The Impact of Trading Halts on the Australian Equities Market

STEVEN LECCE
(200312369)
DR. REUBEN SEGARA

The University of Sydney

Finance Honours Dissertation

OCTOBER 2007

Submitted in fulfilment of the requirement for the award of Bachelor of Commerce (Honours) degree

CERTIFICATE OF ORIGINALITY

I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at University of Sydney or at any other educational institution, except where due acknowledgement is made in the thesis.

Any contribution made to the research by others, with whom I have worked at University of Sydney or elsewhere, is explicitly acknowledged in the thesis.

I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.

(Signed) ……..……

Steven Lecce

RELEASE OF THESIS

I Steven Lecce understand that if I am awarded an honours degree my thesis entitled: “The Impact of Trading Halts on the Australian Equities Market” will be held by the Discipline of Finance and be available after three months for use by academic staff or students in research or other academic purpose. I agree that the Chair of Discipline or the Honours Co-ordinator may allow perusal of a copy of the thesis to an individual for research or study.

Signed.....

Date….....

ACKNOWLEDGEMENTS

First and foremost, I would like to extend a special thanks to my supervisor, Dr Reuben Segara. His assistance, feedback and insightful comments throughout the year have been nothing short of exceptional and I greatly appreciate his efforts. His willingness to be available at any time when I needed some guidance has significantly enhanced the overall quality of this dissertation. He has also made the year far more enjoyable than I ever imagined. I would like to thank the Securities Industry Research Centre of Asia-Pacific (SIRCA) for providing the data set used in this study, with special thanks to Nathan Williams for his tireless work. Special thanks to; Professor Alex Frino for providing guidance in the initial stages of choosing a topic, Dr Andrew Lepone for his guidance throughout the year and George Li for providing data at the later stages of my thesis that was greatly needed. I would also like to thank, Angelo Aspris, James Cummings, Jennifer Kruk, Brad Wong, and Jeffrey Wong for their friendship and insightful comments along the process. I would also like to offer a warm thanks to my honours classmates from the past year; specifically Kiril Alampieski and Erin Cacciola. Their support and friendship has made the entire honours experience considerably more enjoyable. I extend sincere thanks to my family and close friends, whose persistent encouragement and confidence in me throughout the entire process was invaluable. Last but not least, I would like to thank my girlfriend Laura for putting up with me during the whole year, especially in the latter stages when I was never around. Without her support I would not have made it through the year.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

This dissertation examines the impact of trading halts on the trading behaviour for a sample of halted stocks listed on the Australian Stock Exchange (ASX). A detailed analysis of returns, liquidity and volatility around trading halts for a sample of 18,245 halted stocks captured over the period 1 January 2005 to 26 September, 2006 allows this study to extend the literature in three main ways. First, this study re-examines the impact of ASX trading halts in a tighter regulatory environment, where companies were obliged to comply with stricter continuous disclosure requirements. Second, the availability of the largest database of trading halts in Australia, permits an investigation of the benefits of trading halts in a more rigorous manner. Finally, regression analysis is used to identify factors associated with aberrant stock volatility immediately after a trading halt. This will provide a better understanding of the trading behaviour surrounding trading halts and allow ASX exchange officials to fine-tune the market surveillance discipline.

This study finds that trading halts result in abnormally high levels of trading volume and volatility in the period immediately following a trading halt. Additionally, wider bid-ask spreads and lower order depth immediately after a trading halt, suggest that information asymmetry is high during this period. Halted stock returns are persistently high for up to a full trading day after a trading halt. This suggests that trading halts do not fully allow for an efficient dissemination of new information. The impact of trading halts on stock volatility is found to be a function of firm size, and trading halt duration, but not for the announced reason for the trading halt. Overall, this study concludes that trading halts have an immediate negative impact on market quality.

1. INTRODUCTION

The core objective of any securities regulator is to ensure that markets are fair, efficient and transparent.[1] A universal approach to attain this objective depends crucially upon the regulations surrounding the markets. These regulations should be designed to provide a cost effective mechanism through which: (i) volatility (risk) in the markets can be minimised; and (ii) investors can readily liquidate their investments, thereby enabling them to trade in and out of such investments. The political passion for increasing regulation in securities markets tends to be heightened during times when the market is very volatile. This is especially true following stock market crashes and market sensitive news announcements. However, it should be emphasised that any policy change to increase regulatory intervention in securities markets should be carefully considered, as this can be detrimental to market efficiency.

A trading halt is a tool that exchanges in all jurisdictions may use to ensure that their core objective is maintained, thereby protecting investors and preserving market integrity. Towards this end, trading halts provide appropriate time for investors to disseminate new information that could materially affect the value of a single security, a group of securities, or the market as a whole. In addition, trading halts can be used when there is an order imbalance, excessive volatility or when there is some other indication of disorderly trading. In all these cases, trading halts are principally designed to reduce volatility and promote orderly price discovery. Trading halts are classified in two categories: *discretionary* and *automatic.* A *discretionary* trading halt is approved based on the subjective decision of an exchange official or regulatory authority. Conversely, an *automatic* trading halt is

[1] It is noted that most securities regulators around the world are members of the International Organisation of Securities Commissions IOSCO). One of the primary resolutions of IOSCO is to ensure its members cooperate together to promote high standards of regulation in order to maintain just, efficient and sound markets. (see http://www.iosco.org/about/)

immediately activated when actual trading behaviour on the market exceeds pre-set trading parameters, which are specified in the market rules of an exchange[2].

The objective of this study is to determine the impact of trading halts on equities markets. To achieve this end, the impact of *discretionary* trading halts on the trading behaviour of stocks listed on the Australian Stock Exchange ASX) is analysed. Specifically, this study analyses for abnormal changes in returns, liquidity and volatility of ASX stocks around trading halts. A key motivation of this study is to contribute to the considerable debate among securities market regulators, market participants and academics as to the effectiveness of trading halts. Proponents of trading halts contend that trading halts maintain price stability, facilitate an orderly market and keep transaction costs low [see IOSCO (2002)]. This is consistent with empirical results found in the United States [see Madura, Tucker and Ritchie (2006)], Canada [see Kryzanowski (1979)], United Kingdom [see Engelen and Kabir (2006)], Sweden [see De Ridder (1990)] and Turkey [see Bildik (2004)].

Conversely, opponents contend that a trading halt is not desirable because it delays stock price adjustments and impedes price discovery [see Christie, Corwin and Harris (2002)], imposes additional trading opportunity costs on investors and increases post-halt trading volatility [see Lee, Ready and Seguin (1994) and Corwin and Lipson(2000)]. Furthermore, it can be argued that institutional investors can evaluate new information quicker than uninformed investors during the halt period, and can capitalise on that information after the halt using superior trade execution[3]. Perhaps the criticisms of trading halts are best described by Grossman (1990, p.3) who states: “I have always been suspicious of closing markets as doing so merely prevents consenting adults from carrying out their desires on the floor of the

2 For a more detailed analysis of the different types of trading halts see Section 2.1

3 Bildik (2004) finds that institutional investors take the price advantage of new information during a trading halt ahead of individual investors.

exchange." Considering the controversial nature of this debate, it is imperative for a stock exchange to weigh the implied costs and benefits of trading halts against those of continuous trading.

The second motivation of this study is to provide a comprehensive analysis of the impact of trading halts on Australian equity markets. The majority of extant literature on the impact of trading halts is largely concentrated in the United States. While there has been a measure of inconsistency in these studies, it is broadly accepted that post-halt trading behaviour is immediately associated with higher abnormal trading activity and higher volatility. A danger of universally applying these results to other non-U.S. stock markets is that they are specific to the institutional features of that stock market being investigated. Any difference in institutional features between markets may lead to varying results across stock exchanges as to the number of trading halts granted and their impact on various market quality variables (i.e., returns, liquidity, and volatility).

The ASX provides many contrasts to U.S. equities markets, in respect to its market size, trading rules and regulatory environment. Firstly, the ASX has a considerably smaller market capitalisation and is dominated by resource stocks relative to U.S. equities markets, such as the New York Stock Exchange (NYSE).[4] Secondly, the trading halt mechanism used on the ASX to re-open trading differs to that on the NYSE, primarily because of market structure differences (see Section 2.2 for more details). These differences suggest that the impact of trading halts on market quality may be different in Australia.

[4] The materials sector comprises of 21% of the ASX market capitalisation (www.investaustralia.gov) compared to the NYSE were basic materials account for 6.50 % of the NYSE Composite Index (www.nyse.com/marketinfo/indexes/nya_characteristics.shtml). It should be recognised that because resource stock returns are more volatile than industrial stock returns [see Ball and Brown (1980)], it is likely that there will be more trading halts on the ASX than the NYSE. This is confirmed in Section 2.3 of this study.

This study recognises that Aitken, Frino, and Winn (1995) is the only empirical working paper that has examined the impact of trading halts in the Australian market. Nonetheless, it is noted that this study is the first in Australia to examine the impact of trading halts during a period when Australian listed companies were obliged to comply with stricter continuous disclosure requirements. Further, this study extends the work of Aitken, Frino and Winn (1995), by providing a more thorough investigation on the impact of trading halts on additional market quality variables, such as returns and order depth. Additionally, this study differs to others in that it examines the most comprehensive dataset of 18,245 trading halts, compared to Aitken, Frino and Winn (1995) who examine a relatively smaller sample of 5,788 trading halts in Australia; and Fong (1996) who examine the largest sample of 1,512 trading halts in the United States.

The final motivation of this study is to provide ASX exchange officials with a better understanding of the trading behaviour surrounding trading halts, with which to fine-tune the market surveillance discipline. Trading halt statistics show that the number of trading halts to the number of listed shares on the ASX is significantly higher than those found in U.S. stock exchanges (see Table 2.1.). This significant disparity observed is puzzling and needs to be addressed. Perhaps, tighter continuous disclosure regulatory requirements for ASX listed stocks have exacerbated the exchange official's inability to exercise accurate judgement when granting a trading halt request [see Stigler (1964)]. This would be particularly disturbing if trading halts are found to be detrimental to the market, in that they create an inequitable and disorderly market. Considering this valid concern, this study tests whether the impact of trading halts are a function of various exogenous variables such as firm size, trading halt duration, price change during a trading halt, and trading halt reason (i.e. announcement type). Upon analysing these results, the ASX might be able to improve its

screening process used to grant a trading halt request. Overall, these results would be of interest to the ASX and the Australian Securities and Investment Commission (ASIC).

The remainder of this study is organised as follows. Chapter 2 describes the institutional details for trading halt mechanisms on the ASX and other major markets. Chapter 3 provides a review of empirical work examining the impact of trading halts reported in U.S. and other overseas stock exchanges. This is followed in Chapter 4 by the theory and hypothesis development. Chapter 5 outlines the data and research methodology employed in this study. Chapter 6 presents the results and Chapter 7 provides conclusions with suggestions for possible areas of future research.

2. INSTITUTIONAL DETAILS

This chapter provides an explanation of trading halts and their use in securities markets. Section 2.1 identifies the different types of trading halts and discusses their intended purposes. Section 2.2 presents the trading halt rules on the ASX. Section 2.3 examines the continuous disclosure regulation and its impact on the number of trading halts on the ASX. Finally, Section 2.4 examines trading halt rules on the NYSE and NASDAQ.

2.1. Types of Trading Halts

Trading halts are tools used to address both potential and actual market disorder. IOSCO (2002) conducted a survey of trading halt policy from around the world and found that they occur most commonly in one of two sets of circumstances. In the first, the trading halt is designed to facilitate the orderly absorption by market users of new information material to the valuation placed on an issuer's securities. The second main set of circumstances in which trading halts are used occurs when there is an order imbalance, excessive volatility or when there is some other indication of disorderly trading. In these cases, the trading halt generally provides time for supply and demand to rebalance at a new trading price. Based on IOSCO (2002), trading halts can generally be divided into two main categories, *discretionary* and *automatic*.

2.1.1. Discretionary Trading Halts

A *discretionary* trading halt refers to the essentially subjective actions of a market operator or regulatory authority to halt the trading in a security, or group of securities, on its market or within its jurisdiction. This type of trading halt is normally imposed in anticipation of the imminent release of material news about an issuer. This new information may change the fundamental value of the firm, therefore causing unavoidable fundamental volatility. Trading halts cannot reduce unavoidable fundamental volatility but rather aim to reduce any transitory

volatility by allowing the market to absorb information before being able to act upon it. The duration of discretionary trading halts varies depending on their purpose and whether the particular circumstances will affect a single security, a group of securities, or the market as a whole.

2.1.2. Automatic Trading Halts

An *automatic* trading halt refers to a trading halt triggered in a non-discretionary way on the basis of pre-set parameters (e.g., market rules). Such a halt stops trading when large fluctuations in a security's price or the market more generally jeopardize an orderly marketplace. The duration of automatic trading halts is usually shorter than that of discretionary ones. Automatic trading halts are triggered if the reference variable (i.e., price or volume) of a security, or in some cases an index, exceeds preset limits. Automatic trading halts can therefore affect individual securities or the entire market. The parameters and conditions under which automatic trading halts occur are usually identified in rules adopted (and enforced) by the market operator.

2.2. Trading Halt Rules on the ASX

The rationale for imposing trading halts on the ASX is to maintain an orderly market, protect investors and maintain an efficient market[5]. Trading halt policy on the ASX is governed in both Chapter 16 of the Market rules and Chapter 17 of the Listing rules.

[5] These were rationales given by the ASX to the IOSCO (2002) report.

2.2.1. Chapter 16 of the ASX Market Rules

Chapter 16 of the ASX Market Rules sets out that a trading halt may be imposed by the ASX if:

- The ASX receives or releases an announcement in relation to an issuer which, in the opinion of ASX, is market sensitive; or
- An issuer requests a trading halt and the ASX agrees to impose a trading halt.

If a trading halt is called under Market Rule 16.4.2 securities are placed in pre-open[6] following receipt of a price sensitive announcement, or if after close then it will be placed in pre-open the next trading day. This period is usually 10 minutes, or 1 hour for takeover offers. During this time no trading will occur and the trading halt[7] will end either at a time announced by the ASX or the commencement of open session on the second trading day following a halt. The ASX can suspend trading during a trading halt if no announcement is made within the required time frame. If the company believes two days is not enough then it can apply for voluntary suspension. In exceptional cases the company may apply for back to back trading halts that are capped at a maximum of 4 trading days.

2.2.2. Chapter 17 of the ASX Listing Rules

Chapter 17.1 of the Listing rules further sets out how trading halts can occur at the request of an issuer. When a trading halt is requested by an issuer, then the exchange is not required to act on the issuer's request. This provides the exchange officials with the flexibility in their decision to initiate a trading halt. Chapter 17.2 of the listing rules also outlines trading

[6] Pre-open is the period before an opening call auction. Orders may be placed but trades can not be executed.

[7] Paragraph 17 of guidance note 16, highlights that trading halts called by the ASX, when a price sensitive announcement is received are also known as temporary interruptions. For the purposes of this study they are referred to as trading halts.

suspensions on the ASX. This dissertation does not examine trading suspensions as they have different ramifications due to the different reason behind the halt to trading. [8]

2.3. Continuous Disclosure

A potential reason why there are so many trading halts on the ASX is the listing rule requirements for continuous disclosure. Introduced in 1994, the Australian continuous disclosure regime involves a contractual obligation between the ASX and companies admitted to public trading status on its market (listed companies), supported by federal corporations legislation (Corporations Act). The obligation is described in ASX Listing Rule 3.1 in clear terms:

"*Once an entity is or becomes aware of any information concerning it that a reasonable person would expect to have a material effect on the price or value of the entities securities, that entity must immediately tell the ASX that information*."

There are exceptions to these rules including where all of the following are satisfied:

1. A reasonable person would not expect the information to be disclosed; and
2. The information is confidential; and
3. One or more of the following applies:

    (a) It would be a breach of a law to disclose the information; or

    (b) The information concerns an incomplete proposal or negotiation; or

    (c) The information comprises matters of supposition or is insufficiently definite to warrant disclosure; or

    (d) The information is generated for the internal management purposes of the entity; or

    (e) The information is a trade secret.

[8] Trading suspensions can be initiated by the ASX or the listed entity. Trading suspensions can be called by the ASX: if the entity is unwilling to comply with or breaks a listing rule, to prevent a disorderly or uninformed market, the ASX rules require the suspension; or if it is appropriate for some other reason.

In a report by the ASX on continuous disclosure in 2002 [9] they outline:

'There can be circumstances where an entity is not able to make a preliminary announcement or is concerned that such an announcement is insufficient to properly inform the market. In these circumstances, the entity can ask ASX for a trading halt for up to two days. A trading halt is and is designed to be quite different from a suspension. A trading halt can also be an appropriate way of managing an unexplained price and/or volume change until an announcement can be made. Under Australian law and practice, if securities are suspended from trading, there can be negative implications in terms of financial covenants triggering repayment obligations and in terms of ability to issue transaction specific prospectuses. Trading halts do not have these consequences and can thus be used by companies as a tool of good disclosure policy in the interests of a fully informed, fair and transparent market.'

This report suggests that the ASX encourages the use of trading halts in many circumstances. The Continuous disclosure regime has placed pressure on listed companies to release greater amounts of information by announcements on the ASX. In turn, this has placed pressure on the ASX to impose trading halts requested by listed companies in order to meet their continuous disclosure obligations. Figure 2.1 displays the process by which announcements are released to the market. The announcement process begins with specialist ASX staff examining announcements to decide whether trading in the stock needs to be halted while the contents of the announcement are assessed by the market. This may be one of the reasons why there are so many trading halts on the ASX compared to any other market around the world (see Table 2.1).

[9] Continuous disclosure: The Australian Experience, 20 Feb 2002 available at www.asx.com.au.

Figure 2.1 Procedure for Company Announcements

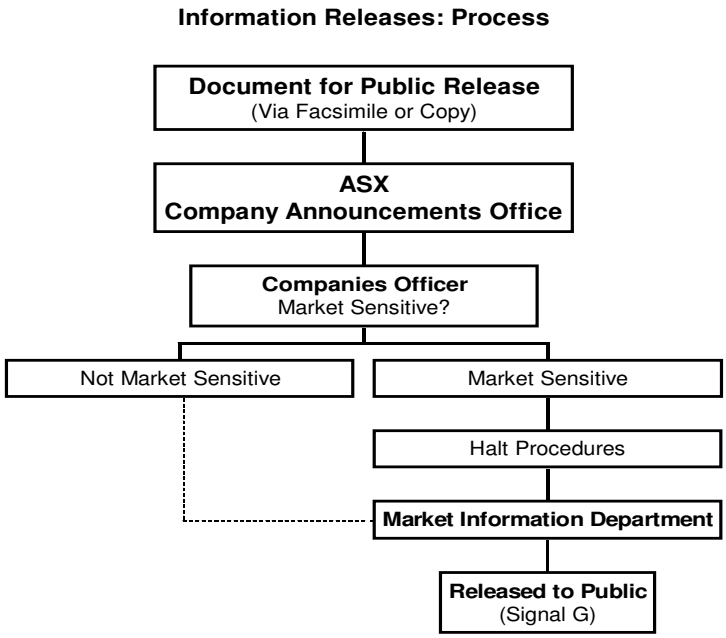


Table 2.1 Relative number of Trading Halts on the ASX, NYSE, NASDAQ, and LSE from Jan 2005-Oct 2006.

Exchange	Trading halts	Listed issuers	Trading halts as % of listed issuers
ASX	18,505	2,014	918.81%
NYSE	1,908	2,764	69.03%
NASDAQ	844	3,388	24.91%
LSE	63	1,606	3.92%

Source: Trading halt statistics were obtained from exchange officials on the ASX, NYSE, NASDAQ and LSE.

2.4. Trading Halt Rules on the ASX vs other markets

Markets such as the NYSE and NASDAQ are where most research has occurred and it is important to understand the institutional differences compared to the ASX. Table 2.2 provides a comparative summary of stock-specific trading halt rules employed on the ASX, NYSE, NASDAQ and the LSE (London Stock Exchange).

Table 2.2 Trading Halt Rules on the ASX, NYSE, NASDAQ, and LSE

Exchange	Type	Reason for trading halt				Call auction after halt
		News pending	*Issuer request*	*Order imbalance*	*Exceeds pre-set limits*	
ASX	Temporary	Yes	No	No	No	Yes
	Long-term	No	Yes	No	No	Yes
NYSE	Regulatory	Yes	Yes	No	No	Yes
	Non-regulatory	No	No	Yes	No	Yes
NASDAQ	Temporary	Yes	Yes	No	Yes	No
LSE	Temporary	Yes	Yes	No	Yes	Yes

The key differences between trading halt policy on the ASX and other major markets can be summarises as follows:

- The ASX does not halt trading in order imbalance or price limit situations;
- NYSE trading halts re-open with a 'tattonement' process followed by a call auction[10], NASDAQ has no call auction and the ASX has a call auction;
- Trading halts are institutionally imposed by the ASX and NASDAQ whereas on the NYSE they are usually called by the specialist.
- Trading halts may be called at any time during the day most exchanges. On the NYSE most trading halts are delayed openings[11], whereas on the ASX trading halts are more spread across the day and only 11.4% are delayed openings (see Table 7.1). The majority (83.4%) are called and re-open during the trading day.[12]

[10] On the NYSE, the specialist may engage in price exploration by issuing indicator quotes (known as tattonement). The specialist may change the indicator quotes up until re-opening, however upon re-opening these indicator quotes are binding on the specialist. Potential traders place commitments that give an indication of the likely re-opening price and a call auction is then initiated.

[11] Delayed openings occur when trading halts are called after the market closes (Lee, Ready and Seguin (1994) indicate 75% occur as delayed openings).

[12] A more detailed analysis of NASDAQ and NYSE trading halts is provided by Madura, Richie and Tucker (2006) and Corwin and Lipson (2000) respectively.

3. EMPIRICAL LITERATURE

The earliest literature on trading halts begins with Stigler (1964) who discusses the regulation of securities markets. Stigler criticises the exchange practice of suspending trading during order imbalance situations because of his doubts about exchange official's ability to exercise accurate judgment in such situations. Stigler argues that trading delays help 'free riders' benefit from the public release of information during a trading suspension. He argues that free riders benefit from costless information gathering during a trading halt at the expense of informed traders.

Despite the seminal work of Stigler (1964), trading halts were not immediately taken to be a topical issue until the earliest empirical work by Hopewell and Schwartz (1976), Hopewell and Schwartz (1978) and Kryzanowski (1979). Even with these studies, the literature developed slowly until the stock market crash of October 1987 ("Black Monday"). The aftermath of the 1987 crash saw high political passions for change, and much interest was raised for the use of trading halt mechanisms. The following section examines the empirical literature surrounding this controversial issue. Table 3.1 demonstrates the mixed opinions surrounding trading halts and provides a summary of the empirical literature relating to trading halts.

3.1. Trading Halts are Beneficial for the Market

Proponents of trading halts contend that trading halts maintain price stability, facilitate an orderly market and keep transaction costs low. Market authorities employ trading halts to 'allow the market to absorb the material information and reflect it in the price of the security in an orderly manner' (IOSCO (2002)). This section reviews the literature that finds trading

halts do obtain these objectives and are beneficial to the market. Evidence from the U.S is reviewed followed by evidence from the rest of the world.

3.1.1. Evidence from the U.S

Hopewell and Schwartz (1978) examine daily abnormal returns for 948 temporary trading suspensions on the NYSE during 1974-1975. They use a market model to calculate the abnormal returns and find anticipatory price reactions for trade imbalance halts and good news halts leading up to the halt, and none for bad news halts. Post-halt returns are close to zero on average, though there is some evidence that post-halt returns of good news (bad news) halts are significantly positive (negative), implying that price adjustments at the re-opening are incomplete. The authors conclude that these inefficiencies cannot be exploited profitably after considering typical transactions costs. There is also no sign of price reversals over the six days following the halt, suggesting that the price discovery process does not typically overreact to the information associated with the trading halt. Overall, their results suggest a reasonably efficient market reaction to significant new information. However, since efficient adjustment might have occurred without suspension or with suspensions of shorter duration, the authors are hesitant to endorse the NYSE administration of temporary trading suspensions.

