & Fare Audit System
FNC	19980305	Logic & Reasoning Software available throughout US
GDP	19980923	Launches Revolutionary New Technology
GPA	19990330	Commissioning of GYRO IT System
ANZ	19990412	Launches Internet Banking with 1.7m Customers Enabled
DTL	19990514	Data 3 Leads Way in E-Commerce Market
ASX	19990615	Derivatives Clearing System Goes Live
AEV	19990712	DIY e-commerce web tool launched for small business/home
DTL	19990721	IBM Media Release - IBM makes commerce e-zy
RGR	19990816	Launches New E-Commerce Product
TLS	19990824	Launch of new CDMA network
CPU	19990913	ASTS System Goes Live at NZSE
RDF	19990920	Red Light Camera System Trial in USA
ANZ	19990930	ANZ E*TRADE Online Investing Service goes live at anz.com
BCH	19991108	Launch of on-line stock trading system-eStar
CXA	19991123	New Internet Messaging Gateway
SEV	19991201	i7 To Leverage Highball`s Expertise To Launch WomenZone

AXR	20000127	AMX to provide High-Speed Internet Delivery Service
QBE	20000303	Announces IT system for Australia & Asia Pacific operations
CML	20000328	Launch of e-commerce Springboard
SRO	20000428	Insight Technologies - New Product Launch
USC	20000504	K-Mart moves to second stage rollout of ILID Technology
MMD	20000511	New ECG System
TNE	20000705	New Retail One-Faster Easier Software for Retailers
PWT	20000712	PWT first Carrier to use Cisco MPLS Tech. for Corp Solutions
ERG	20001113	To Implement 1st Central Clearinghouse for Smart Card System
TLE	20001116	Markets new technology
SWG	20001211	Releases new technology product
LAK	20001214	Mediamatics` new entertainment software package
ASP	20010322	Launches breakthrough software product
POT	20010525	Develops New Direct Debit Payment M/ment System
VCM	20010627	MAA Implements voice enabled quoting system
QTL	20010926	Launch of QBlaze Workflow Management System
MYO	20011016	Launces Chinese Language Software
ANZ	20011101	Launches Australia`s first chip credit card system
OTS	20020111	OTS Expands Software Range
CAB	20020205	Acceptance of VISA Cards in Cabcharge`s EFTPOS system
ERG	20020206	Press Release: Public Launch of San Francisco Transit System
AXN	20020222	Releases new Bioinformatics Software Product
WSS	20020415	To implement ACT State-wide Mental Health Software
ERG	20020502	Successful Rollout of Singapore Smart Card System
ANK	20020904	Media Rel: ANK`s Software powers world`s largest conference
CAT	20021107	Unveil Network-Independent Rewards Technology
CAB	20030326	Cabcharge System Launched into Edinburgh
CAT	20030407	Unveils new loyalty software products at Annual Meeting
PWR	20030414	Laucnh of New Unit Trust/Asset M/mnt Software Co.
KYC	20030611	Keycorp terminals for service stations across Australia
WSS	20030616	Launch of new Patient Administration Software