Fabozzi and Ma (1988) examine over-the-counter (OTC) activities for NYSE stocks during a trading halt. Using trade-by-trade data for 314 halts during 1985, they find that OTC trading is characterized by high volatility. They find that the first transaction price during the halt is an unbiased estimate of the eventual NYSE re-opening price. However, there are no apparent opportunities for arbitrage profits and their results suggest that trading halts are successful in curbing excess volatility.

Howe and Schlarbaum (1986) explore the price behaviour of a sample of 165 corporate securities in which trading was temporarily suspended from 1959-1979. The authors argue that a suspension increases the equality of information dispersion in three ways: (1) it allows wide dissemination of information via mass media; (2) it removes the possible advantage possessed by insiders and professional traders arising from quick access to the market; and (3) it eliminates any advantage that insiders and professionals may have over "part-time" investors attributable to the ability to assess faster the impact of news on security price. It is important to note that SEC trading suspensions differ from the trading halts. SEC suspensions are regulatory actions intended to protect investors and coincide with substantial devaluations of the suspended securities. They find significant and prolonged negative abnormal returns in the post-suspension period. Their results show that suspensions from a regulatory body tend to coincide with a significant devaluation of securities.

Chen, Chen and Valerio (2003) use a sample of 999 trading halts during 1992 from the NYSE to examine their impact on price discovery. This study finds that trading halts help dissipate information and facilitate the price-discovery process. They find that trading halts can help reduce price dispersion when trading is halted due to the fact that some significant news has already been announced and the market needs more time to digest the information. Whereas when halts are called for the impending release of news that will have little significance, then it is found that trading halts actually induce noisier prices and undermine the price discovery process.

Madura, Richie and Tucker (2006) extend the literature on price discovery by using daily and intra-day data to examine the price contribution of the trading halt period relative to total price discovery. They assess 656 trading halts during 1998, from the NASDAQ. They conduct analyses on nine different sub samples that are separated by type of news to examine

whether the impact of a trading halt varies with the type of news event. They find that abnormal returns during trading halts are more pronounced for anticipated events and for their respective sub samples. Weighted price contributions before and during the halts are directly related to firm size. Pre-halt weighted price contributions are lower for surprise events and for some specific news categories. Overall, the price discovery is concentrated in the halt period, but the timing of the price discovery varies by the type of information.

3.1.2. Evidence from Other Overseas Exchanges

Kryzanowski (1979) tests the efficiency of trading suspensions in the Canadian market. This study examines trading suspensions that were issued in order to prevent the exploitation of monopoly information by forcing the public disclosure of previously private firm-specific information. He uses weekly data for a sample of 120 halts from the Canadian markets during 1963-1977. He examines abnormal returns for 40 weeks around each halt and finds the market was only efficient in the semi-strong form for favourable information public disclosures. Suggesting that there seems to be lags and frictions in the downward adjustment of security prices because "selling short" may be a less effective market mechanism for the adjustment of security prices than "buying long". "Selling short" could be less effective than "buying long" because it entails both a greater "downside" risk and more stringent institutional constraints (such as the "zero-up-tick"[13] rule and margin requirements). This finding prompted other studies to divide results into good and bad news halts to determine whether there is a difference.

[13] Zero-up-tick rule places restrictions on when a short sale may be executed. Short sales can only be made when there is no price change in the last trade price. The previous trade price must be higher than the trade price that preceded it.

DeRidder (1990) examines 277 one-day trading suspensions on the Stockholm Stock Exchange between 1 January 1980 and 30 June 1988. He finds that the market is efficient and prices adjust to the new equilibrium price immediately after the suspensions.

Bildik (2004) assesses the efficiency of trading halts by examining return, volatility and volume behaviour around news-initiated trading halts on the Istanbul Stock Exchange (ISE). He investigates, for the first time, the trading behaviour of different types of investors such as individuals, mutual funds and brokerage houses around trading halts. This study uses event study methodology on a sample of 323 halts from 1999-2003 for a period of eighty, 15 minute intervals centred on a halt. The findings show that most of the new information is absorbed by prices within fifteen minutes (almost completely in an hour) following the resumption of trading after a halt. The Reaction of investors to bad news is slower and stronger than good news. He also finds that institutional investors take the price advantage of new information during the halt period ahead of the individual investors. Institutional investors systematically buy and sell at more favourable prices around halts than individual investors do. Finally, he concludes by suggesting that trading halts are effective in dissemination of valuable information and play an important role in enhancing the efficiency of the price discovery mechanism.

Engelen and Kabir (2006) examine the overall efficiency of trading suspensions to disseminate new information among market participants on the Euronext Brussels. The sample investigated contains suspensions related to the disclosure of new information to the capital market. Using a sample of 102 suspensions from 1992-2000 they analyse the stock return behaviour surrounding trading suspensions by using event study methodology. They analyse a 41-day event window that encompasses the event day and 20 trading days before and after suspension. Their results show that there is no anticipatory behaviour before

trading suspensions or any significant abnormal return pattern in the post-suspension period. This indicates that there is a complete and instantaneous adjustment to the new information released during trading suspensions. They also find that there is an increase in trading volume after the suspension. However, there was no significant change in volatility before and after the suspension. These results, again, suggest that information released during the trading suspension, is fully incorporated in stock prices. Overall their results indicate the efficacy of trading suspensions to disseminate price sensitive new information among market participants.

Hauser, Kedar-Levy, Pilo and Shurki (2006) examine the speed of price adjustment following a trading halt event, and the factors influencing it. Using a dataset of 73 halts during 2001 on the Tel Aviv Stock Exchange (TASE) they compare the magnitude and pace of investors' reaction to announcements of similar content and value, with and without trading halts. This is similar to a pseudo-halt [used by Lee, Ready and Seguin (1994)], except that this method uses a matched security rather than the same security. This study controls for content factors with one control group with the same announcement type and a second control group with a price change of comparable value. Both are controlled for industrial sector, time-of-the-day and trading volume. The main finding is that the information contained in the announcement is disseminated faster when a trading halt is imposed, indicating a more efficient price discovery in such cases. They find that information dissemination following trading halts is over 40% faster and that abnormal trading activity is positively related to the speed of price adjustment.

Kim, Yagüe and Yang (2007) study the relative performance of trading halts and price limits using data from the Spanish Stock Exchange. Both trading halts and price limits result in increased trading activity while trading halts seem to perform better than price limits in terms

of liquidity. Spreads decrease and depths increase following trading halts, but the opposite occurs for price limits. These findings differ from the results of Corwin and Lipson (2000) who find that bid-ask spreads increase while depth near the best quotes decrease. However the results of Kim, Yagüe and Yang (2007) are not comparative to Corwin and Lipson (2000) because of the use of daily data in this study. Furthermore their aim is to compare the relative performance of trading halts and price limits rather than the isolated impact of trading halts.

3.2. Trading Halts are NOT beneficial for the Market

Opponents, contend that trading halts prevent prices from reaching their equilibrium level, cause higher volatility in subsequent periods and disrupt the normal functioning of an exchange (Kim and Rhee (1997)). Fama (1989) argues that mandatory trading halts increase, rather than reduce, volatility by inciting trading in anticipation of halts. He highlights that, if the rationale for imposing trading halts is to provide investors a cooling-off period to evaluate information, 'homemade' trading halts are readily available. That is, 'home made' trading halts are available to any investor who requires time to analyse market events. This section reviews the literature that finds trading halts are not beneficial to the market. Evidence from the U.S is reviewed followed by evidence from the rest of the world.

3.2.1. Evidence from the U.S

Ferris, Kumar and Wolfe (1992) examine the effect of SEC suspensions on returns, volume and volatility using a sample of 40 suspensions from 1963-1987. Consistent with Howe and Schlarbaum (1986) they find that there is a significant devaluation following a suspension. They also find that volume and volatility both increase post-suspension and do not return to normal for about 20 days after the suspension. The authors conclude that trading suspensions are not associated with the immediate elimination of unusual market activity.

In Lee, Ready and Seguin (1994) the volume and volatility surrounding 852 trading halts on the NYSE during 1988 are examined. Using intra-day data in half hour intervals they investigate the levels of trading volume and price volatility surrounding trading halts relative to a "pseudo-halt". A "pseudo-halt" is a control period of continuous trading for the same firm, matched on time-of-day and halt duration. To further control for the amount of information released during a trading halt they also match halt observations to pseudo-halts with net-of market returns[14] of similar size. The authors recognise that this method can lead to a sample selection bias because not all trading halts can be matched with pseudo-halts. This results in trading halts with extremely large absolute price moves being excluded that reduces the power of the tests. The resulting selection bias narrows the scope of the conclusions to trading halts with relatively small halt returns. They find that volume and volatility is significantly higher in the first full trading day after a trading halt than following pseudo-halts. Higher post-halt volume is observed into the third day while higher post-halt volatility decays within hours. They conclude trading halts do not having a calming down effect on the market that allows for the orderly emergence of a new consensus price.

Fong (1996) uses similar methodology to Lee, Ready and Seguin (1994) to examine 1512 trading halts on the NYSE and American Stock Exchange (AMEX) from 1988-1989. The results are similar to Lee, Ready and Seguin (1994) except the duration of excess post-halt volatility is less than half (Lee, Ready and Seguin (1994) find 4 hours). Fong (1996) posits the duration of excess post-halt volatility may be significantly shorter due to the different methods used in identifying pseudo-halts. This study matches halts based on pure excess returns whereas Lee, Ready and Seguin (1994) match based on absolute excess returns. Also, Lee, Ready and Seguin (1994) pseudo-halts could come from the second trading day in the

[14] Net-of market returns are the return for the halted stock less the return on the market index.

post-halt period so that the events underlying the trading halts might affect the post pseudo-halt volatility. Fong (1996) corrects for this by ensuring that the pseudo-halt is not within 10 days of the halt.

Corwin and Lipson (2000) analyse the effects of trading halts on order flow, spreads, and the limit order book. Using a data set of 295 NYSE trading halts from 1995-1996 they also examine the relationships between the limit order book and the re-opening price as well as liquidity and post-halt volatility. They find that market and limit order submissions and cancellations increase significantly during trading halts. They also find that a large proportion of the limit order book at the re-open is composed of orders submitted during the halt, and that the market-clearing price at the re-open is a good predictor of future prices. Order depth near the quotes is unusually low before, during, and after trading halts. This reduction likely reflects investors' reduced willingness to supply liquidity at these times. However, they do find that total depth after a trading halt increases. This reflects uncertainty in the market as traders are not willing to place orders near the best quotes. In examining bid-ask spreads, they find that the quoted spread and several measures of limit order book spread are unusually high at the re-open. This increase generally dissipates within two minutes for order imbalance halts and within 30 minutes for news halts. Consistent with Lee, Ready and Seguin (1994), they find that both volume and volatility increase significantly after NYSE trading halts.

Christie, Corwin and Harris (2002) study the effects of alternative halt and re-opening procedures on prices, transaction costs, and trading activity for a sample of news-related trading halts on NASDAQ. Studying 1167 trading halts from 1997-1998 they find that post-halt volatility and transaction cost effects are significantly larger following NASDAQ halts re-opened with a 5-minute quotation period than for either NASDAQ halts re-opened with a

90-minute quotation period or NYSE halts. These results are consistent with Greenwald and Stein (1991), who show that trading halts allow for information dissemination during market closures which can improve market liquidity. They also find that trading halts are followed by unusually high volatility even when the halt mechanism allows for information transmission during the halt. Their results also show that trade size is unusually low immediately after NASDAQ halts suggesting that market makers are unwilling to commit to large trades during this period of high uncertainty.

3.2.2. Evidence from Other Overseas Exchanges

Kabir (1994) investigates share price behaviour associated with a sample of 426 trading suspensions on the LSE from 1970-1988. Using monthly returns this study detects the presence of significant positive abnormal return in the month immediately following trading reinstatement. This finding casts doubt on the belief that trading suspension results in wide dissemination of information among investors. It also indicates that either the complete impact of new information release takes place only gradually, or not all relevant information is disclosed during the suspension period.

Aitken, Frino and Winn (1995) examine the effects of information related trading halts on price discovery on the Australian Stock Exchange. This study examines a market setting with a substantially different re-opening to the NYSE to determine the robustness of the finding by Lee, Ready and Seguin (1994). They further extend the work of Lee, Ready and Seguin (1994) by examining the effect of trading halts on bid-ask spreads in addition to trading volume and price volatility. They use a sample of 5,788 trading halts on individual securities that are accompanied by an information release from 1992-1995. This study adopts the pseudo-halt methodology from Lee, Ready and Seguin (1994) to examine eighty half-hour intervals centred on the halt. They find that a halt is typically associated with significantly greater trading volume for less than a day preceding the halt and for over two days

subsequent to the halt. Over the same period, halts resulted in abnormally high volatility compared to pseudo-halt periods with similar amounts of information but no halt. Despite the significant amount of news released around the halt, there were marked increases in uncertainty and costs to trading. Consistent with Lee, Ready and Seguin (1994) they find that halts hinder the price discovery process around informative news releases.

Kryzanowski and Nemiroff (1998) examine a sample of 412 trading halts, from 1988-1990, using 20 half hour intervals from the Montreal Stock Exchange (MSE). They find that both volatility and volume increase after a halt as new information is incorporated into the price. Much of this information is found to be incorporated into the price within half an hour. Their results again support the hypothesis that closures merely delay the resolution of uncertainty. The results are again mostly consistent with Lee, Ready and Seguin (1994) but find halts are less of an impediment than on the NYSE. The authors believe this may be due to the open order book or smaller order flow on the MSE.

Wu (1998) evaluates the effectiveness of trading suspensions from the Hong Kong Stock Exchange on price discovery, return volatility and volume. Using daily data from 1986-1993 this study examines 522 suspensions for 30 days either side of the halt. The findings show that the stock prices adjust to new information quickly during the suspension. The results further show that trading volatility increases in the post-suspension period, and the post-suspension volatility is relatively higher for mandatory suspensions than for voluntary suspensions. This study also finds that turnover rises significantly in the post-suspension period for both suspensions and is the highest on the first day of re-opening. Wu (1998) provides evidence that the market reactions are sensitive to the announced reason for the suspension. The returns and volatility changed substantially around mergers, acquisitions and private placement suspensions, but they did not show significant changes around privatization

halts. This suggests that the nature of suspension news may be a factor in explaining the market behaviour around trading suspensions.

Kryzanowski and Nemiroff (2001) use intra-day quotes and transactions on halted securities from the MSE and Toronto Stock Exchanges (TSE) to decompose the spreads and examine quoted depths. Using a data set of 96 trading halts from 1988-1990 they analyse trading halts using, 30 minute intervals centred on each halt. Their results show that the adverse-selection component of the spread is higher around trading halts and highest at the trading halt. Furthermore, the authors find that whether print media articles appeared within four days of the halt, has no apparent impact on the time-series behaviour of the spread components. News announcements prior to trading resumption and information that specialists obtain from the order flow during the first few hours of post-halt trading resolve most of the asymmetric information associated with a halt.

Tan and Yeo (2003) examine 470 voluntary trading suspensions on the Singapore Stock Exchange (SSE) from 1986-1995. This study uses daily data for a period of 60 days around each suspension and sub-groups firm-initiated suspensions into 'favourable news' and 'unfavourable news' suspensions. The 'favourable news' group experiences significant positive abnormal returns around the event date. Conversely the 'unfavourable news' group, shows a prolonged decline. The high trading volumes in the pre and post-suspension periods suggest that firm-initiated suspensions on the SSE involve the release of new sensitive information. Firm initiated trading suspensions are also accompanied by increases in post-suspension return volatility.

3.3. Other Studies

This section reviews literature relating to trading halts that do not directly imply that trading halts are beneficial or not to the market. Bhattacharya and Spiegel (1998) examine the NYSE's ability to maintain an open trading environment by conducting a cross-sectional analysis of all trading suspensions that occurred during the period 1974-1988 on the NYSE. They find that the NYSE has improved its ability to absorb more extreme news by shortening halt durations. They show that there is a significant difference between news-pending and order-imbalance related suspensions. They find that order-imbalance suspensions have significant return reversals, whereas the news-pending suspensions have significant return persistence. If a suspension occurs for inventory-related reasons, then after trade resumes, the stock's price will head back toward the pre-suspension price as the dealer's inventory returns to its desired level. The size of the firm also appears to play a large role in the duration of a suspension.

Masulis and Shivakumar (2002) examine whether different market microstructures affect the speed at which new information is incorporated into prices (speed of price discovery). Using transactions data, they compare the price reaction speeds on NASDAQ with those on the NYSE and the AMEX. Specialists have an affirmative obligation to stabilize prices, which creates incentives for them to buy some stock when prices are falling, especially in the face of temporary order imbalances. Therefore they believe that the speed of adjustment should be slower on the NYSE/AMEX than the NASDAQ. Also trading halts on NASDAQ are allowed only for pending or actual news announcements and not for order imbalances.

Consistent with their hypotheses Masulis and Shivakumar (2002) find that price adjustments are quicker by as much as one hour on the NASDAQ. This result is not due to differences in issuer characteristics or announcement effects across the markets, but due to differences in

market structures. Greater risk taking by dealers, more rapid order execution, and more frequent informed trading on NASDAQ, as well as stale limit orders and a less efficient opening price-setting mechanism on the NYSE/AMEX, all contribute to faster stock price adjustments on NASDAQ. This study confirms that market structure differences can have a significant impact on the market.

Kim and Yang (2004) provide a survey of the trading halt literature and analyse what makes them attractive to financial markets. The literature suggests that trading halts do not reduce volatility or volume in stock markets, instead, both volume and volatility increase after a trading halt. The authors discuss how regulators argue trading halts lessen the breakdown in the transmission of information among market participants, and their very existence seems to suggest that the advantage is at least great enough to cover the costs. However, they conclude that further research is necessary to justify this net advantage of trading halts.

3.4. Empirical Literature Summary

This chapter has reviewed the existing research in the area of trading halts and it is clear that some questions have been answered while many remain unknown. From the literature, it is almost widely accepted that volume and volatility are abnormally high around trading halts. This has been confirmed by many studies on markets with differing microstructures.[15] Other market quality indicators have not been looked at as extensively such as bid-ask spreads and market depth. Corwin and Lipson (2000) are one of the few papers that examine bid-ask spreads and they find that they widen around trading halts. However this result has not been confirmed extensively with only a few papers in this area.[16] Market depth has only been examined by Corwin and Lipson (2000) and they find that depth near the best quotes falls after a trading halt. This result is yet to been confirmed or denied by any other studies or on

[15] Lee, Ready and Seguin (1994), Aitken, Frino and Winn (1995) and Corwin and Lipson (2000) are examples.
[16] Aitken, Frino and Winn (1995) and Kryzanowski and Nemiroff (1998) are others to date.

any other market microstructure including the ASX. Many studies have examined the price discovery process around trading halts and many find that trading halts are efficient, with abnormal returns disappearing quickly. This has never been tested on the ASX and this dissertation examines abnormal return behaviour around trading halts

Table 3.1 Review of Empirical Literature Examining the Impact of Trading Halts on Equity Markets

Study	Market	No. of Halts (Sample period)	Event Window	Variables Examined	Halt Type	Main findings
A. Literature that finds trading halts are beneficial for the market						
U.S Markets						
Hopewell and Schwartz (1978)	NYSE	948 (1974-1975)	[-6,6] Daily	Returns	News and order imbalance	Efficient market reaction to significant new information. However, since efficient adjustment might have occurred without suspension or with suspensions of shorter duration. They are hesitant to endorse the NYSE administration of temporary trading suspensions.
Fabozzi and Ma (1988)	NYSE NASDAQ	314 (1985)	[0,42] Minute	Volatility	News and order imbalance	Trading halts are successful in curbing excess volatility.
Howe and Schlarbaum (1986)	NYSE	165 (1959-1979)	[-40,40] Weekly [-5,5] Daily	Returns	SEC suspensions	Suspensions are found to coincide with substantial devaluations of the suspended securities. Further, significant and prolonged negative abnormal returns are observed in the post-suspension period, an apparent violation of semi-strong form market efficiency.
Chen, Chen, and Valerio (2003)	NYSE	999 (1992)	Daily	Price dispersion	News and order imbalance	Trading halts help disseminate information and facilitate the price-discovery process.
Madura, Richie and Tucker (2006)	NASDAQ	656 (1998)	[-3,3] Daily	Returns	News	Price discovery is concentrated in the halt period, which suggests trading halt are efficient. Stock price adjustments surrounding trading halts are conditioned on the underlying event that caused the halt
Outside the U.S						
Kryzanowski (1979)	TSE, CSE, MSE & VSE [17]	120 (1963-1977)	[-40,40] Weekly	Returns	News	The market is efficient in the semi-strong form for favourable but not unfavourable information public disclosures, suggesting that there seem to be a lags and frictions in the downward adjustment of security prices.
Bildik (2004)	ISE[18]	323 (1999-2003)	[-40,40] 15 min	Volume, volatility & returns	News	Institutional investors take the price advantage of new information during the halt period ahead of the individual investors by better timing in trading after halts. He suggests that trading halts are effective in the dissemination of valuable information and play an important role in enhancing the efficiency of the price discovery mechanism.

[17] Toronto, Canadian, Montreal and Vancouver Stock Exchanges respectively
[18] Istanbul Stock Exchange

Study	Market	No. of Halts (Sample period)	Event Window	Variables Examined	Halt Type	Main findings
(Continued) A. Literature that finds trading halts are beneficial for the market - Outside the U.S						
Engelen and Kabir (2006)	Euronext Brussels	102 (1992-2000)	[-20,20] daily	Returns, volume & volatility	News	The disclosure of new information and the time obtained by investors to evaluate this information appear to produce no destabilizing effect on the stock market.
Hauser, Kedar-Levy, Pilo and Shurki(2006)	TASE[19]	73 (2001)	[-2,21] 5 min	Returns	News	The information dissemination following trading halts is over 40% faster when a trading halt is imposed, indicating a more efficient price discovery during trading halts.
B. Literature that finds trading halts are NOT beneficial for the market						
U.S Markets						
Ferris, Kumar and Wolfe (1992)	NYSE AMEX	40 (1963-1987)	[-30,30] Daily	Returns, volatility & volume	SEC suspensions	Suspensions are associated with high unusual activity. Volume and variance are abnormally high.
Lee, Ready and Seguin (1994)	NYSE	852 (1988)	[-13,13] 30 min	Volatility & volume	News and order imbalance	Volume and volatility for the trading day following the halt are significantly larger than corresponding measures following the matched pseudo-halt. The act of calling the halt does not generally achieve the objective of creating a "calming down" period that allows for the emergence of a new consensus price in an orderly fashion.
Fong (1996)	NYSE AMEX	1512 (1988-89)	[0,13] 30 min	Volatility	News and order imbalance	Post-halt volatility is significantly larger than the post pseudo-halt volatility for less than two trading hours. The duration of excess post-halt volatility found in this study is less than half of that found in Lee, Ready and Seguin (1994).
Corwin and Lipson (2000)	NYSE	295 (1995-1996)	Trade & 30 min	Volume, volatility, depth, spreads & order flow	News and order imbalance	Market and limit order submissions and cancellations increase significantly during trading halts. Depth near the quotes is unusually low around trading halts, though specialists and/or floor traders appear to provide additional liquidity at these times. Finally, specialists appear to "spread the quote" prior to imbalance halts to convey information to market participants.
Christie, Corwin and Harris (2002)	NASDAQ	1167 (1997-1998)	[-4,4] 30 min	Volatility, volume & spreads.	News	Post-halt volatility and transaction cost effects are significantly larger following NASDAQ halts re-opened with a 5-minute quotation period than for either NASDAQ halts re-opened with a 90-minute quotation period or NYSE halts.

[19] Tel Aviv Stock Exchange

Study	Market	No. of Halts (Sample period)	Event Window	Variables Examined	Halt Type	Main findings
Outside the U.S						
Kabir (1994)	LSE	426 (1970-1988)	[-5,5] Monthly	Returns	News and order imbalance	Presence of significant positive abnormal returns in the month immediately following the trading reinstatement. This finding casts doubt on the belief that trading suspension results in wide dissemination of information among investors.
Aitken, Frino and Winn (1996)	ASX	5,788 (1992-1995)	[-40,40] 30 min	Volatility, volume & spreads.	News	Significantly greater trading volume and volatility for less than a day preceding the halt and for over two days subsequent to the halt. Market bid ask spreads also increased significantly in the period following a halt. Trading halts appears to hinder the price discovery process around informative news releases.
Kryzanowski and Nemiroff (1998)	MSE	412 (1988-1990)	[-10,10] 30 min	Returns, volatility & volume	News and order imbalance	The results are consistent with Lee, Ready and Seguin (1994) but appear halts appear to less of an impediment than on the NYSE. They believe this may be due to the open order book or smaller order flow.
Wu (1998)	SEHK[20]	522 (1986-1993)	[-30,30] Daily	Returns, volatility & volume	News	Findings are consistent with Lee, Ready and Seguin (1994) suggesting that suspensions may not effectively ease unusual market activities immediately. Results suggest that the nature of suspension news may be a factor in explaining the market behaviour around trading suspensions.
Kryzanowski and Nemiroff (2001)	MSE TSE	96 (1988-1990)	[-130,130] 30 min	Spreads	News	Their results show that the adverse-selection component of the spread is higher around trading halts and highest at the trading halt.
Tan and Yeo (2003)	SSE[21]	470 (1986-1995)	[-30,30] Daily	Returns, volume & volatility	News and firm initiated	The 'favourable news' group experiences significantly positive abnormal returns around the event date. The 'unfavourable news' group, on the other hand, suffers a prolonged decline. High trading volumes in the pre and post-suspension periods are also accompanied by increases in post-suspension return volatility.

[20] Stock Exchange of Hong Kong
[21] Singapore Stock Exchange

4. THEORY AND HYPOTHESIS DEVELOPMENT

Several theories and hypotheses have been developed to explain the impact of non-trading periods on liquidity, volatility and stock returns. These hypotheses are developed below, in relation to the impact of trading halts.

4.1. Liquidity Impacts

4.1.1. Trading Volume

Admati and Pfleiderer (1988) develop a theory in which concentrated trading patterns arise endogenously because of the strategic behaviour of liquidity traders and informed traders. Their results show how trading volume will be elevated after a non-trading period, suggesting that trading volume will be abnormally high following a trading halt. Consistently, trading volume is expected to increase due to the need of investors to trade for liquidity and portfolio rebalancing purposes after receiving new information. This is consistent with the empirical studies of Aitken, Frino and Winn (1995), Lee, Ready and Seguin (1994) and Corwin and Lipson (2000). This view leads to the first hypothesis:

H_1: *Trading volume for halted stocks should be relatively higher than for control stocks in the post-halt trading period.*

Increases in abnormal trading volume found after a trading halt should be of concern to any market participant because this can lead to higher volatility due to the positive relationship documented in previous studies [(French and Roll (1986) and Harris (1986)). As noted earlier, higher levels of volatility after a trading halt would be of concern to regulators as a main purpose of trading halts is to curb excess volatility.

4.1.2. Bid-ask Spreads

Market regulators posit that trading halts protect investors from high levels of information asymmetry, which can lead to high transaction costs. If trading halts are successful in reducing uncertainty, then bid-ask spreads should decrease following a trading halt. However, there is a growing body of literature with models of 'learn-by-trading' (e.g., Glosten and Milgrom (1985), Grundy and McNichols (1989), Brown and Jennings (1989), and Leach and Madhavan (1993)). In these models, equilibrium prices are 'discovered' through the trading process, where uninformed traders infer the information held by informed traders by trading with (or against) them. Consequently, following a period of trade suspension, uninformed traders will experiment with a series of "trial' prices, learning the true equilibrium price through the responses of informed traders.

Leach and Madhavan (1993) show that dealers will widen spreads in order to reduce the relative number of noise traders and to obtain a clearer information signal from trade prices and order flow. Madhavan (1992) and Subrahmanyam (1997) also suggests that trading halts could exacerbate the problem of information asymmetry, as traders can no longer observe prices. Overall, 'learn-by-trading' models predict that the loss in price discovery associated with trading halts will result in wider spreads when trading resumes. This leads to the second hypothesis:

H_2: *Bid-ask spreads of halted stocks should be immediately wider than for control stocks in the post-halt trading period.*

4.1.3. Order Depth

Greenwald and Stein (1991) present a model where a large order imbalance may increase short-term volatility and decrease liquidity. They demonstrate that in this situation, transactional risk becomes high, causing investors to panic and withdraw liquidity from the market. Greenwald and Stein (1991) argue in circumstances where there is a supply shock, it may be beneficial to sacrifice timely execution by initiating a trading halt. This allows liquidity suppliers with the time needed to enter the market and provide the necessary liquidity to stabilise the market. Overall, the sequence of these events suggest that trading halts increase total order depth, which should result in abnormally high levels around trading halts.

By contrast, the learn-by-trading models posit that information asymmetry will be at its highest immediately after a trading halt. Subsequently, order depth for halted stocks is anticipated to be low during this period. This hypothesis is consistent with the findings of Brockman and Chung (1999) who demonstrate the existence of a negative relationship between order depth and information asymmetry on the order driven market of the Stock Exchange of Hong Kong (SEHK). Furthermore, Chung, Van Neese and Van Ness (1999) argue that when there are few limit orders outstanding, spreads will be wider because of the lack of competition. Upon examination of order depth around trading halts for a sample of U.S stocks, Corwin and Lipson (2000) find that total order depth increases after a trading halt. However, order depth near the best quote is found to be relatively low. This reflects the presence of uncertainty in the market, as traders are willing to be in the market but not near the best quotes.

These views lead to the following hypotheses:

H_3: *Total order depth of halted stocks should be immediately higher than those for control stocks during the post-halt trading period.*

H_4: *Order depth at the best quotes for halted stocks should be lower than those for control stocks around a trading halt.*

4.2. Volatility Impacts

A number of empirical papers have noted the positive relationship between trading volume and volatility. Notably, Schwert (1989) finds that growth in trading volume is positively related to an increase in monthly stock return volatility. French and Roll (1986) also show that volatility is higher when the market is open than when it is closed, suggesting that trading activity is an important contributor of short-run volatility. Brailsford (1995) utilises the auto regressive conditional heteroskedascity (ARCH) class of models to examine the impact of market closures on conditional volatility in the Australian equity market. He shows market closures are associated with an increase in conditional variance after the market closure. This finding suggests that the production of information over the market closure affects volatility once the market re-opens.

Stoll and Whaley (1990) argue that a trading halt is reasonable only if the procedure for re-opening leads to prices that more truly reflect security value. They find that the volatility of open-to-open returns is greater than close-to-close returns. This result could be explained by private information being revealed through the trading process, which supports the 'learn-by-trading' class of models. Consistently, Gerety and Mulherin (1994) find that volatility dissipates throughout the trading day and contend that the act of closing markets interrupts information flow and increases transitory volatility.

Gerety and Mulherin (1992) highlight a fundamental cost of closing markets because some investors wish to shed the risk of holding positions when the market is closed. Trading halts prevent such a transfer and can cause investors to overreact and leave the market more quickly than if a circuit breaker did not exist. Further, Gerety and Mulherin (1992) provide support for the idea that trading facilitates the incorporation of information into security prices ('learn-by-trade' models). Consequently, it is hypothesised that the trading behaviour of price volatility in halted stocks should be similar to those predicted for trading volume. This leads to the following hypothesis:

H_5: *Volatility for halted stocks should be relatively higher than those for control stocks in the post-halt trading period.*

4.3. Return Impacts

Trading halts are tools that provide a non-trading period, where market sensitive information can be efficiently disseminated into the halted stock price, before trading resumes. Trading halts are assumed to be installed unpredictably and withdrawn when full disclosure of information takes place. Considering this, it is hypothesised that there should not be any abnormal return behaviour around trading halts. This leads to the following hypothesis:

H_6: *Abnormal returns in the pre and post-halt period should not be significantly different from zero.*

4.4. Impact of Halt duration, Market capitalisation and Announcement type

Bhattacharya and Spiegel (1998) find that the NYSE has improved its ability to absorb more extreme news by using shorter halt durations. Conversely, Christie, Corwin and Harris (2002) find that post-halt price volatility and transaction cost impacts are significantly larger following NASDAQ halts that are re-opened with a 5-minute quotation period than for NASDAQ halts re-opened with a 90-minute quotation period. This is consistent with Greenwald and Stein (1991), who suggest that longer trading halts will allow time for greater information dissemination and allow time for liquidity suppliers to enter the market. Consequently, it is anticipated that trading halts with longer durations allow for increased resolution of uncertainty as reflected by narrower spreads and lower volatility in the post-halt trading period. This leads to the following hypothesis:

H_7: Trading halts with longer durations should have narrower spreads and lower volatility in the immediate post-halt trading period.

Spiegel and Subrahmanyam (2000) contend that variance uncertainty and asymmetric information is lower for larger stocks because they have greater analyst coverage and are widely held. Subsequently, they suggest that the cessation of trade due to impending public disclosures should occur less often for larger stocks. This leads to the following hypothesis:

H_8: Trading halts on larger stocks should have narrower spreads and lower volatility in the immediate post-halt trading period.

Wu (1998) provides evidence that market reactions are sensitive to the announced reason for the trading halt. Returns and volatility change substantially around mergers, acquisitions and private placement suspensions, but do not show significant changes around privatisation

halts. This suggests that the nature of halt news may be a factor in explaining the market behaviour around trading halts. Kim and Verrecchia (1991) also suggest that different trading halt announcement types may generate significant variations in trading volume and volatility. Aitken, Frino and Winn (1995) examine whether the amount of information released during a trading halts effects trading behaviour. Their results indicate that trading halts have no significant impact on the market around less-informative releases and conclude that trading halts lead to abnormal[22] levels of volatility and bid-ask spreads around informative announcements. These views lead to the following hypotheses:

H_9: *Trading halts for informative new announcements result in abnormal volatility and bid-ask spreads.*

H_{10}: *Trading halts for less informative new announcements do not result in abnormal volatility and bid-ask spreads.*

4.5. Volatility and Order depth

Corwin and Lipson (2000) find evidence that suggests increases in volatility are related to decreases in order depth in the post-halt period. However, they find that the decreased order depth appears to explain, at best, a small portion of the increased volatility. The remaining unexplained volatility may be the result of unmeasured information effects or due to the market closure itself. To investigate this further, the following hypothesis is tested:

H_{11}: *Abnormal volatility around trading halts is a result of decreased order depth in the limit order book.*

[22] Abnormal statistics are calculated using the measure around the trading halt, less the measure during the control period. See Section 5.2.2 for further details.

5. DATA AND METHOD

5.1. Data

The data for trading halts used in this study is provided by the Australian Stock Exchange ASX). The dataset consists of 18,505 trading halts, which were placed on ASX listed stocks between 1 January, 2005 and 26 September, 2006. The trading behaviour of stocks around their trading halts are compared to those for a set of control stocks (i.e. pseudo-halt stocks), which are identified by a strict set of selection criteria (see Section 5.2). Control stocks are obtained between 20 August, 2004 and 19 September, 2006. Trading halts are identified by the ASX Signal G database, which provides information on the start date and time and the end date and time for each trading halt. Additionally, the reason for each trading halt is also shown. Trading data for ASX stocks are extracted from the Stock Exchange Automated Trading System (SEATS) databases maintained by the Securities Industry Research Centre of Asia-Pacific (SIRCA).[23] The SEATS database provides complete details of all order and trade records placed on the ASX. These records provide details of price, volume, date, time and broker for every order and trade. The All Ordinaries Index is obtained to control for the impact of market-wide effects on returns for the sample.

Sample selection criteria are applied to obtain the necessary full sample of trading halts, which are then used to analyse their impact on the trading behaviour of ASX listed stocks. Excluded from the final dataset are:

- ASX stocks that underwent a change in the basis of quotation during the event period. This avoids any price changes that are not associated with the news announcement of the trading halt.

[23] SEATS is a competitive and open, electronic order book which trades continuously (from 10:00 to 16:00) from Monday to Friday. It allows brokers to clearly see bids and offers, place buy or sell orders, execute transactions, communicate with other brokers, and report any off-market transactions.

- ASX stocks that are placed into trading suspensions. This criterion is used because the effect of trading suspensions on stock behaviour is found to be notably different than for trading halts [Ferris, Kumar and Wolfe (1992)].

- Trading halts on securities preceding de-listings or transfers to other exchanges and trading halts representing the first transaction of a new listing. This criterion is used to ensure trading halts have trading data available for 20 hours on either side of the trading halt, since this is the event interval analysed (see Section 5.3).

- Trading halts on the same company that are applied more than once in the event interval. This criterion is used to prevent sample selection bias**.**

These exclusions produce a full sample of 18,245 trading halts for analysis.

5.2. Research Method

Several steps are undertaken in this study to examine the impact of trading halts on the trading behaviour of ASX listed stocks. First, trading halts are separated into various categories for analysis. Second, a procedure is adopted to identify control stocks (i.e. pseudo halts), which are needed to analyse for abnormal trading behaviour around trading halts. Third, intra-day-analysis is performed on several market quality variables to compare the trading behaviour between halted stocks and control stocks. Finally, supplemental analyses are performed including regression analysis to determine the relationships between market quality variables immediately after a trading halt.

5.2.1. Trading Halt Analysis

For a more detailed analysis of stocks placed in trading halts on the ASX, they are categorised by their trading halt duration, market capitalisation, price change during the trading halt interval, and announcement type. These four categories are:

[1] Trading halt duration is defined as the length of the trading halt in minutes and is divided into the following four groups: (i) less than 15 minutes (< 15 min); (ii) 15 to 30 minutes (15-30 mins); (iii) 30 to 60 minutes (30-60 mins); and (iv) more than 60 minutes (> 60 mins).

[2] Market capitalisation is a proxy for firm size. Halted stocks are divided into three market capitalisation groups: (i) the largest 50 stocks (top 50), where these stocks represent the most liquid with extensive analyst coverage; (ii) the next 150 stocks (51-200) are defined to be medium in size; and (iii) the remaining stocks outside the top 200 (>200), which represent small stocks (i.e., less liquid) with minor stock analyst coverage.

[3] Price change during the trading halt is defined by the halted stock return adjusted for the market return as proxied by the All Ordinaries Index.[24] This measure (hereafter termed the market-adjusted halt return) provides an indication for the amount of information content revealed during the trading halt interval.[25] Informative trading halts are defined by either a positive ('good news') or negative ('bad news') market-

[24] The stock return over the halt is computed using the mid-point price (i.e. mid-point of the bid-ask spread) immediately before the halt and the first traded price immediately after the halt. If no trade occurs then the mid-point price immediately after re-open is used. This computational procedure mitigates against bid-ask bounce in intra-day returns and recognises the problems of thin trading in less liquid stocks.

[25] This technique is identical to that used by Bildik (2004), who find that it produces very similar results to the tick test of Lee and Ready (1991).

adjusted halt return. Conversely, less informative halts ('no news') are defined by a zero market-adjusted halt return.

[4] Trading halt announcement type describes the reason as to why an ASX listed stock was placed in a trading halt. This descriptor is obtained from the ASX Signal G database, which categorises the reason for the trading halt using specific primary and secondary codes (see Appendix). There are nineteen trading halt announcement types contained in the primary code. This study condenses the trading halt descriptor into a smaller subset of seven trading halt announcement types based on similar characteristics (see Appendix) for more meaningful analysis.

5.2.2. Identification Procedure for Control stocks

To investigate for abnormal trading behaviour around trading halts, a procedure to identify control stocks that exhibit 'normal' trading behaviour is required. Lee, Ready and Seguin (1994) highlight that an ideal experiment to achieve this task is to compare two identical firms, which experience the same market sensitive news announcement, where only one of those firms is placed into a trading halt. Though this ideal experiment is not achievable, this study adopts a procedure to identify control stocks towards this end. Developing an identification procedure for control stocks begins with an understanding of the main factors that influence the trading behaviour of stocks placed in a trading halt. Three broad factors that have been described to influence the trading behaviour of halted stocks include:

[1] **Time:** It is a well stylised fact that the trading behaviour of equities can be dependant on the time-of-day and/or day-of-week. For example, the existence of U-shaped intra-day volume, spread and volatility patterns (characterised by high values at the open

and close, compared to other periods within the day) has been reported consistently in the United States and a number of other overseas stock exchanges.[26]

[2] **Information content**: The intensity of the information content contained in the announcement accompanying the trading halt is likely to influence stock trading behaviour [see Lee, Ready and Seguin (1994);Brown, Clinch and Foster (1992)]; and

[3] **Trading halt mechanism:** The trading halt and procedure used to re-open trading may is likely to have an impact on stock trading behaviour [see Gerety and Mulherin (1992) and Lee Ready and Seguin (1994)]

Controlling for the first two factors allow for the isolation and appropriate examination of the trading halt mechanism and its impact on the trading behaviour of halted stocks. To make the necessary adjustments, a three step identification procedure for control stocks is applied as follows:

Step 1: An absolute market-adjusted halt return[27] for each ASX trading halt is computed.

Step 2: For each ASX halted stock, a historical series of control intervals (i.e. pseudo-halt intervals) matched by time-of-day and day-of-week of the actual halt is sampled. The control intervals identified are bounded within the control period, which

[26] Intra-day patterns in trading volume, spreads and volatility have been found to exhibit time dependent behaviour for most major stock markets around the world. These include the New York Stock Exchange [see McInish and Wood (1992)], Hong Kong Stock Exchange [see Brockman and Chung (1998)] and Australian Stock Exchange [see Aitken, Brown and Walter (1994)].

[27] Absolute market-adjusted halt return is computed as the absolute value of the halt return minus the return on the market index (All Ordinaries index).

extends from 140 to 14 days before the actual halt.[28] Absolute market-adjusted returns for all control intervals are estimated.

Step 3: A matching algorithm is used to sequentially compare the absolute market-adjusted halt return of each actual halted stock to the return in the nearest control interval. The interval in the control period with the closest market-adjusted absolute return to that found across the actual halt, is chosen as the control stock.

The identification procedure for control stocks can be enhanced by specifying a low percentage for the abnormal absolute market-adjusted halt return (see Step 3). A shortcoming of doing so is that not all traded halts will be matched with control stocks, but on the upside this should allow for a better analysis of the extent of abnormal trading behaviour around trading halts. Consequently, this study not only examines the full sample of 18,245 trading halts, but does so for a more refined pseudo-halt sample of 16,113 trading halts. This pseudo-halt sample is obtained by setting the abnormal market-adjusted absolute return to 1 percent, in order for relevant control stocks to be selected.

5.2.3. Intra-day Analysis of Trading Behaviour around Trading Halts

The interval in which an ASX stock is placed in a trading halt (the 'event') is defined as t=0. An event window of eighty 15 minute intervals before (i.e., pre-halt period) and after the event (i.e., post-halt period) is used to analyse for abnormal trading behaviour of halted stocks.[29] This allows for an examination of 20 hours of trading data on either side of the trading halt, which should provide sufficient time to detect if any abnormal trading

[28] Lee, Ready and Seguin (1994) pseudo-halts could come from the second trading day in the post-halt period so that the events underlying the trading halts might affect the post pseudo-halt volatility. This study ensures that pseudo-halts are not within 14 days of the actual halt.

[29] The opening and closing call auction periods are omitted from the intra-day intervals. This avoids any confounding effects from the call auction. If an interval begins within 15 minutes of the closing call auction, then the interval will end the following trading day after the opening call auction.

behaviour exists. Previous studies use daily or half hour intervals, with the only exception being Bildik (2004), who examines eighty 15-minute intervals. Shorter intervals allow for a more detailed analysis of abnormal trading behaviour around trading halts, which might be lessened through aggregation over longer interval lengths.

Abnormal trading behaviour for several market quality variables (see Section 5.3) are analysed on an intra-day basis. For each halted stock analysed, an abnormal market quality variable measure is calculated. This measure is computed for each intra-day interval, by subtracting the market quality variable of interest in the control stock from that of the actual halted stock. The mean for each particular abnormal market quality variable is then calculated for each of the four 15-minute intervals surrounding a trading halt and for several event windows ranging from 20, 40 and 80 intervals on either side of the trading halt. The significance of each abnormal market quality variable is tested using a one-tailed Wilcoxon signed rank test. This test uses the rank and value of observations and avoids the assumptions of standard *t*-tests with only a small loss in efficiency.

5.3. Market Quality Variables used in the Analysis

To examine the impact of trading halts, data for three main statistics of market quality are obtained. Market quality has many characteristics including liquidity, volatility and informative prices. This study uses similar measures to Lee, Ready and Seguin (1994), as well as Aitken, Frino and Winn (1995), which will allow for a direct comparison.

5.3.1. Liquidity Measures

5.3.1.1. Trading Volume

Total dollar value of trades, total volume of shares traded and total number of trades in each interval is computed. Each of these measures provide similar results so only total volume of

shares traded in each time interval is presented. The re-opening auction volume is also calculated and represents the volume traded during the opening call auction following the end of a trading halt. Relative trading volume is also computed by dividing the trading volume for each firm by the total number of securities outstanding for that trading day. This measure is superior to other raw trading measures because it adjusts for market capitalisation changes.

5.3.1.2. Bid-ask Spreads

The difference between the lowest ask and the highest bid defines the bid-ask spread. Bid-ask spreads tend to vary with the price of a stock and are often subject to arbitrary minimum tick size rules. Consequently, following McInish and Wood's (1992) study, a time-weighted relative measure is calculated. That is, each spread is weighted by the amount of time it existed and divided by the time-weighted midpoint price.

5.3.1.3. Order Depth

Order depth is measured by summing the total volume of all orders in the limit order book at the start of each interval. Four measures different measures of order depth are calculated. Relative best bid (ask) order depth is computed as volume at the best quote on the buy (sell) side of the market. Relative total bid (ask)-side order depth, computed as the total volume on the buy (sell) side of the market. Relative order depth measures are computed by dividing the depth measure for each firm by the total number of securities outstanding for that trading day. This measure is superior to other raw trading measures because it adjusts for market capitalisation changes.

5.3.2. Volatility Measures

Trading halts are designed to minimise excessive volatility, therefore the impact of trading halts on stock return volatility is examined. Volatility is measured by ABSRET, computed as the absolute value of the difference between the last midpoint price before the interval and

the last midpoint price in the interval. ABSRET is a traditional measure of volatility and is believed to be a better estimator than squared returns (Lee, Ready and Seguin (1994)). ABSRET will capture the degree to which news around halts causes excess volatility regardless of the nature of the information. The use of quote midpoints avoids bid-ask bounce, which imparts an upward bias in price volatility estimates based on trade prices (see Venkatesh (1992)).

5.3.3. Return Measures

To examine the return behaviour around trading halts, abnormal returns are computed for each interval around the trading halt. A key issue in an event study is how to measure 'abnormal' returns. Engelen and Kabir (2006) use five different models to estimate abnormal returns and find that a simple market-adjusted model works as well as more complex models. Brown and Warner (1980) confirm that the simple models can work as well if not better than the complex models. Therefore abnormal returns are computed as the return on the halted stock, adjusted for the return on the market index (All Ordinaries Index). Abnormal returns are computed for 80 intervals either side of each trading halt. The abnormal returns for each trading halt are then cumulated from interval -80, to interval 80. The cumulative abnormal returns (CAR's) for each trading halt are then averaged to provide cumulative average abnormal returns (CAAR's) in each interval.

5.4. Supplementary Analyses

5.4.1. Volatility and Order Depth

To investigate the relationship between volatility and order depth, this study uses a similar methodology to Corwin and Lipson (2000). Firstly abnormal volatility and abnormal order

depth at the best quotes[30] are plotted against each other for the first 45-minutes after a trading halt. This will provide some indication of the relationship between volatility and order depth immediately after a trading halt. To further investigate this relationship, controls for abnormal volume, halt duration and market capitalisation are needed[31]. To control for these effects, an ordinary least squares (OLS) regression of abnormal volatility on abnormal depth and the control variables is estimated. The regressions are estimated for period 1 (15 minutes after a trading halt) to give an indication of the relationship immediately after a trading halt. The regressions take the following general form:

$$Abnormal\ Volatility_i = a_0 + a_1 * AbnDepth_i + a_2 * AbnVolume_i + a_3 * MktCap_i + a_4 * HaltDuration_i + \varepsilon_i .$$

The dependent variable is abnormal ABSRET[32] and is used as the measure of abnormal volatility. The explanatory variables include the abnormal volume during interval 1 (AbnVolume), abnormal depth at the best quotes (AbnDepth) at the start of interval 1[33], market capitalisation of halted stock (MktCap) and the duration of the trading halt in minutes (HaltDuration). The intercept from the regression can be interpreted as the average level of abnormal volatility that cannot be explained by the control variables.

Corwin and Lipson (2000) estimate their regression controlling for the return during the trading halt, but do not control for market capitalisation and halt duration. This study already controls for trading halt return using the pseudo-halt methodology which Corwin and Lipson

[30] Corwin and Lipson (2000) use abnormal limit order depth within $0.25 of the best quotes.
[31] See Section 4.5 for discussion of theory related to the possible impact of these variables.
[32] Abnormal ABSRET is the ABSRET measure during the trading halt less the ABSRET measure during the corresponding pseudo-halt. ABSRET is defined in Section 5.4.2.
[33] Abnormal depth at the best quotes is equal to the depth at the best bid, plus the depth at the best offer. Relative depth is not used because changes in market capitalisation is a controlled for in the regression.

(2000) do not use. Market capitalisation and halt duration, as discussed in Section 4.4, are expected to impact on the trading behaviour around trading halts. At the same time as well as examining the relationship between volatility and liquidity, the regression allows a further examination of the relationship between volume and volatility, as well as the impact of market capitalisation and trading halt duration on abnormal volatility.

5.4.2. Alternative Matching Procedure

Lee, Ready and Seguin (1994) highlight that a bias may occur if the matching pseudo-halts have, on average, lower absolute price moves than the true halts. The requirement of a 1% match mitigates this problem, but the bias may still exist. To alleviate this possibility, they created an "overmatched" sample where every halt was matched against the pseudo-halt with the closest absolute net-of-market return greater than the absolute net-of-market halt return. They find similar results using the overmatched sample. To ensure that the results in thus study are not prone to the same possible bias, a sample is created were trading halts are matched within 0.05%. This effectively ensures that each trading halt is matched with a pseudo-halt of almost identical returns.

6. RESULTS

6.1. Descriptive Statistics for Trading Halts

6.1.1. Full Sample

Table 6.1 provides descriptive statistics for the full sample of 18,245 trading halts (Panel A). Statistics include the total number of trading halts, the mean and medians for the length of the trading halt in minutes (i.e. trading halt duration), and those for the market-adjusted returns and absolute market-adjusted returns realised across the trading halt period. Trading halts are also examined by duration (Panel B), market capitalisation (Panel C), price change during the halt period (Panel D), and announcement type (Panel E).

On examination of the full sample of trading halts (see Panel A of Table 6.1), the mean (median) trading halt duration is 39.41 (12.37) minutes. This large difference can be explained by outliers attributed to long term trading halts that usually last up to 2 trading days. Market-adjusted returns across the trading halt period are positive with the mean (medians) in the magnitude of 0.99% (0.21%). This suggests that trading halts in the sample period are associated with good news announcements. The mean (median) absolute market-adjusted return of 2.31% (0.95%) is four times smaller to those documented by Lee, Ready and Seguin (1994) for their sample of trading halts on the NYSE[34]. This suggests that trading halts on NYSE stocks are only used during periods of higher volatility, relative to those on the ASX. Under this premise, trading halts are used less often by exchange officials on the NYSE than on the ASX and is consistent with the relative number of trading halts used by these stock exchanges (see Table 2.1).

[34] Lee, Ready and Seguin (1994) find that their sample of trading halts on the NYSE have a mean (median) absolute market-adjusted return of 8.1% (4.2%).

Table 6.1, Panel B reports that the majority (86%) of trading halts have durations of less than 15 minutes. The bulk of the remaining trading halts have durations between 15 and 30 minutes, with 10% of the sample falling within this category. The number of trading halts with durations between 30 and 60 minutes are the most infrequent. The mean and median market-adjusted absolute returns across the halt period are found to be higher for trading halts with longer durations. Trading halts over one hour have a mean of 8.31% compared to 1.97% for halts of less than 15 minutes.

In Panel C of Table 6.1, trading halts are examined within three market capitalisation groups. Across all market capitalisation groups, the median halt duration is similar, with each approximately 12 minutes. It is noted that there is a difference in the mean duration, for smallest stocks the mean is 40.96 minutes compared to 24.13 for the largest stocks. This suggests that smaller stocks are halted for longer periods than larger stocks. The mean and median market-adjusted returns (both actual and absolute) are found to decrease with firm size. This could be expected as the smallest stocks have longer average durations, which tend to produce higher halt returns.

Table 6.1, Panel D classifies each trading halt by the sign of the price change during the trading halt duration period. A positive (negative) price change is associated with 'good news' ('bad news'), where a zero price change represents a 'no news' event. In the sample period, 53% (31%) of trading halts are associated with 'good news' ('bad news'). 'No news' trading halts (16%) have a shorter average trading halt duration (i.e., 18 minutes) than for trading halts with 'good news' (i.e., 45.40 minutes) or 'bad news' (i.e., 39.80 minutes). An explanation for this observation is that trading halts with longer (shorter) durations provide market participants with more (less) time to appropriately disseminate.

Table 6.1 Descriptive Statistics for Full Sample

This Table provides descriptive statistics for the full sample of ASX trading halts examined between 1 January 2005 and 25 September 2006. Mean (Median) statistics are provided for trading halt duration and both actual and absolute market-adjusted returns for the trading halt duration. Market-adjusted returns are calculated as the return during the trading halt less the return on the All ordinaries index during the same period. Trading halts are also reported by trading halt duration, market capitalisation of halted stock, price change during the trading halt and announcement type.

	Number of Trading Halts in Sample (% of total)	Trading Halt Duration (in minutes) Mean (Median)	Market-adjusted Return Mean (Median) %	Market-adjusted Absolute Return Mean (Median) %
Panel A: Full sample				
Full Sample	18,245 (100%)	39.41 (12.37)	0.99% (0.21%)	2.31% (0.95%)
Panel B: Full sample: Trading Halt Duration				
Less than 15 minutes	15,713 (86%)	12.09 (12.15)	0.82% (0.19%)	1.97% (0.88%)
15-30 minutes	1,806 (10%)	17.86 (16.75)	0.89% (0.24%)	3.06% (1.23%)
30-60 minutes	103 (1%)	41.60 (39.18)	0.54% (-0.16%)	6.81% (2.77%)
Longer than 60 minutes	623 (3%)	790.59 (207.88)	5.97% (1.87%)	8.31% (3.34%)
Panel C: Full sample: Market Capitalisation				
Top 50 (Largest)	857 (5%)	24.13 (12.68)	0.03% (0.01%)	0.89% (0.16%)
51-200 (Medium)	1,524 (10%)	44.31 (12.73)	0.22% (0.06%)	1.12% (0.31%)
201+ (Smallest)	13,814 (85%)	40.96 (12.32)	1.09% (0.40%)	2.49% (1.13%)
Panel D: Full sample: Price Change During Trading Halt				
'Bad News'(Negative)	5,612 (31%)	39.80 (12.35)	-2.24% (1.31%)	1.73% (0.76%)
'Good News' (Positive)	9,734 (53%)	45.40 (12.46)	3.12% (1.64%)	2.81% (1.20%)
'No News' (Zero)	2,897 (16%)	18.54 (12.10)	0.00% (0.00%)	1.76% (0.28%)
Panel E: Full sample: Announcement Type				
Asset acquisition/ Disposal	1,259 (7%)	16.64 (12.77)	0.98% (0.21%)	2.01% (0.64%)
ASX announcement/Query	737 (4%)	626.59 (88.37)	2.86% (0.42%)	5.60% (2.07%)
Financial Information	3,769 (21%)	12.87 (12.00)	0.18% (0.02%)	1.69% (0.75%)
Miscellaneous	1,834 (10%)	13.70 (11.88)	0.14% (0.01%)	1.80% (0.67%)
Progress Report	8,654 (47%)	13.40 (12.43)	1.50% (0.79%)	2.40% (1.17%)
Share issue	1,250 (7%)	15.81 (12.30)	-0.44% (-0.01%)	2.16% (0.88%)
Takeover related	742(4%)	36.18 (13.60)	1.91% (0.02%)	3.14% (0.48%)

market sensitive information into the stock price. Subsequently, it can be argued that trading halts with longer (shorter) durations will result in either positive or negative (zero) price changes.

In Panel E of Table 6.1, trading halts are grouped by announcement type. The majority of trading halts (47%) are initiated immediately before the release of a progress report by the listed company. This is consistent with the need for ASX listed companies to comply with continuous disclosure regulations (see Section 2.3). The duration of trading halts are comparable across most announcement types, except for those classified by ASX announcement/query. These halts have a median duration of 88.37 minutes and are associated with the highest average market-adjusted (both actual and absolute) halt return. Conversely, trading halts used for the release of financial information and for miscellaneous reasons such as company administration have small average market-adjusted halt returns. The lack of significant positive returns during the halt period for these types of announcements are explained by (i) the lack of importance placed on the information being released to the market; and/or (ii) the fact that this information has already been impounded into the stock price before the trading halt used to provide for the "official" information release. The announcement to issue new capital by an ASX listed company is the only announcement type associated with a negative market-adjusted halt return. The mean market-adjusted halt return of -0.44% indicates a negative reaction to the issue of new capital.

6.1.2. Matched Sample

*Table 6.*2 reports the descriptive statistics for the pseudo-halt matched sample. Of the 18,245 trading halts in the full sample, 88.31% are matched with pseudo-halts, resulting in a matched sample of 16,113 trading halts. This matched sample is larger relative to Lee, Ready and Seguin (1994) who match 59% of their full sample using the same method. In Panel A of

Table 6.2, it can be observed that the pseudo-halt matched sample has similar trading halt durations and lower market-adjusted returns (both actual and absolute) compared to the full sample (see Panel A, Table 6.1).[35] The results of these direct comparisons are consistent with a correct application of the pseudo-halt matching procedure.

6.2. Liquidity Impacts

6.2.1. Trading Volume

6.2.1.1. Trading Volume: Full vs. Matched Sample

Table 6.3 reports the abnormal trading volume and abnormal relative trading volume for both the full sample and the pseudo-halt matched sample. Each measure has been calculated for 80 intervals either side of the trading halt as well as the average for 20, 40 and 80 intervals either side of the trading halt. Table 6.3 reports the average abnormal volume and abnormal relative volume for the event periods [-80,-1], [-40,-1], [-20,-1], -4, -3, -2, -1, 1, 2, 3, 4, [1, 20], [1, 40] and [1, 80].

The full sample results in Table 6.3 show that both abnormal volume and relative volume are extremely high and significant in the post-halt period. Firstly, the re-opening volume is significantly higher (24,644) than the volume traded during the pseudo-halt. Immediately following the trading halt abnormal volume is 392,236 units in interval 1 (first 15 minutes following a trading halt). Following interval 1, abnormal trading volumes begin to decline while remaining significantly high. This is shown by the abnormal volume of 19,602 units in interval [1, 80] (the average abnormal volume in the 80 intervals following a trading halt).

[35] The mean market-adjusted return (market-adjusted absolute return) for the pseudo-halt matched sample is 0.50% (1.30%) compared to 0.99% (2.31%) for the full sample. It is noted that this difference reflects the problem of finding suitable matches for trading halts that exhibit large price changes across the trading halt period.

Table 6.2 Descriptive Statistics for Matched Sample

This Table provides descriptive statistics for the matched sample of ASX trading halts examined between 1 January 2005 and 25 September 2006 Mean (Median) statistics are provided for trading halt duration and both actual and absolute market-adjusted returns for the trading halt duration. Market-adjusted returns are calculated as the return during the trading halt less the return on the All ordinaries index during the same period. Trading halts are also reported by trading halt duration, market capitalisation of halted stock, price change during the trading halt and announcement type.

	Number of Trading Halts in Sample (% of total)	Trading Halt Duration (in minutes) Mean (Median)	Market-adjusted Return Mean (Median) %	Market-adjusted Absolute Return Mean (Median) %
Panel A: Matched sample				
Matched Sample	16,113	34.50 (12.32)	0.50% (0.13%)	1.30% (0.73%)
Panel B: Matched sample: Trading Halt Duration				
Less than 15 minutes	14,094 (87.5%)	12.05 (12.13)	0.48% (0.13%)	1.23% (0.69%)
15-30 minutes	15,209 (9.4%)	17.59 (16.54)	0.52% (0.15%)	1.46% (0.86%)
30-60 minutes	71 (0.4%)	40.29 (37.13)	-0.64% (-0.34%)	2.05% (1.28%)
Longer than 60 minutes	428 (2.7%)	832.75 (240.59)	1.34% (0.53%)	2.77% (1.75%)
Panel C: Matched sample: Market Capitalisation				
Top 50 (Largest)	816 (5%)	23.15 (12.65)	0.04% (0.01%)	0.45% (0.15%)
51-200 (Medium)	1,411 (10%)	40.58 (12.67)	0.04% (0.06%)	0.60% (0.28%)
201+ (Smallest)	12,143 (85%)	35.24 (12.28)	0.56% (0.24%)	1.42% (0.90%)
Panel D: Matched sample: Price Change				
'Bad News'(Negative)	5,155 (32%)	38.54 (12.32)	-1.87% (-1.17%)	1.15% (0.64%)
'Good News' (Positive)	8,265 (51%)	37.04 (12.40)	2.11% (1.35%)	1.43% (0.90%)
'No News' (Zero)	2,691 (17%)	18.96 (12.12)	0.00% (0.00%)	1.15% (0.17%)
Panel E: Matched sample: Announcement Type				
Asset acquisition/ Disposal	1,139 (7%)	16.70 (12.72)	0.56% (0.15%)	1.13% (0.50%)
ASX announcement/Query	572 (4%)	584.92 (20.61)	0.80% (0.09%)	2.25% (1.33%)
Financial Information	3,459 (21%)	12.85 (11.98)	0.06% (0.01%)	1.10% (0.63%)
Miscellaneous	1,692 (11%)	13.71 (11.87)	0.07% (0.01%)	1.21% (0.52%)
Progress Report	7,485 (46%)	13.32 (12.42)	0.93% (0.59%)	1.39% (0.89%)
Share issue	1,126 (7%)	15.58 (12.23)	-0.30% (0.00%)	1.33% (0.63%)
Takeover related	640 (4%)	27.25 (13.10)	0.16% (-0.02%)	0.86% (0.35%)

Table 6.3 Abnormal Trading Volume: Full Vs Matched Sample

This Table reports the average abnormal volume and relative volume behaviour around trading halts. Full represents the full sample and matched indicates the pseudo-halt matched sample. Re-opening represents the abnormal volume (relative) volume traded in the opening call auction after a trading halt less the volume (relative) volume traded over the same period in the pseudo-halt. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests.

	Abnormal Trading Volume		Abnormal Relative Trading Volume (%)	
Interval	**Full**	**Matched**	**Full**	**Matched**
[-80,-1]	-270	359	-0.0005	0.0000
[-40,-1]	2,060	2,747	0.0003	0.0007
[-20-1]	3,741	4,672	0.0011	0.0017
-4	1,303	3,780	0.0005	0.0013
-3	5,46	6,023	-0.0002	0.0005
-2	6,145	8,381	0.0009	0.0016
-1	5,688	4,184	0.0017	0.0026
Re-opening	24,644***	5,918**	0.0102***	0.0020***
1	392,236***	239,433***	0.1447***	0.0822***
2	114,598***	70,624***	0.0430***	0.0236***
3	67,922***	40,166***	0.0272***	0.0151***
4	45,481***	29,319***	0.0197***	0.0115***
[1,20]	52,566***	31,396***	0.0206***	0.0107***
[1,40]	32,434***	19,493***	0.0123***	0.0060***
[1, 80]	19,602***	12,113***	0.0074***	0.0038***

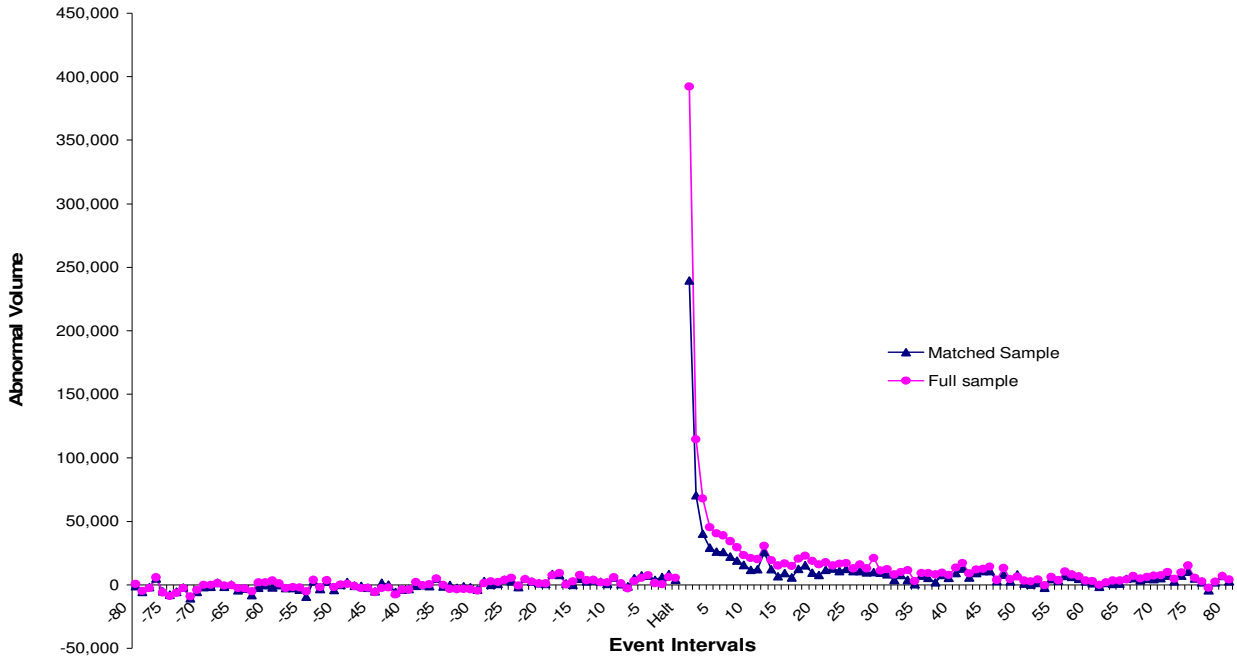
The full sample results control for firm, time-of-day and day-of-week effects but do not control for the magnitude of the price move during the halt. Typically, a trading halt is associated with a major price move, so a portion of the post-halt volume may be attributable to liquidity trading and portfolio rebalancing activities made in reaction to changes in share value. Thus, these results for the full sample may not be surprising. The pseudo-halt matched sample overcomes this and isolates the abnormal trading volume attributable to the trading halt mechanism.

The matched sample in Table 6.3 reports similar results to the full sample, but of a smaller magnitude. The abnormal re-opening trading volume is still significantly high, but is now only 5,918 units compared to 24,644 units for the full sample. Similarly all of the post-event windows show the same results but of lesser magnitude. This reduction in abnormal trading volume reflects controlling for the amount of information being released. The presence of further abnormal trading volume is attributable to the impact of the trading halt itself. The results for relative volume show a similar result to the volume statistics and will not be discussed.

In order to graphically examine the difference between the results of the full vs. matched sample, Figure 6.1 reports abnormal trading volumes for 80 intervals either side of the trading halt for the full and matched sample. Both exhibit a similar pattern in the pre-event intervals with no significant abnormal trading volume in the lead up to a trading halt. Immediately after the trading halt in interval 1, both samples increase dramatically and do not return to the pseudo-halt levels until interval 10 (150 minutes after a trading halt). Some positive abnormal trading behaviour still exists after interval 10 and persists for over 30 intervals. Taken together these results are consistent with similar studies such as Lee, Ready and Seguin (1994) and Aitken, Frino and Winn (1995) and also consistent with hypothesis 1.

Figure 6.1 Abnormal Trading Volume: Full Vs Matched Sample

This Figure displays the average abnormal trading volume for the full and matched sample over the event period [-80, 80].



6.2.1.2. Trading volume by Market capitalisation, Trading halt duration, Price change and Announcement type

Table 6.4, reports the results separated by the market capitalisation of the halted stocks. Abnormal trading volume in interval [1, 20] is 233% higher for the largest 50 stocks (70,383 units) compared to the smallest stocks (30,117 units) in the sample. This result is consistent across all post-halt event periods and suggests trading halts on larger stocks result in higher abnormal volume compared to smaller stocks in the post-halt period. Table 6.4 also presents the results separated by the duration of the trading halt. Trading halts of longer duration result in significantly larger and prolonged abnormal volumes. For example, the abnormal volume for halts of less than 15 minutes (<15) in interval [1, 80] is 10,287 units compared to 72,310 units for trading halts over an hour (>60). This suggests that longer trading halts increase liquidity around trading halts, however it is vital that the excess trading volume does not result in excess volatility (to be examined in Section 6.3).

Table 6.4 Abnormal Trading Volume by Price Change, Market Capitalisation and Trading Halt Duration

This Table reports the average abnormal volume behaviour around trading halts for the matched sample. Re-opening represents the abnormal volume traded in the opening call auction after a trading halt less the volume traded over the same period in the pseudo-halt. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). Price change represents the price change during the trading halt. Market Capitalisation represents the market capitalisation of the halted stock. Halt duration is the length of the trading halt in minutes. For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests

	Abnormal Volume by:									
	Price Change			Market Capitalisation			Halt Duration (Minutes)			
Interval	**'Bad News'**	**'Good News'**	**'No News'**	**Top 50**	**51-200**	**201+**	**<15**	**15-30**	**30-60**	**60+**
[-80,-1]	1,578	-363	288***	5,134	7,004*	-773	-130	539	17,465 *	13,930**
[-40,-1]	5,464*	2,124	-423***	-2,514*	11,713***	2,494	2,530	-904	21,204	20,960***
[-20-1]	8,384**	4,245	-958***	-3,156*	16,956**	4,478	3,849	5,050	32,252	27,457***
-4	2,958	6,196*	-2,066	6,776	10,834*	3,206	2,668	5,620	16,286	33,884
-3	9,649	6,277	-1,527	6,026	26,057	4,739	4,402	3,950	21,929	68,204**
-2	13,096	7,604	1,950	-9,120	51,368**	7,292	7,410	12,106	25,735*	25,558*
-1	4,446	4,651	2,233	443	21,633	3,289	3,747	-860	-29,978	44,545**
Re-opening	-9,996***	17,954***	-708***	-161,527***	-29,525***	21,607***	11,080***	26,911**	13,443	-249,639***
1	223,332***	311,811***	48,057***	430,502***	217,072***	249,006***	205,425***	333,843***	564,204***	1023,785***
2	82,595**	83,799***	7,945	162,853***	112,378***	66,562***	60,461***	89,180***	154,077***	343,706***
3	44,389**	49,843***	2,664	98,217***	54,864***	38,205***	31,945***	57,779***	162,145***	241,829***
4	48,401***	29,896***	-8,099	84,903***	42,409***	27,245***	22,181***	46,827***	131,785***	196,687***
[1,20]	38,053***	36,155***	4,401**	70,383***	40,293***	30,117***	26,221***	41,823***	77,874***	166,119***
[1,40]	25,179***	21,581***	2,482	45,800***	31,950***	17,823***	16,245***	25,324***	58,926***	104,920***
[1, 80]	16,824***	12,953***	736	29,573***	18,707***	11,300***	10,287***	11,848***	42,666***	72,310***

Table 6.4 further reports abnormal volume separated by the price change during the trading halt period. The abnormal volume increases most significantly for 'good news' halts in interval 1 (311,811), while remaining significantly high for 'bad news' (223,332) and 'no news' (48,057) trading halts. Trading halts associated with 'good news' or 'bad news', result in significantly abnormal volume for up to one trading day, whereas abnormal volume disappears within 1 hour for 'no news' halts. Abnormal trading volume still exists after 'no news' trading halts, but is lower suggesting the impact of trading halts is not as significant when the information being released is less informative.

The presence of abnormal trading volume for up to an hour is of concern for 'no news' trading halts. If there is no price change during the trading halt, there should not be any abnormal trading behaviour caused by liquidity trading and portfolio-rebalancing activities made in reaction to changes in share value. This suggests that many trading halts are called for the release of information that does not have a material effect on the price of a security. The only impact is to impose an unnecessary restriction on trading that leads to abnormal trading volume after a trading halt.

Table 6.5 reports abnormal trading volume results by the type of announcement being released during the trading halt. The results all show similar patterns with some stronger than others. As expected, trading halts grouped together as miscellaneous have the lowest abnormal trading volumes in the post-halt period. These announcements are not highly informative and do not result in large price changes.[36] Despite the lack of information, they still result in significant and positive abnormal volumes. This is shown by the abnormal trading volume in interval [1, 20] of 20,326 units. The category with the highest abnormal

[36] Table 6.2 shows the average abnormal return during miscellaneous trading halts is 0.07%. The matched sample has an average abnormal return of 0.50%.

Table 6.5 Abnormal Trading Volume by Announcement Type

This Table reports the average abnormal volume behaviour around trading halts for the matched sample. Re-opening represents the abnormal volume traded in the opening call auction after a trading halt less the volume traded over the same period in the pseudo-halt. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). Announcement Type represents categories formed based on the announcement made during each trading halt. For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests

	Announcement Type						
Interval	**Asset Acquisition/ Disposal**	**ASX Announcement/Query**	**Financial Information**	**Miscellaneous**	**Progress Report**	**Share Issue**	**Takeover Related**
[-80,-1]	1,586	37,752***	-5,294**	-1,622	-319	7,095	-3,136
[-40,-1]	148	58,049***	-1,156	-1,603	1,810	5,340**	-2,868
[-20-1]	7,624	75,308***	-184	1,503	1,812	5,096**	3,986
-4	27,788**	43,260***	-5,969*	6,722	950	9,945	-6,601
-3	17,163	68,258***	-47	-2,636	4,352	8,816	1,292
-2	455	53,716***	-4,158	31,096	6,931	3,733	14,778
-1	-13,083	50,794***	-3,072	22,538	4,794	-11,152**	3,293
Re-opening	6,316	-97,986	-2,089**	-2,108***	16,901***	34,531	-15,770***
1	305,974***	638,923***	101,164***	100,848***	277,136***	339,258***	262,813***
2	88,512***	230,387***	39,118***	25,511***	75,625***	64,046***	139,487***
3	52,144***	170,518***	26,569***	13,970***	36,679***	56,018***	59,047***
4	39,863***	154,330***	24,834***	7,204***	23,986***	30,713***	42,290***
[1,20]	43,839***	129,562***	16,296***	20,326***	28,846***	40,037***	47,772***
[1,40]	29,312***	92,531***	12,230***	10,063***	15,873***	25,987***	32,508***
[1, 80]	16,170***	60,502***	8,395***	5,424***	9,310***	21,727***	15,915***

trading volume over the same period is halts called for an ASX announcement or query. Trading halts of this type have a longer average duration (584.92 minutes) compared the matched sample (34.50 minutes) and all other halts categories (see Table 6.2). Table 6.2 demonstrates that longer trading halts tend to result in larger abnormal volumes.[37]

6.2.2. Bid-ask Spreads

6.2.2.1. Relative Bid-ask Spreads: Full and Matched Sample

Table 6.6 presents the abnormal relative bid-ask spreads results for both the full and matched sample. Interval -1 (-0.0031%) and interval [-20, 1] (0.0359%) indicate that the abnormal relative bid-ask spreads are not significantly different from zero, for the matched sample, in the pre-halt period. The post-halt intervals display a different pattern with significantly wider abnormal relative bid-ask spreads in interval 1 (0.1203%). The abnormal relative bid-ask spreads have more than tripled from the pre-halt period and remain abnormally wide in interval 2, 3 and 4. The abnormal relative bid-ask spread in interval [1, 20] (0.0112%), suggests that abnormal relative bid-ask spreads begin to narrow in the post-halt period.

Figure 6.2 shows that abnormal relative bid-ask spreads are widest immediately following a trading halt and remain abnormally wider for 11 intervals, (2 hours and 45 minutes) before becoming abnormally narrow over the remaining intervals. This is shown in Table 6.6 by the significantly narrow abnormal relative bid-ask spreads in interval [1, 80] (-0.0739%). This suggests that trading halts in the long term reduce bid-asks spreads, but impose higher transaction costs through bid-ask spreads immediately after a trading halt. This is consistent with hypothesis 2.

[37] Table 6.2 shows the average abnormal return during trading halts longer than 60 minutes is 1.34% compared to 0.48% for halts of less than 15 minutes.

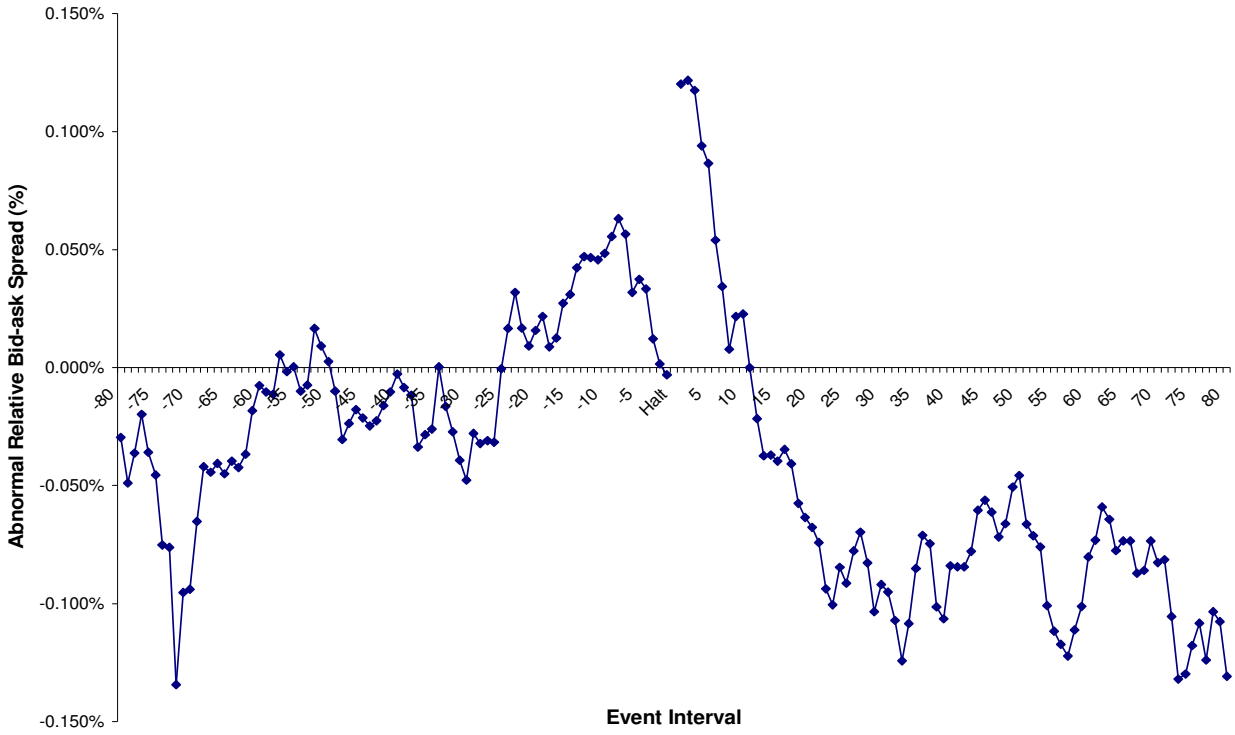
Table 6.6 Abnormal Relative Bid-ask Spreads: Full Vs Matched Sample

This Table shows the average abnormal relative bid-ask spread behaviour around trading halts. Full represents the full sample and matched indicates the pseudo-halt matched sample. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests.

Abnormal Relative Bid-ask Spreads (%)		
Interval	**Full**	**Matched**
[-80,-1]	-0.0017***	-0.0167***
[-40,-1]	0.0169***	0.0070
[-20-1]	0.0429	0.0359
-4	0.0370	0.0333
-3	0.0131***	0.0121
-2	-0.0031***	0.0015
-1	-0.0099***	-0.0031***
1	0.1348***	0.1203***
2	0.1059*	0.1217***
3	0.1023*	0.1175***
4	0.0838*	0.0940**
[1,20]	-0.0253***	0.0112*
[1,40]	-0.0773***	-0.0487***
[1, 80]	-0.0934***	-0.0739***

Figure 6.2 Abnormal Relative Bid-ask Spread: Matched Sample

This Figure displays the average abnormal relative bid-ask spreads for the matched sample over the event period [-80, 80].



These results are similar to Corwin and Lipson (2000) who find that bid-ask spreads are abnormally wide around trading halts but narrow within 30 minutes for news-related trading halts. The results in Figure 6.2 suggest that the trading halt mechanism on the ASX may take longer to impound new information and trading halts result in longer and wider abnormal spreads than on the NYSE. Aitken, Frino and Winn (1995) also find that bid-ask spreads are abnormally wide immediately after a trading halt. Aitken, Frino and Winn (1995) show that abnormal bid-ask spreads persist for up to two days following trading halts on the ASX. In contrast the results in Figure 6.2, shows that abnormal relative bid-ask spreads narrow within 3 hours after a trading halt. This suggests that the ASX has improved in its ability to release information, but still impose higher transaction costs through the use of trading halts.

6.2.2.2. Relative Bid-ask Spreads by Price change, Market capitalisation and Trading halt duration

Table 6.7 and Figure 6.3 present the abnormal relative bid-ask spreads for the different price change categories. The abnormal relative bid-ask spreads are significantly wider before and after 'no news' trading halts. The abnormal relative bid-ask spreads are particularly wide for 'no news' halts, in the pre-halt period as shown by interval [1, 20] (0.8219%) in Table 6.7. In Figure 6.3, abnormal relative bid-ask spreads begin to narrow following 'no news' trading halts, returning close to zero approximately a day after 'no news' trading halts. The abnormally wide spreads may be due to uncertainty in the market which, following a trading halt is resolved. Alternatively, it could suggest that trading halts impose unreasonably wider bid-ask spreads in situations were no significant news is announced. This is inconsistent with hypothesis 10.

In contrast to 'no news' trading halts, 'bad news' and 'good news' trading halts provide different results. Abnormal relative bid-ask spreads for 'bad news' trading halts, in Figure

6.3, are close to zero leading up to a trading halt, abnormally wide immediately after a trading halt, before gradually narrowing in the following days. The trading halt appears to impose wider relative bid-ask spreads for 'bad news' trading halts then what would have occurred if no trading halt were called. The results for the 'good news' halts are in contrast with abnormally narrow relative bid-ask spreads in the lead up to a trading halt, followed by narrower spreads after a trading halt. This suggests trading halts are more effective in reducing uncertainty around positive news announcements.

Figure 6.3 Abnormal Relative Bid-ask Spread by Price Change

This Figure displays the average abnormal relative bid-ask spreads for the matched sample over the event period [-80, 80]. Results are separated by the price change during the trading halt.

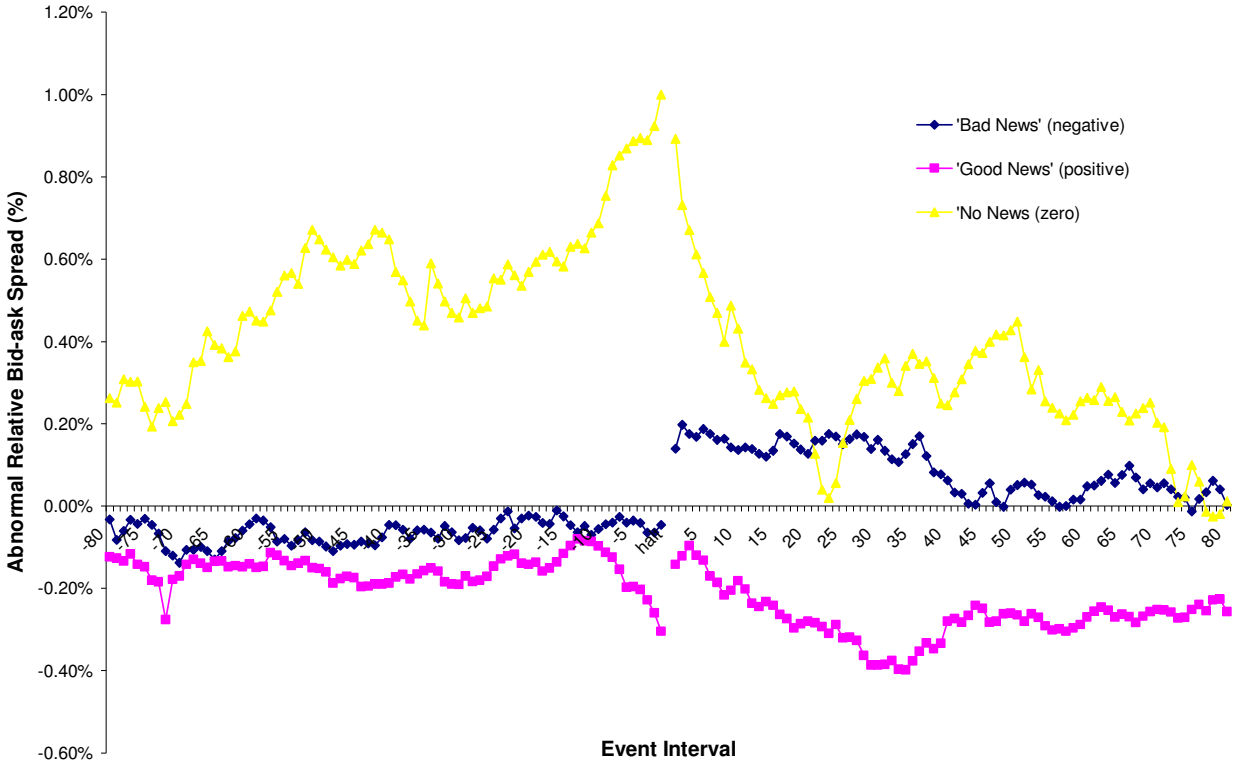


Table 6.7 Abnormal Relative Bid-ask Spreads by Price change, Market Capitalisation and Trading Halt Duration

This Table shows the average abnormal relative bid-ask spread behaviour around trading halts for the matched sample. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests. Price change represents the price change during the trading halt. Market Capitalisation represents the market capitalisation of the halted stock. Halt duration is the length of the trading halt in minutes.

	Abnormal Relative Bid-ask Spreads % by:									
Category	**Price Change**			**Market Capitalisation**			**Halt Duration (Minutes)**			
Interval	**'Bad News'**	**'Good News'**	**'No News'**	**Top 50**	**51-200**	**201+**	**<15**	**15-30**	**30-60**	**60+**
[-80,-1]	-0.0626	-0.1795***	0.5665***	0.0127	-0.0182***	-0.0680***	-0.0109***	-0.0052	-0.1508*	-0.2420***
[-40,-1]	-0.0502*	-0.1819***	0.6915***	0.0079*	-0.0125**	-0.0349	0.0204	-0.0580	0.0042	-0.2228***
[-20-1]	-0.0393*	-0.1750***	0.8219***	0.0001*	-0.0058*	0.0041	0.0523	-0.0598	-0.0461	-0.1689**
-4	-0.0409	-0.2032***	0.8947***	0.0007	0.0176*	0.0142	0.0472	-0.0463	0.3741	-0.2208
-3	-0.0645	-0.2283***	0.8890***	-0.0012	0.0192	-0.0063	0.0211	-0.0438	0.2116	-0.1323*
-2	-0.0648	-0.2596***	0.9233***	0.0064	-0.003**	-0.0219	0.0135	-0.0810	0.4730*	-0.1898
-1	-0.0450	-0.3041***	0.9995***	0.0045	-0.0011	-0.0294***	0.0123	-0.1172	0.2750	-0.1802*
1	0.1396***	-0.1418**	0.8923***	0.0365***	0.0334***	0.1049***	0.1308***	0.0063*	-0.5305*	0.2952***
2	0.1973***	-0.1220***	0.7317***	0.0287**	0.0334*	0.1080**	0.1338***	-0.0046*	-0.3935*	0.2625*
3	0.1748***	-0.0964**	0.6703***	0.0309***	0.0162*	0.1102***	0.1286***	0.0206*	-0.6201*	0.2207*
4	0.1679***	-0.1197***	0.6118***	0.0267*	0.0093*	0.0761*	0.1109***	-0.0309*	-0.4803*	0.0709*
[1,20]	0.1663***	-0.2379***	0.4800***	0.0249*	-0.0125*	-0.0332*	0.0382*	-0.2014**	-0.6049*	-0.0314*
[1,40]	0.1511***	-0.3093***	0.3722	0.0153*	-0.0198***	-0.0976***	-0.0181***	-0.2457***	-0.7625***	-0.2604**
[1, 80]	0.0950*	-0.3037***	0.3129	0.0112*	-0.0069***	-0.1288***	-0.0413***	-0.2493***	-0.8862***	-0.4217***

Figure 6.4 and Table 6.7 illustrate a significant difference between the abnormal relative bid-ask spreads for different sized stocks. Immediately following a trading halt, abnormal relative bid-ask spreads are widest for smaller stocks. The abnormal relative bid-ask spreads in interval 1 are 270% wider for the smallest category (0.1049%) compared to the largest category (0.0365%). This is consistent with hypothesis 8. Figure 6.4 further illustrates that the abnormal relative bid-ask spreads for smaller stocks, in the post-halt period, begin to narrow and become abnormally narrow after interval 8. This suggests that trading halts in due course are effective in reducing the large amounts of uncertainty present for smaller stocks. For larger stocks, there is no abnormal relative bid-ask spreads in the pre-halt period, this is followed by abnormally wide relative bid-ask spreads in the post-halt period until interval 25. This suggests that trading halts seem to place an unnecessary impediment for larger stocks were less uncertainty is present.

Figure 6.4 Abnormal Relative Bid-ask Spread by Market Capitalisation

This Figure displays the average abnormal relative bid-ask spreads for the matched sample over the event period [-80, 80]. Results are separated by market capitalisation.

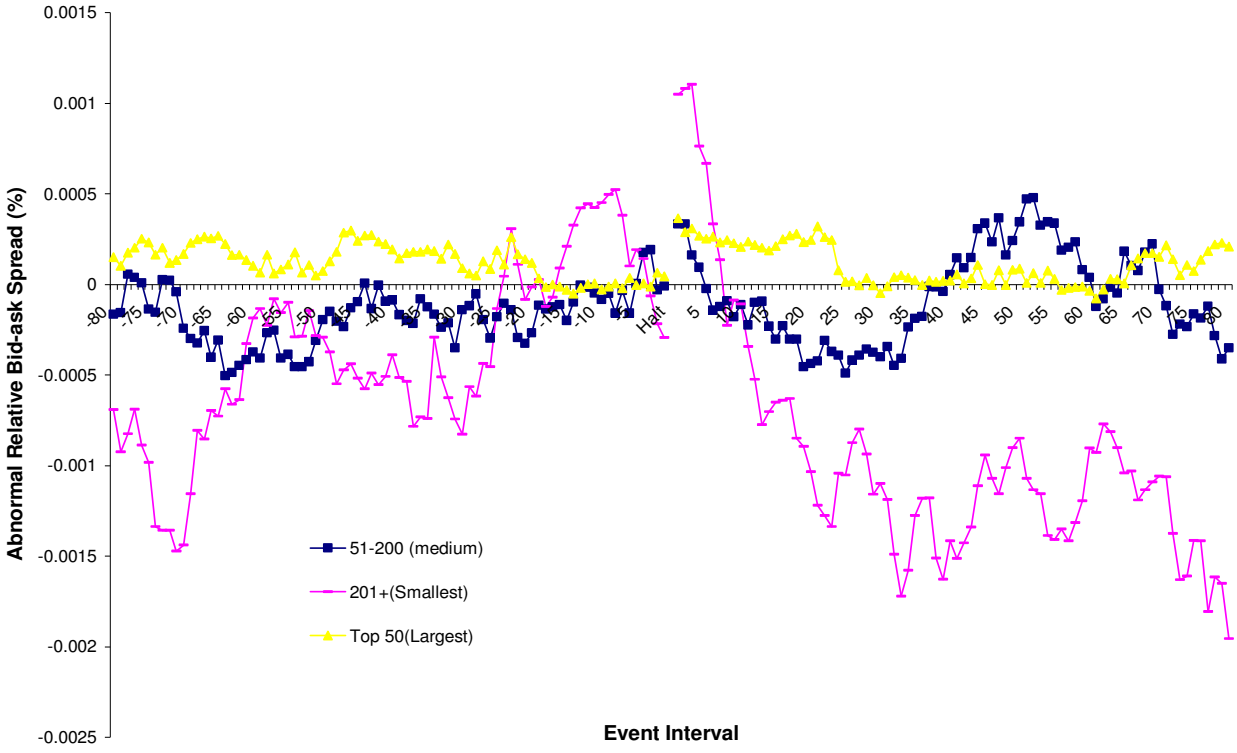
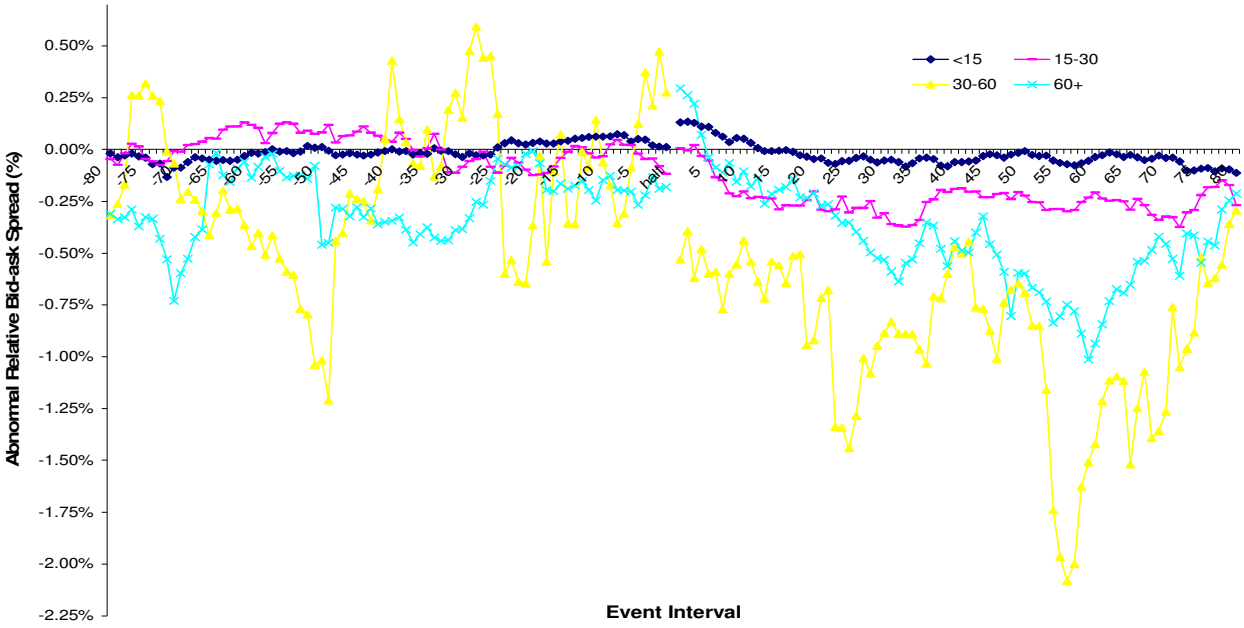


Table 6.7 and Figure 6.5 highlight that the duration of a trading halt may affect abnormal relative bid-ask spreads. Trading halts of less than 15 minutes make up the majority (87.5%) of the matched sample and consequently provide similar results to the matched sample. Trading halts of between 15-30 minutes appear to more effective than those less than 15 minutes. The abnormal relative bid-ask spreads (15-30 minutes) are not significantly wide immediately following a trading halt, before becoming abnormally narrow after only an hour. Trading halts between 30-60 minutes exhibit the greatest variation of abnormal relative bid-ask spreads around a trading halt. The relative bid-ask spreads are abnormally wide leading into a trading halt before becoming abnormally narrow in the post-halt period. Suggesting that trading halts (30-60 minutes), involve large amounts of uncertainty being resolved through the information revealed during a trading halt. Trading halts with a duration over an hour result in abnormally narrow bid-ask spreads leading up to a trading halt and abnormally wide bid-ask spreads immediately after a trading halt. This result is consistent with hypothesis 7.

Figure 6.5 Abnormal Relative Bid-ask Spread by Trading Halt Duration

This Figure displays the average abnormal relative bid-ask spreads for the matched sample over the event period [-80, 80]. Results are separated by the trading halt duration (Minutes).



6.2.3. Order Depth

6.2.3.1. Abnormal Order depth: Matched sample

This section examines the impact of trading halts on order depth. Table 6.8 reports abnormal order depth for the matched sample, presented as relative order depth (percentage of the number of shares outstanding on the halted stock). The results are highly significant and indicate that abnormal best bid depth is significantly greater than zero in all intervals except interval 1 (-0.0106%). In contrast, abnormal best ask depth before the trading halt is not significantly different from zero, as shown by interval [-80,-1] (0.0010%). The post-event results are significant and illustrate that order depth at the best ask is significantly lower following a trading halt and remains low as shown by the abnormal depth at the best ask in interval [1, 20] (-0.0025%). This reduction likely reflects investors' reduced willingness to supply liquidity at these times.

Table 6.8 Abnormal Order Depth: Matched Sample

This Table shows the average abnormal order depth behaviour around trading halts for the matched sample. Order depth is represented by relative depth at the best bid (Best bid), relative depth at the best ask (Best ask), relative total depth on bid-side (Total bid-side) and relative total depth on ask-side (Total ask-side). Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests.

Abnormal Relative Order Depth %				
Interval	**Best bid**	**Best ask**	**Total bid-side**	**Total ask-side**
[-80,-1]	0.0149***	0.0010	-0.0027***	-0.0085***
[-40,-1]	0.0161***	0.0010	-0.0041***	-0.0085***
[-20-1]	0.0178***	0.0009	-0.0049***	-0.0100***
-4	0.0199***	0.0015	-0.0215***	-0.0153***
-3	0.0293***	0.0020	-0.0161***	-0.0199***
-2	0.0245***	0.0013***	-0.0129***	-0.0194***
-1	0.0215***	0.0012	-0.0018***	-0.0212***
1	-0.0106***	-0.0159***	0.0369	-0.0115**
2	0.0134***	-0.0032	0.0242***	-0.0368***
3	0.0167***	-0.0025	0.0251***	-0.0280***
4	0.0092***	-0.0058**	0.0295***	-0.0259***
[1,20]	0.0095***	-0.0025**	0.0192	-0.0067***
[1,40]	0.0127***	-0.0001***	0.0241	-0.0000**
[1, 80]	0.0174***	-0.0000***	0.0227*	0.0018

These results are inconsistent with hypothesis 4 because order depth at the best bid and ask, are not abnormally low before a trading halt, however both order depth at the best bid and ask are abnormally low in the 15 minutes immediately after a trading halt. This result is similar to the finding of Corwin and Lipson (2000), except that they find that abnormal depth at the best quotes before and after a trading halt. This disparity may be explained by the different market microstructure being examined. Corwin and Lipson (2000) examine trading halts on the NYSE where specialists influence order depth at the best quotes. Specialists may set their quotes wider leading up to a trading halt as they may fear holding an unwanted position during a trading halt.

Results for total order depth on both the bid and ask side are further reported in Table 6.8. Total bid-side depth is significant and abnormally low before a trading halt, as shown by interval [-20,-1] (-0.0049%). This reverts immediately following a trading halt (abnormal bid-side depth in interval 1, 0.0369%) and remains high for the remainder of the post-halt intervals. Total ask-side depth displays a different pattern, with total ask-side depth significant and abnormally low, before and immediately after a trading halt. Total ask-side depth remains abnormally low for up to 11 intervals (165 minutes) before becoming abnormally high as shown by interval [1,80] (0.0018). Taken together the results for total ask-side and bid-side order depth suggest that total depth in the order book is abnormally low before a trading halt, before becoming abnormally high after a trading halt.

Corwin and Lipson (2000) attribute part of the increase in total order depth in the post-halt periods to stale orders that do not reflect new information. As the price moves away from these orders, depth away from the best quotes increases but only on one side of the market. Corwin and Lipson (2000) find total depth on the bid-side is abnormally high for ‘good news’ halts, whereas abnormal total depth on the ask-side does not differ from zero. Just the

opposite occurs for 'bad news' halts. The results in Table 6.8 suggest that abnormal total depth increases after a trading halt on the bid-side more than the ask-side. The sample is dominated by 'good news' halts (51%) which may suggest that the relatively larger abnormal bid-side depth may consistent with the explanation of Corwin and Lipson (2000) . To examine this further, Table 6.9 reports abnormal total bid-side and ask-side order depth, separated by the price change during the trading halt.

6.2.3.2. Order Depth by Price change

Table 6.9 reports, for 'good news' halts, total order depth on the bid-side is significant and abnormally high in interval 1 (0.0645%) and interval [1, 20] (0.0259%). Total ask-side depth is still significant, however total ask-side depth is very close to zero and much lower than the bid-side in interval 1 (0.0103%) and interval [1, 20] (0.0016%). This suggests a similar pattern to Corwin and Lipson (2000) for 'good news' trading halts. However, for 'bad news' halts, total depth on the bid-side is significant and abnormally high in interval [1, 20] (0.0231%). The ask-side total depth is abnormally low in both interval 1 (-0.0445%) and interval [1, 20] (-0.0087%). This result does not support the notion that the increase in total abnormal depth may be due to stale orders that do not reflect new information.

To further investigate, 'no news' halts are also reported in Table 6.9. There is no evidence of an increase in total depth on either the bid or ask side for 'no news' halts. In fact, total depth is abnormally low for both the bid-side (-0.0088%) and ask-side (-0.0285%) in interval [1, 20]. This supports the explanation of Corwin and Lipson (2000) because when the price does not move, depth away from the best quotes does not increase on either side of the market. Overall the results in Table 7.8 and Table 7.9 are consistent with hypothesis 3. However, it appears that at least some of the increase in total depth in the post-halt period may be due to stale orders. To test this further it would be necessary examine the amount of order submissions and cancellations to determine whether these orders are in fact stale orders.

Table 6.9 Abnormal Order Depth by Price Change

This Table shows the average abnormal order depth behaviour around trading halts for the matched sample. Order depth is represented by relative depth at the best bid (Best bid), relative depth at the best ask (Best ask), relative total depth on bid-side (Total bid-side) and relative total depth on ask-side (Total ask-side). Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests. Price change represents the price change during the trading halt.

Abnormal Relative Order Depth % by:

	Negative (Bad News)				Positive (Good News)				Zero (No News)			
	Best bid	**Best ask**	**Total bid-side**	**Total ask-side**	**Best bid**	**Best ask**	**Total bid-side**	**Total ask-side**	**Best bid**	**Best ask**	**Total bid-side**	**Total ask-side**
[-80,-1]	0.0416	-0.0001	0.0159	-0.0288222**	0.0021***	0.0011	-0.0143**	0.006	0.0039	0.0026	-0.0022***	-0.0144*
[-40,-1]	0.0445**	-0.0006	0.0148**	-0.0326**	0.0022***	0.0017	-0.0132**	0.0088*	0.0055**	0.0015	-0.0113***	-0.0159
[-20-1]	0.0493***	0.0005	0.0163***	-0.0319**	0.0021***	0.0014	-0.0143**	0.0079*	0.0067***	0.0002	-0.0156***	-0.0237**
-4	0.0540*	-0.0042	-0.0020***	-0.0507*	-0.0001	0.0042	-0.0139***	0.0120**	0.0171**	0.0063	-0.1593***	-0.0577**
-3	0.0714*	-0.0027	0.0147***	-0.0598*	0.0052*	0.0029	-0.0134**	0.0098***	0.0220**	0.0158	-0.1703***	-0.0614***
-2	0.0569***	-0.0034*	0.0069***	-0.0632	0.0056**	0.0036*	-0.0079***	0.0119**	0.0221*	0.0053	-0.1427***	-0.0601***
-1	0.0480***	0.0013**	0.0256***	-0.0622**	0.0053	0.0012	-0.0070***	0.0056***	0.0248	0.0013	-0.0916***	-0.0389***
1	0.0260***	-0.0143***	0.0013***	-0.0445	-0.0365***	-0.0177***	0.0645***	0.0103***	0.0142***	-0.0021	-0.0045***	-0.0242**
2	0.0339***	-0.0022	-0.0088***	-0.0551	0.0000***	-0.0031	0.0475	-0.0165***	0.0192	-0.0078	0.0034***	-0.0955
3	0.0518	-0.0077*	-0.0065***	-0.0457	-0.0036***	-0.0001**	0.0474	-0.0103***	0.0112*	0.0055**	0.0043**	-0.0723
4	0.03	-0.0107	-0.0021***	-0.0334	-0.0064***	-0.0054***	0.0445*	-0.0144***	0.0276	0.0107***	0.0555**	-0.0694
[1,20]	0.0339	-0.0021	0.0231***	-0.0087	-0.0051***	-0.0035***	0.0259***	0.0016***	0.0086*	0.0000*	-0.0088***	-0.0285
[1,40]	0.0374	-0.0014	0.0316***	-0.0078**	-0.0018***	-0.0000***	0.0278***	0.0110***	0.0107	0.0004	-0.0015***	-0.0203
[1, 80]	0.0419**	-0.001	0.0317**	-0.0073***	0.0047***	0.0000***	0.0247***	0.0141**	0.0107	0.0000	-0.0000***	-0.0190

6.3. Volatility Impacts

6.3.1. Volatility: Full and Matched sample

Table 6.10 reports the results for the abnormal absolute midpoint return measure (ABSRET) used as the main estimator of volatility for both the full and matched sample. As expected**,** results are similar to the trading volume results, with the full sample showing stronger but qualitatively similar results to the matched sample. Abnormal volatility is low and not significantly different from zero in most cases in the pre-halt period. Immediately after the trading halt, abnormal volatility in the matched sample increases significantly from -0.0050% in interval -1 to 1.0015% in interval 1. Abnormal and significantly high volatility continues in the post-halt period as shown by the average abnormal volatility in intervals [1, 20] (0.1726%), [1, 40] (0.1025%) and [1, 80] (0.0577%).

Figure 6.6 graphs the abnormal volatility around a trading halt for both the full and matched samples. Abnormal volatility is effectively zero in the pre-halt period, before increasing significantly immediately after a trading halt. Abnormal volatility persists for over one trading day before returning to the pseudo-halt levels represented by zero. This suggests trading halts cause volatility to spill over and persist for longer periods after an information announcement. The full sample and matched sample present similar results except for higher volatility in interval 1 for the full sample. This difference represents the excess volatility caused by the release of information that alters fundamental values. The matched sample

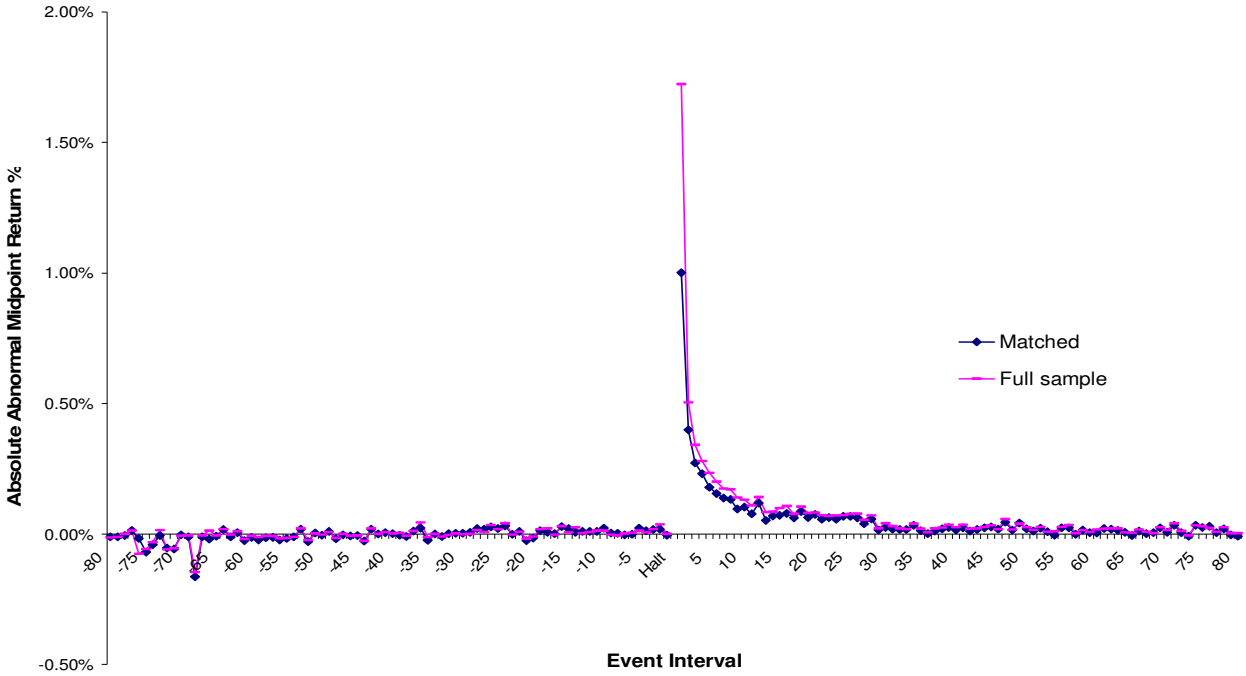
Table 6.10 Abnormal Volatility: Full Vs Matched Sample

This Table shows the average abnormal volatility behaviour around trading halts. Volatility is represented by absolute abnormal midpoint returns (ABSRET %). Full represents the full sample and matched indicates the pseudo-halt matched sample. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests.

Interval	Full (%)	Matched (%)
[-80,-1]	-0.0081	-0.0065
[-40,-1]	0.0058	0.0050
[-20-1]	0.0072	0.0070
-4	0.0055	0.0121
-3	0.0177	0.0170*
-2	0.0363	0.0175
-1	-0.0006	-0.0050
1	1.7234***	1.0015***
2	0.5037***	0.3993***
3	0.3409***	0.2716***
4	0.2792***	0.2312***
[1,20]	0.2424***	0.1726***
[1,40]	0.1419***	0.1025***
[1, 80]	0.0796***	0.0577***

Figure 6.6 Abnormal Volatility: Full Vs Matched Sample

This Figure displays the average abnormal volatility for the full and matched sample over the event period [-80, 80].



controls for this, and the results illustrate there is still a large proportion of positive abnormal volatility that may be attributable to the trading halt. This is consistent with hypothesis 5.

This result is consistent with Lee, Ready and Seguin (1994), Aitken, Frino and Winn (1995) and Corwin and Lipson (2000). Conversely, the results conflict with the more recent findings of Engelen and Kabir (2006) who find trading halts are effective in reducing excess volatility. This may be explained by the contrasting control methods used. Engelen and Kabir (2006) do not control for the amount of information being released and only compare the pre-halt and post-halt levels of volatility. Lee, Ready and Seguin (1994) and Aitken, Frino and Winn (1995) use similar controls to this study which account for the amount of information being released.

6.3.2. Volatility by Market capitalisation, Trading halt duration, Price change and Announcement type

Table 6.11 reports the abnormal volatility results based on the market capitalisation of the halted stock. Abnormal volatility is similar in the pre-halt intervals for all three categories. The post-halt results suggest that abnormal volatility is higher for smaller stocks immediately following a trading halt. This result persists in the post-halt period (interval [1, 20]), were abnormal volatility is higher for the smallest stocks (0.1914%) compared to the largest stocks (-0.0210%). Volatility in the post-halt period dissipates at a similar rate for all three categories, (see Figure 6.7). This result is consistent with hypothesis 8 and can be explained by the lower uncertainty and asymmetric information in larger stocks that are widely followed by analysts.

Figure 6.7 Abnormal Volatility by Market Capitalisation

This Figure displays the average abnormal volatility for the matched sample over the event period [-80, 80]. Results are separated by market capitalisation.

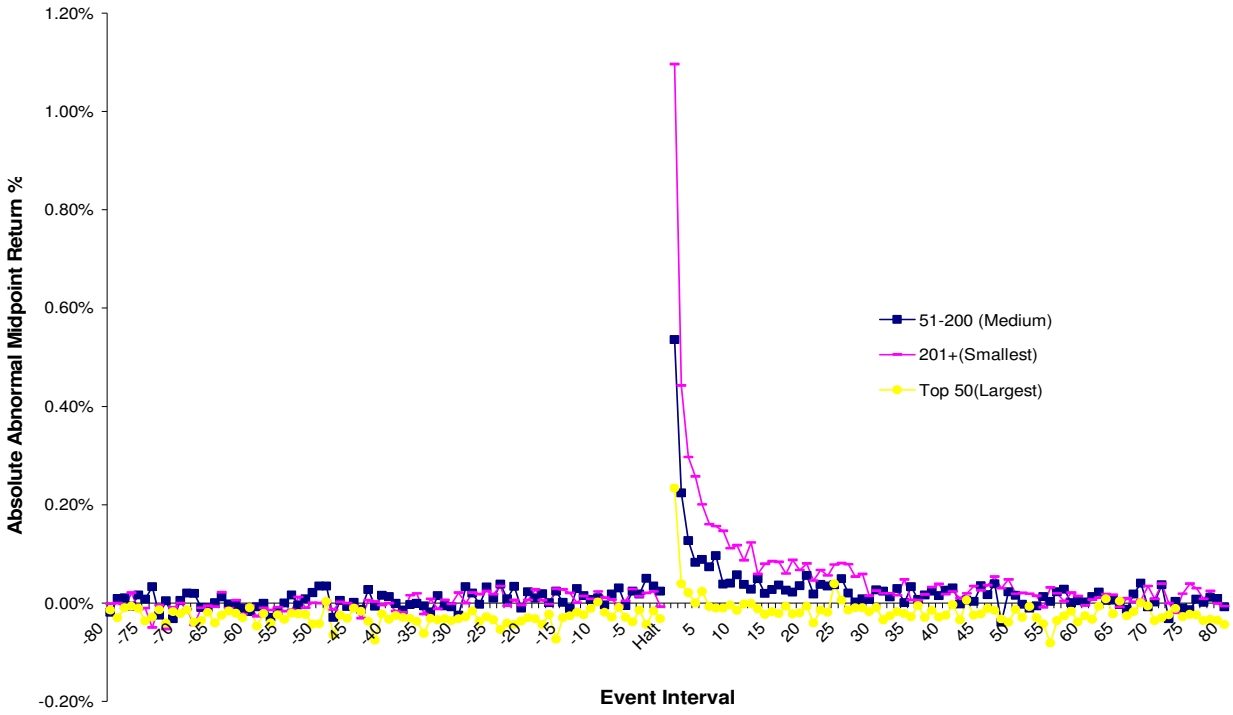
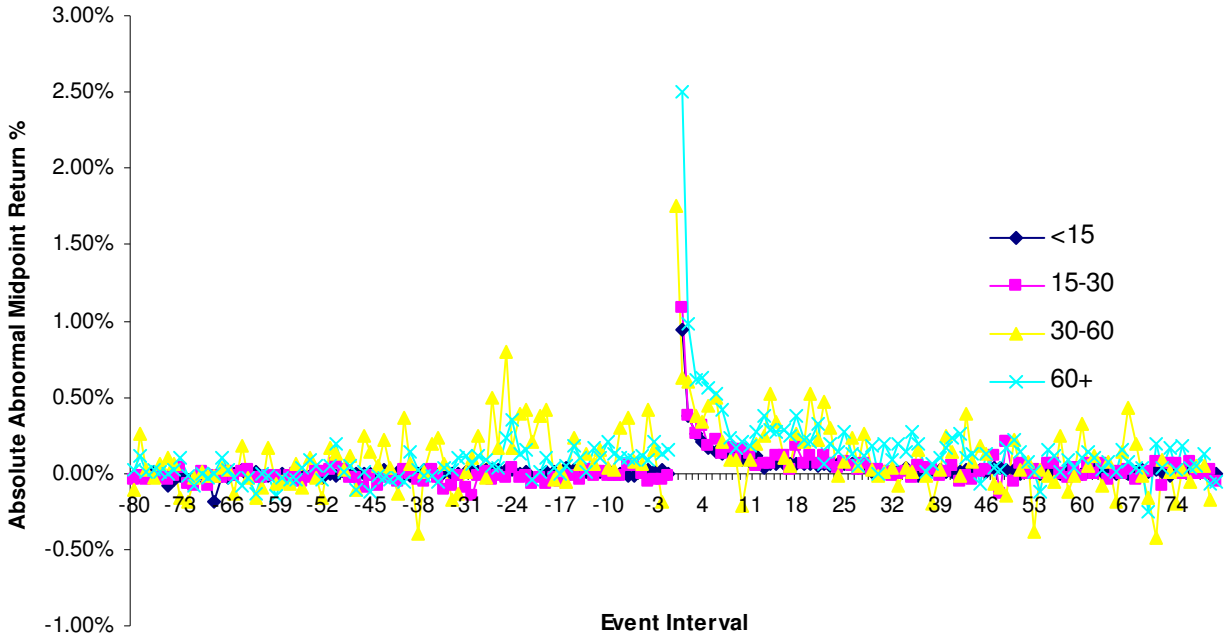


Table 6.11 further reports the abnormal volatility results separated by the duration of the trading halt. Abnormal volatility immediately following a trading halt is significantly higher (interval 1, 2.4991%) and persists for longer (interval [1, 80], 0.1946%) in the post-halt period for trading halts of longer durations (60+). Figure 6.8 illustrates the results graphically were volatility is higher and persists for longer following trading halts of greater duration. This is inconsistent with hypothesis 7 and can be explained by the 'learn-by-trade' class models discussed in Chapter 4. Table 6.11 further reports the volatility results separated by the price change over the trading halt. Abnormal volatility is similar to the matched sample for 'good news' and 'bad news' halts, while the results differ for 'no news' halts.

Figure 6.8 Abnormal Volatility by Trading Halt Duration

This Figure displays the average abnormal volatility for the matched sample over the event period [-80, 80]. Results are separated by trading halt duration.



'No news' trading halts exhibit small and mostly insignificant abnormal volatility in the pre-halt (Interval [-80,-1], -0.0287%) and post-halt (Interval [1, 80], 0.0013%) periods. 'No news' trading halts are associated with less informative news announcements which suggest that trading halts do not cause abnormal volatility for less informative events. Table 6.11 also suggests that trading halts are not successful in controlling abnormal volatility around informative news announcements. These results support both hypothesis 9 and hypothesis 10.

Table 6.12 reports the volatility results separated by the news announcement being released. As expected similar results to the abnormal volume measures in Table 6 are found. The largest abnormal values are observed for trading halts called for an ASX announcement or query. Abnormal volatility in the post-halt period for ASX announcement or query trading halts is 0.5581% (interval [1, 20]), this is significantly larger than the matched sample results (0.1726%) shown in Table 6.10. These trading halts appear to be called in reaction to large amounts of abnormal volatility in the pre-halt period (interval [-20, -1], 0.3750%). Each of

Table 6.11 Abnormal Volatility by Price change, Market Capitalisation and Trading Halt Duration

This Table shows the average abnormal volatility behaviour around trading halts for the matched sample. Volatility is represented by absolute abnormal midpoint returns (ABSRET %). Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests. Price change represents the price change during the trading halt. Market Capitalisation represents the market capitalisation of the halted stock. Halt duration is the length of the trading halt in minutes.

	Abnormal Volatility % by:									
Category	**Price change**			**Market Capitalisation**			**Halt Duration (Minutes)**			
Interval	**'Bad News'**	**'Good News'**	**'No News'**	**Top 50**	**51-200**	**201+**	**<15**	**15-30**	**30-60**	**60+**
[-80,-1]	0.0015***	-0.0041	-0.0287***	-0.0591*	0.0061*	-0.0019	-0.0047	-0.0400	0.0790	0.0419***
[-40,-1]	0.0148***	0.0067	-0.0187***	-0.0634	0.0108**	0.0092	0.0072	-0.0444	0.1385	0.0879***
[-20-1]	0.0087	0.0143	-0.0186	-0.0594*	0.0161***	0.0127	0.0081	-0.0353	0.1379	0.1033
-4	0.0306	0.0001	0.0143	-0.0142*	0.0178	0.0133	0.0167	-0.0526	0.0566	0.0889*
-3	-0.0011	0.0298*	0.0119	-0.0437	0.0505	0.0206*	0.0163	-0.0456	0.4112	0.2128*
-2	0.0607	0.0029	-0.0190*	-0.0156	0.0348	0.0238	0.0196	-0.0393	0.1495	0.1344
-1	0.0158	-0.0139	-0.0197	-0.0315	0.0241	-0.0073	-0.0073	-0.0175	-0.1830	0.1541
1	0.8216***	1.4492***	-0.0383**	0.2334***	0.5357***	1.0961***	0.9471***	1.0807***	1.7540***	2.4991***
2	0.3492***	0.5553***	0.0135	0.0394***	0.2244***	0.4423***	0.3835***	0.3831***	0.6237***	0.9801***
3	0.2395***	0.3807***	-0.0035	0.0213***	0.1272***	0.2971***	0.2620***	0.2564***	0.6047***	0.6129***
4	0.2466***	0.3025***	-0.0174	-0.0001***	0.0825***	0.2571***	0.2105***	0.3127***	0.3772***	0.6274***
[1,20]	0.1647***	0.2358***	-0.0061***	-0.0210***	0.0854***	0.1914***	0.1624***	0.1795***	0.3381***	0.4766***
[1,40]	0.1005***	0.1377***	-0.0018*	-0.0307***	0.0537***	0.1151***	0.0963***	0.0994***	0.2206***	0.3106***
[1, 80]	0.0535***	0.0787***	0.0013	-0.0397***	0.0302***	0.0659***	0.0544***	0.04901***	0.1235***	0.1946***

the other categories, result in either insignificant or close to zero abnormal volatility for the same pre-halt period. Table 6.12 further shows that post-halt volatility is high for all types of news announcements, suggesting that announcement type is not a factor in explaining abnormal post-halt volatility.

6.4. Return Impacts

6.3.1 Abnormal Returns: Full sample

Table 6.13 reports the AAR's and the CAAR's that have been calculated starting 80 intervals before a trading halt, until 80 intervals after a trading halt. For the purposes of brevity, the results are presented for only 15 intervals either side of the trading halt. Figure 6.9, graphs the CAAR's for eighty intervals either side of the trading halt. There appears to be a significant amount of abnormal return behaviour around a trading halt. In the pre-halt period, there is a significant positive trend with a CAAR of 1.219% in the 80 intervals leading into a trading halt. This may suggest some anticipatory behaviour leading into a trading halt. During the halt, there is a significant increase in the CAAR of 0.99%, followed by another large increase of 1.28% in interval 1. Following this, the CAAR's continue to drift upwards until interval 25 after a trading halt. Therefore, the abnormal returns are not restricted to the trading halt period itself. This is inconsistent with hypothesis 6 and suggests that trading halts are not effective in disseminating information. The results do however suggest that the price produced during a trading halt is accurate and efficient because there is no price reversal over the remainder of the 80 intervals.

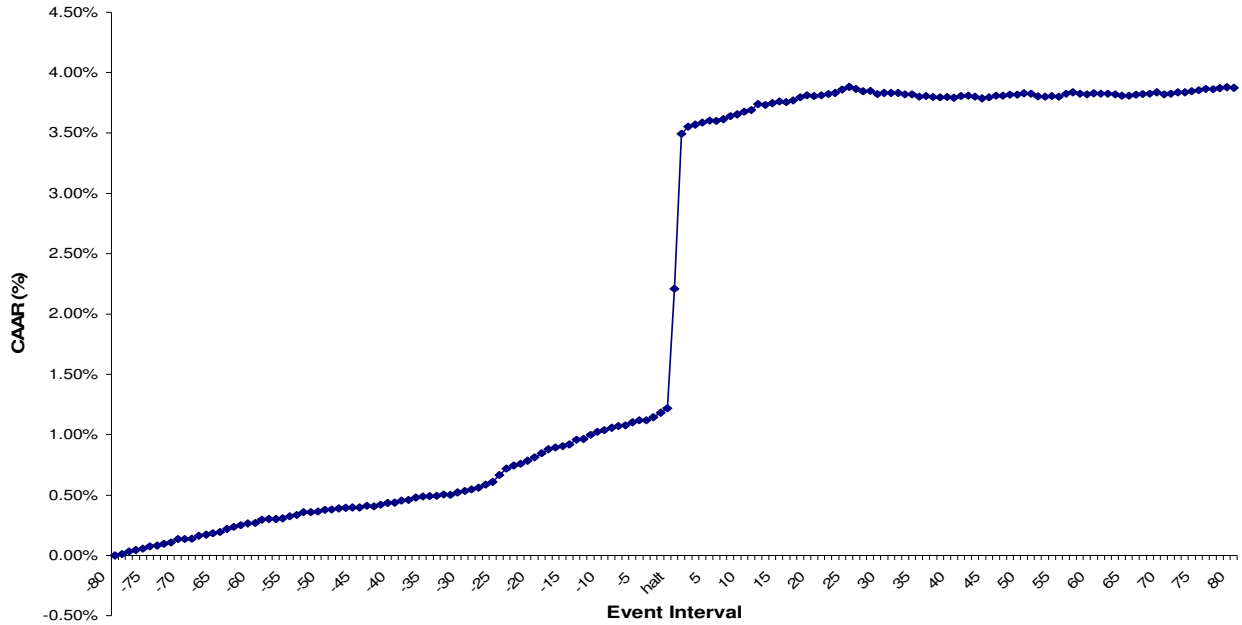
Table 6.12 Abnormal Volatility by Announcement Type

This Table shows the average abnormal volatility behaviour around trading halts for the matched sample. Volatility is represented by (ABSRET %) absolute abnormal returns. *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively, using Wilcoxon sign-ranked tests. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). Announcement Type represents categories formed based on the announcement made during each trading halt.

	Announcement Type						
Interval	**Asset Acquisition/ Disposal**	**ASX Announcement/Query**	**Financial Information**	**Miscellaneous**	**Progress Report**	**Share Issue**	**Takeover Related**
[-80,-1]	-0.0057	0.1964***	-0.0234	-0.0294	-0.0064	-0.0080	-0.0350***
[-40,-1]	-0.0109	0.3300***	-0.0230	-0.0022	0.0021	-0.0035	-0.0380***
[-20-1]	0.0015	0.3750***	-0.0223	0.0100	-0.0008	-0.0181**	-0.0261***
-4	-0.0831**	0.1870***	0.0076	0.0331	0.0147	-0.0028	-0.0096
-3	-0.0326	0.3874***	-0.0122	0.0549	0.0138	-0.0592*	0.0031
-2	0.0271	0.2949***	0.0124	0.1830	-0.0339	-0.0164	0.0076
-1	-0.0604*	0.3377***	-0.0239	-0.0009	-0.0066	-0.0684	0.0087
1	1.2760***	2.4262***	0.6697***	0.5956***	1.1292***	1.1311***	0.3778***
2	0.3523***	1.0945***	0.3109***	0.2568***	0.4558***	0.3508***	0.1329***
3	0.2375***	0.8289***	0.2098***	0.1606***	0.2914***	0.3833***	0.0343**
4	0.2096***	0.5622***	0.1637***	0.2371***	0.2612***	0.1994***	0.0223**
[1,20]	0.1918***	0.5581***	0.1181***	0.1235***	0.1843***	0.2041***	0.0261
[1,40]	0.1256***	0.3847***	0.0653***	0.0737***	0.1049***	0.1312***	0.0075
[1, 80]	0.0678***	0.2541***	0.0345***	0.0407***	0.0568***	0.0825***	0.0029

Figure 6.9 CAAR's around Trading Halts

This Figure displays the cumulative average abnormal returns (CAAR's) for the full sample over the event period [-80, 80].



6.4.1. Abnormal Returns by Price change, Market capitalisation and Trading halt duration

To examine these results in more detail, Table 7.14 reports the CAAR's separated by the price change during the trading halt. Figure 6.10 graphs these result for the full period [-80, 80] and illustrates that 'no news' trading halts exhibit no significant abnormal returns before, during or after a trading halt. This is as expected, suggesting that 'no news' trading halts are initiated for the release of less informative announcements that have no significant impact on the returns generated. The 'good news' halts exhibit a very similar pattern to the full sample while the 'bad news' halts provide some unanticipated results.

Firstly, there is a strong upward trend in the pre-halt period resulting in a significant CAAR of 2.137% between interval -80 and interval -1. This is followed by a significant drop of -3.43% during the trading halt and in interval 1. The CAAR continues to fall slowly over the next seven intervals before levelling out over the remainder of the periods. These results for

Table 6.13 Abnormal Returns around Trading Halts

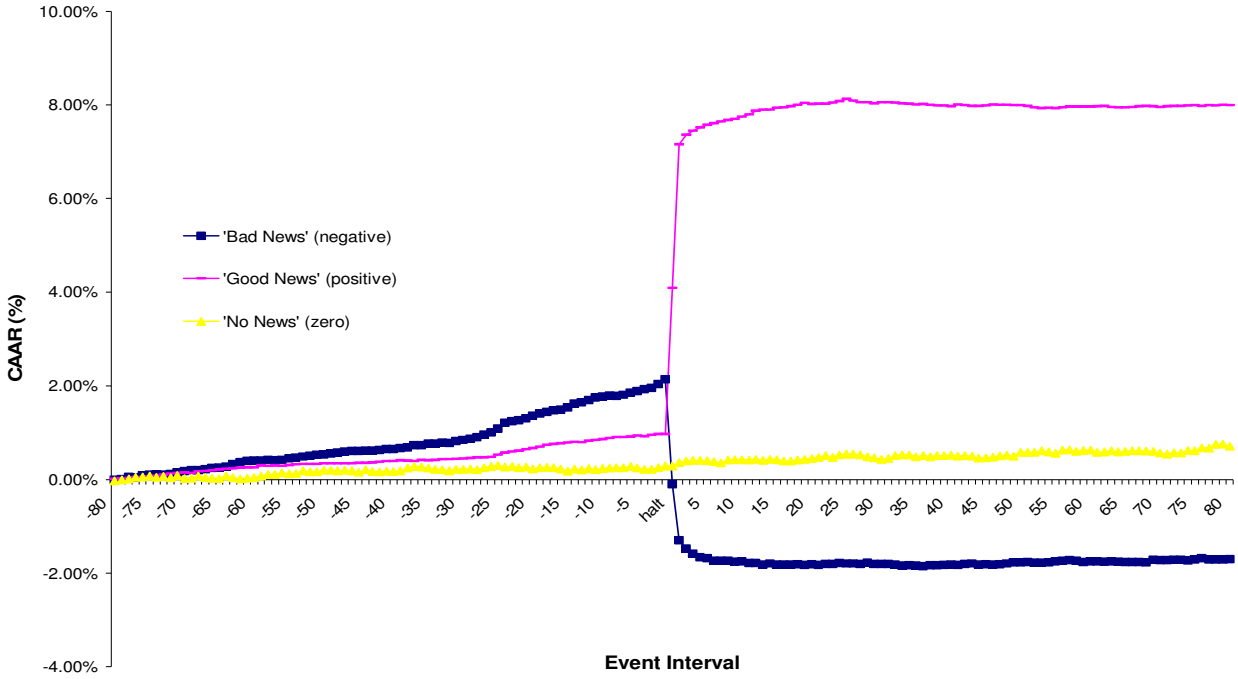
This Table shows the Cumulative Average Abnormal Return (CAAR) behaviour around trading halts for the full sample. Abnormal returns are computed using the return on the halted stock less the return on the All Ordinaries Index. *p*-values for both standard *t*-statistics and Wilcoxon Signed Rank tests are presented. CAAR's are cumulated starting 80 intervals before the trading halt and ending 80 intervals after the trading halt. Each interval consists of 15 minutes and represents the CAAR from interval -80 until that interval. CAAR's are only presented from interval -15 to interval 15 for the purposes of brevity.

Interval	AAR	*p*-value (*t*-stat)	*p*-value (Wilcox)	CAAR	*p*-value (*t*-stat)	*p*-value (Wilcox)
-15	0.011%	0.188	0.213	0.920%	0.000	0.000
-14	0.033%	0.060	0.029	0.958%	0.000	0.000
-13	0.004%	0.592	0.010	0.966%	0.000	0.000
-12	0.034%	0.000	0.660	1.000%	0.000	0.000
-11	0.023%	0.014	0.771	1.024%	0.000	0.000
-10	0.014%	0.107	0.697	1.038%	0.000	0.000
-9	0.022%	0.012	0.187	1.059%	0.000	0.000
-8	0.012%	0.181	0.039	1.071%	0.000	0.000
-7	0.004%	0.682	0.711	1.078%	0.000	0.000
-6	0.023%	0.018	0.031	1.104%	0.000	0.000
-5	0.017%	0.092	0.284	1.120%	0.000	0.000
-4	0.000%	0.969	0.002	1.119%	0.000	0.000
-3	0.025%	0.024	0.000	1.145%	0.000	0.000
-2	0.035%	0.042	0.156	1.181%	0.000	0.000
-1	0.038%	0.001	0.021	1.219%	0.000	0.000
Halt	0.990%	0.000	0.000	2.209%	0.000	0.000
1	1.276%	0.000	0.000	3.493%	0.000	0.000
2	0.040%	0.026	0.594	3.551%	0.000	0.000
3	0.015%	0.315	0.055	3.568%	0.000	0.000
4	0.016%	0.224	0.024	3.585%	0.000	0.000
5	0.017%	0.176	0.345	3.602%	0.000	0.000
6	0.001%	0.970	0.005	3.601%	0.000	0.000
7	0.014%	0.292	0.359	3.614%	0.000	0.000
8	0.026%	0.030	0.019	3.640%	0.000	0.000
9	0.010%	0.368	0.000	3.653%	0.000	0.000
10	0.020%	0.087	0.003	3.677%	0.000	0.000
11	0.014%	0.147	0.177	3.689%	0.000	0.000
12	0.049%	0.227	0.103	3.738%	0.000	0.000
13	-0.011%	0.342	0.016	3.733%	0.000	0.000
14	0.010%	0.357	0.068	3.747%	0.000	0.000
15	0.014%	0.250	0.067	3.759%	0.000	0.000

the 'bad news' halts are unanticipated for two reasons. First, there is a positive price run up in the pre-halt period for 'bad news' trading halts. If there was correct anticipatory trading behaviour in the market, 'bad news' trading halts should show a negative run up. This could only be explained by investors that anticipate trading halts and trade in the incorrect direction to the information released during the trading halt. Secondly, 'price discovery' occurs faster on 'bad news' halts rather than 'good news' halts.[38] This finding is surprising because previous studies such as Kryzanowski (1979) suggest there should be lags and frictions in the downward adjustment of security prices, due to the many restrictions on short selling.

Figure 6.10 CAAR's around Trading Halts by Price change

This Figure displays the cumulative average abnormal returns (CAAR's) for the full sample over the event period [-80, 80]. Results are separated by the price change during the trading halt.



[38] The abnormal returns disappear at a faster rate for rate for 'bad news', suggesting that price discovery occurs faster.

Table 6.14 Abnormal Returns by Price Change

This Table shows the Cumulative Average Abnormal Return (CAAR) behaviour around trading halts for the full sample. Abnormal returns are computed using the return on the halted stock less the return on the All Ordinaries Index. *p*-values for both standard *t*-statistics and Wilcoxon Signed Rank tests are presented. CAAR's are cumulated starting 80 intervals before the trading halt and ending 80 intervals after the trading halt. Each interval consists of 15 minutes and represents the CAAR from interval -80 until that interval. CAAR's are only presented from interval -15 to interval 15 for the purposes of brevity. Price change represents the price change during the trading halt.

Interval	'Bad News'			'Good News'			'No News'		
	CAAR	*p*-value (*t*-stat)	*p*-value (Wilcox)	CAAR	*p*-value (*t*-stat)	*p*-value (Wilcox)	CAAR	*p*-value (*t*-stat)	*p*-value (Wilcox)
-15	1.536%	0.000	0.000	0.786%	0.000	0.011	0.182%	0.220	0.037
-14	1.614%	0.000	0.000	0.800%	0.000	0.019	0.225%	0.138	0.025
-13	1.652%	0.000	0.000	0.799%	0.000	0.024	0.204%	0.181	0.012
-12	1.699%	0.000	0.000	0.825%	0.000	0.009	0.238%	0.124	0.011
-11	1.755%	0.000	0.000	0.846%	0.000	0.002	0.213%	0.180	0.006
-10	1.765%	0.000	0.000	0.861%	0.000	0.003	0.231%	0.146	0.008
-9	1.789%	0.000	0.000	0.884%	0.000	0.001	0.239%	0.134	0.009
-8	1.784%	0.000	0.000	0.907%	0.000	0.001	0.252%	0.116	0.013
-7	1.810%	0.000	0.000	0.905%	0.000	0.001	0.250%	0.120	0.021
-6	1.856%	0.000	0.000	0.916%	0.000	0.000	0.284%	0.079	0.037
-5	1.889%	0.000	0.000	0.941%	0.000	0.000	0.243%	0.132	0.020
-4	1.925%	0.000	0.000	0.926%	0.000	0.000	0.217%	0.176	0.010
-3	1.959%	0.000	0.000	0.953%	0.000	0.000	0.218%	0.178	0.011
-2	2.038%	0.000	0.000	0.966%	0.000	0.000	0.251%	0.121	0.015
-1	2.137%	0.000	0.000	0.970%	0.000	0.000	0.288%	0.074	0.024
Halt	-0.103%	0.000	0.000	4.090%	0.000	0.000	0.288%	0.000	0.000
1	-1.297%	0.000	0.566	7.157%	0.000	0.000	0.362%	0.026	0.050
2	-1.477%	0.000	0.551	7.361%	0.000	0.000	0.390%	0.016	0.097
3	-1.588%	0.000	0.116	7.450%	0.000	0.000	0.407%	0.013	0.095
4	-1.660%	0.000	0.052	7.523%	0.000	0.000	0.409%	0.013	0.077
5	-1.686%	0.001	0.045	7.573%	0.000	0.000	0.399%	0.017	0.071
6	-1.737%	0.002	0.011	7.608%	0.000	0.000	0.382%	0.022	0.051
7	-1.741%	0.003	0.011	7.642%	0.000	0.000	0.352%	0.035	0.049
8	-1.744%	0.003	0.012	7.674%	0.000	0.000	0.417%	0.015	0.081
9	-1.755%	0.004	0.010	7.703%	0.000	0.000	0.423%	0.013	0.080
10	-1.752%	0.004	0.011	7.745%	0.000	0.000	0.424%	0.014	0.079
11	-1.790%	0.008	0.003	7.793%	0.000	0.000	0.414%	0.016	0.070
12	-1.785%	0.007	0.004	7.876%	0.000	0.000	0.434%	0.011	0.067
13	-1.820%	0.015	0.002	7.895%	0.000	0.000	0.408%	0.018	0.050
14	-1.793%	0.010	0.002	7.898%	0.000	0.000	0.430%	0.013	0.050
15	-1.819%	0.015	0.001	7.938%	0.000	0.000	0.422%	0.016	0.042

Table 6.15 and reports the CAAR's separated by market capitalisation. The results show that the CAAR is highest for smallest stocks over the period surrounding a trading halt. Figure 6.11 illustrates that smaller stocks exhibit the most significant abnormal returns before a trading halt compared to larger stocks. This could suggest greater information leakage for smaller stocks. During a trading halt, there are lower abnormal returns for the smallest stocks (0.22%) compared to the largest stocks (1.9%). Immediately following a trading halt, significant abnormal returns are observed for the smallest stocks (1.42%) compared to the largest stocks (0.06%). The post-halt period for smaller stocks results in significant abnormal returns as shown by the CAAR of 1.86% during the first 25 intervals after a trading halt. This suggests that 'price discovery' is not contained in the trading halt for smaller stocks. In contrast, trading halts on larger stocks appear to be installed unexpectedly and re-opened when the entire 'price discovery' has occurred.

Figure 6.11 CAAR's around Trading Halts by Market Capitalisation

This Figure displays the cumulative average abnormal returns (CAAR's) for the full sample over the event period [-80, 80]. Results are separated by market capitalisation.

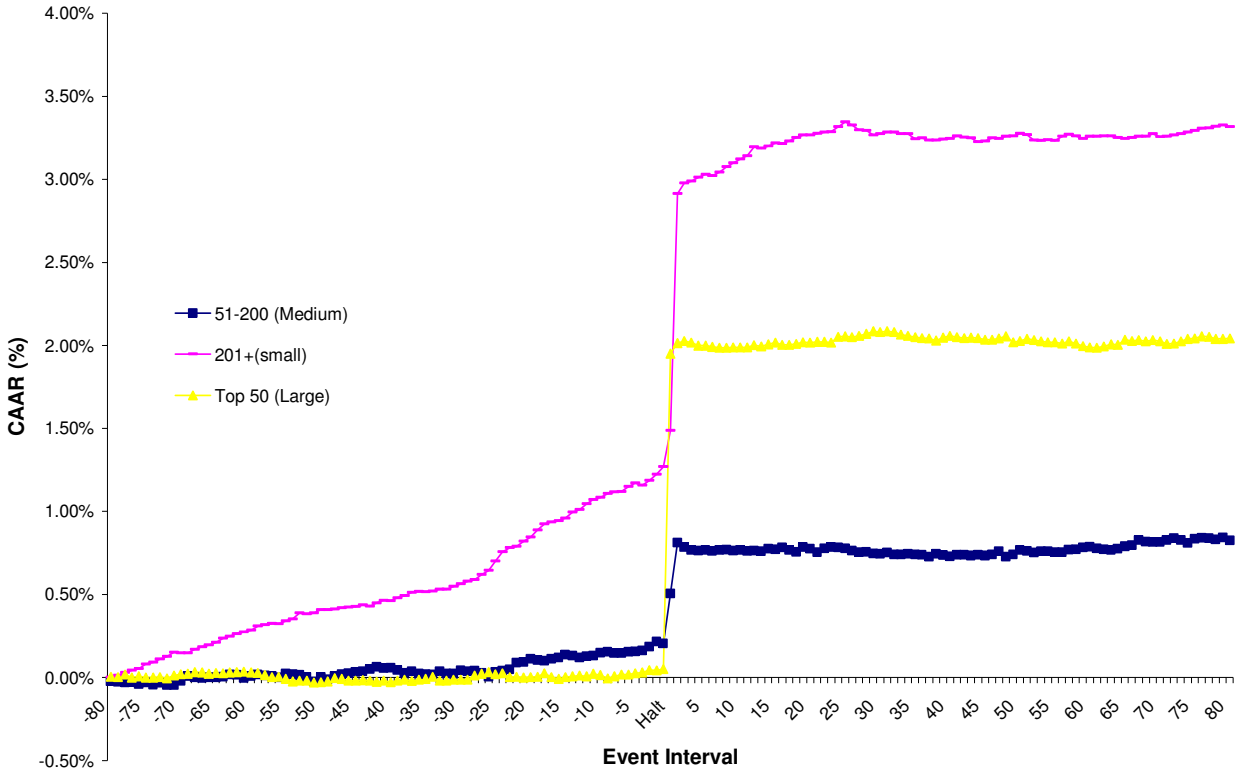


Table 6.15 Abnormal Returns by Market Capitalisation

This Table shows the Cumulative Average Abnormal Return (CAAR) behaviour around trading halts for the full sample. Abnormal returns are computed using the return on the halted stock less the return on the All Ordinaries Index. *p*-values for both standard *t*-statistics and Wilcoxon Signed Rank tests are presented. CAAR's are cumulated starting 80 intervals before the trading halt and ending 80 intervals after the trading halt. Each interval consists of 15 minutes and represents the CAAR from interval -80 until that interval. CAAR's are only presented from interval -15 to interval 15 for the purposes of brevity. Market Capitalisation represents the market capitalisation of the halted stocks grouped into three categories.

	Top 50			51-200			201+		
Interval	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**
-15	0.002%	0.980	0.682	0.137%	0.206	0.308	0.960%	0.000	0.000
-14	0.007%	0.929	0.668	0.132%	0.226	0.357	0.995%	0.000	0.000
-13	0.012%	0.875	0.586	0.120%	0.271	0.354	1.010%	0.000	0.000
-12	0.009%	0.910	0.731	0.128%	0.246	0.376	1.047%	0.000	0.000
-11	0.023%	0.771	0.826	0.131%	0.232	0.346	1.071%	0.000	0.000
-10	0.016%	0.847	0.813	0.150%	0.172	0.192	1.085%	0.000	0.000
-9	-0.006%	0.946	0.536	0.155%	0.158	0.141	1.108%	0.000	0.000
-8	0.007%	0.930	0.600	0.148%	0.181	0.167	1.117%	0.000	0.000
-7	0.017%	0.836	0.719	0.147%	0.189	0.146	1.120%	0.000	0.000
-6	0.019%	0.825	0.546	0.154%	0.167	0.133	1.150%	0.000	0.000
-5	0.026%	0.757	0.605	0.158%	0.162	0.125	1.172%	0.000	0.000
-4	0.032%	0.706	0.657	0.163%	0.152	0.143	1.158%	0.000	0.000
-3	0.045%	0.593	0.799	0.186%	0.114	0.138	1.187%	0.000	0.000
-2	0.045%	0.605	0.736	0.216%	0.072	0.082	1.225%	0.000	0.000
-1	0.050%	0.559	0.794	0.205%	0.090	0.148	1.270%	0.000	0.000
Halt	1.950%	0.000	0.000	0.505%	0.000	0.000	1.490%	0.000	0.000
1	2.014%	0.256	0.693	0.812%	0.001	0.000	2.914%	0.000	0.000
2	2.026%	0.221	0.564	0.785%	0.002	0.001	2.978%	0.000	0.000
3	2.017%	0.260	0.569	0.768%	0.002	0.002	2.990%	0.000	0.000
4	1.998%	0.348	0.734	0.766%	0.003	0.001	3.012%	0.000	0.000
5	1.999%	0.345	0.733	0.767%	0.003	0.002	3.031%	0.000	0.000
6	1.991%	0.388	0.675	0.762%	0.003	0.001	3.023%	0.000	0.000
7	1.987%	0.408	0.684	0.768%	0.003	0.001	3.043%	0.000	0.000
8	1.987%	0.415	0.695	0.771%	0.003	0.001	3.076%	0.000	0.000
9	1.990%	0.403	0.652	0.765%	0.004	0.001	3.100%	0.000	0.000
10	1.988%	0.415	0.762	0.766%	0.004	0.001	3.123%	0.000	0.000
11	1.989%	0.411	0.706	0.762%	0.004	0.001	3.142%	0.000	0.000
12	2.002%	0.355	0.661	0.765%	0.004	0.001	3.195%	0.000	0.000
13	1.993%	0.393	0.661	0.760%	0.005	0.001	3.188%	0.000	0.000
14	2.008%	0.329	0.505	0.775%	0.004	0.001	3.201%	0.000	0.000
15	2.017%	0.294	0.416	0.772%	0.004	0.001	3.218%	0.000	0.000

Table 6.16 reports the CAAR's separated by the duration of the trading halt. The results present mixed evidence regarding the impact of trading halt duration on abnormal returns surrounding trading halts. Abnormal returns are higher for trading halts of longer durations, which was expected based on the descriptive statistics in Table 7.1. Figure 6.12 graphs the CAAR's and illustrates that trading halts of less than 30 minutes exhibit similar patterns to those of less than 15 minutes, suggesting that trading halt duration does not impact on abnormal returns. Overall Figure 6.12 suggests that abnormal returns, excluding the discernable pattern of larger CAAR's around trading halt of longer duration, are not affected by trading halt duration.

Figure 6.12 CAAR's around Trading Halts by Trading Halt Duration

This Figure displays the cumulative average abnormal returns (CAAR's) for the full sample over the event period [-80, 80]. Results are separated by the trading halt duration (Minutes).

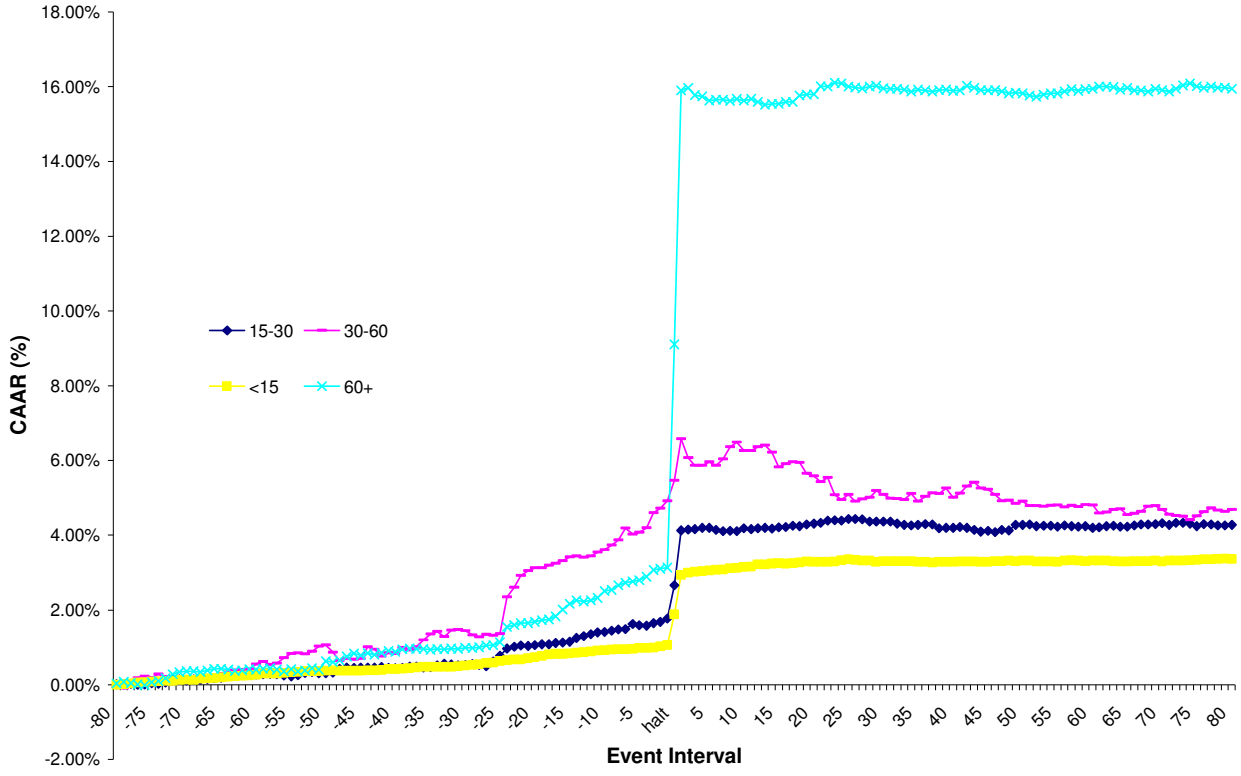


Table 6.16 Cumulative Average Abnormal Returns by Trading Halt Duration

This Table shows the Cumulative Average Abnormal Return (CAAR) behaviour around trading halts for the full sample. Abnormal returns are computed using the return on the halted stock less the return on the All Ordinaries Index. *p*-values for both standard *t*-statistics and Wilcoxon Signed Rank tests are presented. CAAR's are cumulated starting 80 intervals before the trading halt and ending 80 intervals after the trading halt. Each interval consists of 15 minutes and represents the CAAR from interval -80 until that interval. CAAR's are only presented from interval -15 to interval 15 for the purposes of brevity. Halt duration is the length of the trading halt in minutes.

	<15			**15-30**			**30-60**			**60+**		
Interval	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**	**CAAR**	***p*-value (*t*-stat)**	***p*-value (Wilcox)**
-15	2.164%	0.000	0.000	1.148%	0.000	0.066	3.423%	0.007	0.020	0.829%	0.000	0.000
-14	2.260%	0.000	0.000	1.248%	0.000	0.108	3.438%	0.006	0.023	0.858%	0.000	0.000
-13	2.225%	0.000	0.000	1.298%	0.000	0.107	3.411%	0.005	0.022	0.863%	0.000	0.000
-12	2.260%	0.000	0.000	1.353%	0.000	0.065	3.438%	0.005	0.019	0.895%	0.000	0.000
-11	2.325%	0.000	0.000	1.397%	0.000	0.034	3.538%	0.004	0.018	0.914%	0.000	0.000
-10	2.503%	0.000	0.000	1.406%	0.000	0.030	3.610%	0.006	0.020	0.922%	0.000	0.000
-9	2.534%	0.000	0.000	1.446%	0.000	0.014	3.734%	0.006	0.017	0.940%	0.000	0.000
-8	2.666%	0.000	0.000	1.479%	0.000	0.015	3.874%	0.008	0.020	0.945%	0.000	0.000
-7	2.726%	0.000	0.000	1.493%	0.000	0.014	4.180%	0.005	0.016	0.946%	0.000	0.000
-6	2.760%	0.000	0.000	1.622%	0.000	0.004	4.023%	0.004	0.021	0.961%	0.000	0.000
-5	2.799%	0.000	0.000	1.585%	0.000	0.007	4.068%	0.003	0.018	0.983%	0.000	0.000
-4	2.884%	0.000	0.000	1.582%	0.000	0.009	4.197%	0.003	0.020	0.978%	0.000	0.000
-3	3.065%	0.000	0.000	1.641%	0.000	0.003	4.605%	0.002	0.010	0.991%	0.000	0.000
-2	3.105%	0.000	0.000	1.675%	0.000	0.002	4.712%	0.001	0.009	1.027%	0.000	0.000
-1	3.132%	0.000	0.000	1.767%	0.000	0.000	4.920%	0.001	0.005	1.058%	0.000	0.000
Halt	9.102%	0.000	0.000	2.657%	0.000	0.000	5.460%	0.000	0.000	1.878%	0.000	0.000
1	15.897%	0.000	0.000	4.124%	0.000	0.000	6.577%	0.001	0.002	2.929%	0.000	0.000
2	15.970%	0.000	0.000	4.154%	0.000	0.000	6.075%	0.001	0.002	2.993%	0.000	0.000
3	15.781%	0.000	0.000	4.163%	0.000	0.000	5.866%	0.001	0.003	3.021%	0.000	0.000
4	15.748%	0.000	0.000	4.200%	0.000	0.000	5.868%	0.001	0.005	3.037%	0.000	0.000
5	15.629%	0.000	0.000	4.201%	0.000	0.000	5.956%	0.001	0.002	3.061%	0.000	0.000
6	15.650%	0.000	0.000	4.139%	0.000	0.000	5.863%	0.001	0.003	3.067%	0.000	0.000
7	15.655%	0.000	0.000	4.111%	0.000	0.000	6.035%	0.001	0.002	3.084%	0.000	0.000
8	15.618%	0.000	0.000	4.114%	0.000	0.000	6.365%	0.000	0.001	3.113%	0.000	0.000
9	15.673%	0.000	0.000	4.102%	0.000	0.000	6.488%	0.000	0.001	3.127%	0.000	0.000
10	15.625%	0.000	0.000	4.181%	0.000	0.000	6.263%	0.000	0.001	3.148%	0.000	0.000
11	15.675%	0.000	0.000	4.160%	0.000	0.000	6.259%	0.001	0.002	3.163%	0.000	0.000
12	15.591%	0.000	0.000	4.181%	0.000	0.000	6.358%	0.001	0.002	3.220%	0.000	0.000
13	15.515%	0.000	0.000	4.194%	0.000	0.000	6.407%	0.001	0.002	3.216%	0.000	0.000
14	15.537%	0.000	0.000	4.179%	0.000	0.000	6.213%	0.001	0.003	3.233%	0.000	0.000
15	15.539%	0.000	0.000	4.213%	0.000	0.000	5.826%	0.001	0.003	3.247%	0.000	0.000

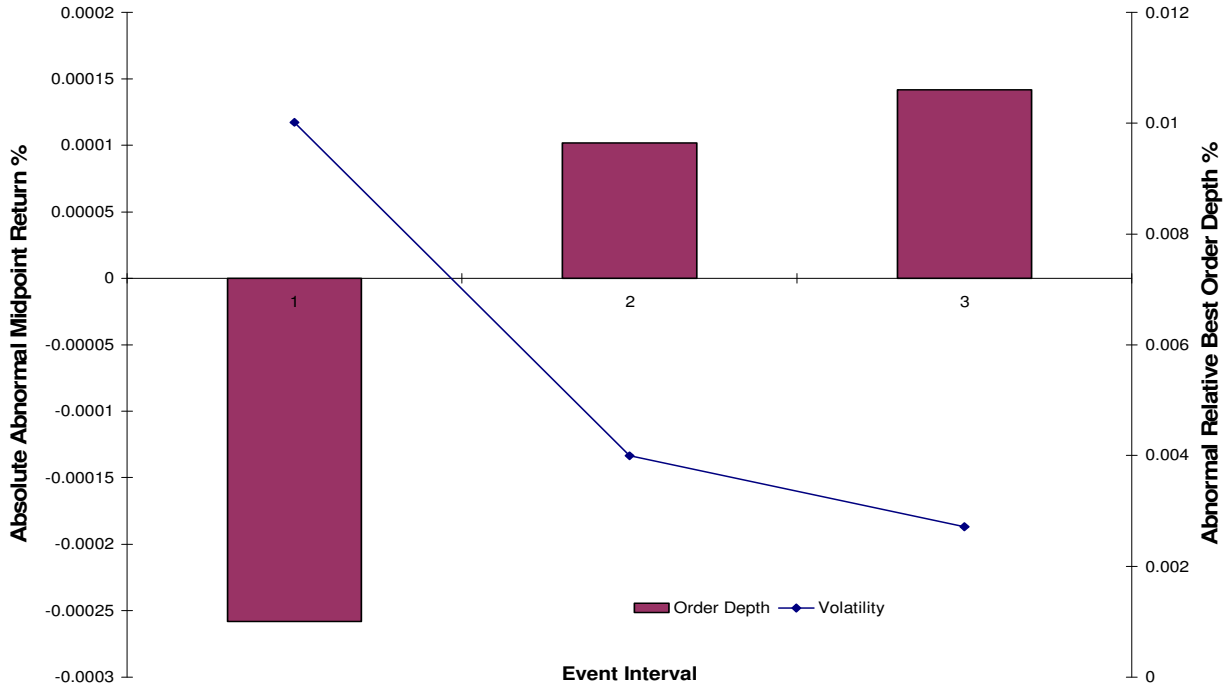
6.5. *Supplemental Analyses*

6.5.1. *Volatility and Order Depth*

To examine the relationship between post-halt volatility and order depth, Figure 6.13 graphs abnormal volatility and abnormal order depth at the best quotes. Figure 6.13 shows abnormal order depth at the best quotes (the bars) and abnormal volatility (the line). To limit scale differences, abnormal volatility corresponds to the left-hand Y-axis and the abnormal depth measure corresponds to the right-hand Y-axis. From Figure 6.13, it appears that there is a negative relationship between post-halt abnormal volatility and abnormal depth at the best quotes.

Figure 6.13 Volatility Vs Order Depth

This Figure displays the average values of abnormal volatility and best order depth for the matched sample over the event period [1, 3]. Abnormal depth (the bars) corresponds to the right-hand Y-axis. Abnormal volatility (the line) corresponds to the left-hand Y-axis.



The result in Figure 6.13 suggests that the high levels of volatility observed immediately after trading halts may result, at least partially, from changes in liquidity around the halt. However, these tests do not control for other factors that may explain changes in abnormal behaviour around trading halts. To control for these effects, an ordinary least squares (OLS) regression of abnormal volatility on abnormal depth, abnormal volume, trading halt duration and market capitalisation is estimated.

Table 6.17 Abnormal Volatility Regression

This Table lists coefficients from a regression of abnormal volatility (during interval 1) on several explanatory variables. Interval 1 extends from the re-open until 15 minutes after the re-open. The matched sample of 16,113 trading halts is used. The results are tested for heteroskedascity using White's general test. The null hypothesis of heteroskedascity is rejected at a 1% level of significance. The regression takes the following form:

$$Abnormal\ Volatility_i = a_0 + a_1 * AbnDepth_i + a_2 * AbnVolume_i + a_3 * MktCap_i + a_4 * HaltDuration_i + \varepsilon_i$$

	Intercept (a_0)	**Abnormal Relative Best Order Depth** (a_1)	**Abnormal Trading Volume** (a_2)	**Market Capitalisation of halted stock** (a_3)	**Trading halt duration (Minutes)** (a_4)
Coefficient	0.0096	2.58 E-11	2.43 E-09	-4.78 E-13	5.75 E-6
***t*-stat**	22.87	0.63	12.57	-5.24	4.00
***p*-value**	0.0001	0.5294	0.0001	0.0001	0.0001
Adjusted R^2	0.0189				
R^2	0.0192				
Mean Abnormal Volatility	0.0100				

The regression results in Table 6.17 show that the coefficient of abnormal best depth is highly insignificant and provides no evidence of a relationship between abnormal depth and abnormal volatility. As expected, the coefficient on abnormal volume is significantly positive at a 1% level of significance. The coefficient for market capitalisation is significantly negative at a 1% level and confirms a negative relationship between abnormal volatility and market capitalisation. Table 6.14 also confirms a significant positive relationship, at a 1% level, between the duration of a trading halt and abnormal volatility.

Most importantly, after controlling for abnormal volume, abnormal depth, trading halt duration and market capitalisation the regression intercept remains highly significant. In addition, the magnitude of the intercept (0.00956) is similar to the magnitude of mean abnormal volatility (0.0100), suggesting that the model explains, at best, a small portion of the observed abnormal volatility. This is also consistent with the adjusted R^2 of 0.0189. Taken together, the results in this section provide little support for hypothesis 11. It appears that other factors, such as unmeasured information effects or the closure of trading, explain the majority of the observed post-halt volatility.

6.5.2. Alternative Matching Procedures

As discussed in Section 6.8.2 the matching procedure for pseudo-halts may induce a bias as halts are only matched on returns within 1%. To ensure that the results in this study are not prone to this bias, Table 6.18 reports the abnormal results for volume, relative bid-ask spreads, volatility and order depth for the 0.05% matched sample. 10,080 of the initial 18,245 trading halts can be matched within 0.05%. The 0.05% matched sample provides qualitatively similar results to those for the sample matched within 1%. This suggests that the matching procedure within 1% does not induce any bias.

6.6. Limitations

Whether a trading halt can be successfully matched with a pseudo-halt is not random. This matching process typically excludes trading halts with extremely large absolute price moves. There are two implications of this selection bias. First, by excluding large price moves, the power of the tests are reduced, thus biasing against finding a difference in the matched sample. Second, since halts can only be matched for relatively small halt returns, the resulting selection bias narrows the scope of the conclusions to trading halts with relatively small halt returns.

Table 6.18 Abnormal Measures around Trading Halts for Matched Sample (0.05%)

This Table shows the average abnormal behaviour around trading halts for the 0.05% matched sample. Interval 1, 2, 3 and 4 represent fifteen-minute intervals immediately following a trading halt. Interval -1, -2, -3 and -4 represent fifteen-minute intervals immediately before a trading halt. Interval (1, 20) denotes the average measure during the period between interval 1 and 20 following a trading halt. Similarly, (-20, -1) refers to the period between interval -1 and interval -20 interval prior to a trading halt. Similarly for (-40, -1), (1, 40), (-80, -1) and (1, 80). For the abnormal measures, *, **, *** denotes the statistical significance, at the one, five and ten percent levels, respectively using Wilcoxon sign-ranked tests.

Interval	Volume	Relative Bid-ask Spreads (%)	Volatility (%)	Best Bid Depth (%)	Best Ask Depth (%)	Total Bid-side Depth (%)	Total Ask-side Depth (%)
[-80,-1]	-1,931	0.0245*	-0.0119**	0.0159	0.0031	0.0079***	-0.0015*
[-40,-1]	-611	0.0369	-0.0066	0.0153**	0.0033	-0.0007***	-0.0003**
[-20-1]	1,192	0.0771	-0.0038	0.0150***	0.0032	-0.0054***	-0.0019***
-4	-801	0.0801	0.0220	0.0202***	0.0065	-0.0165***	-0.0018**
-3	2,866	0.0621	0.0169	0.0233***	0.0081***	-0.0214***	-0.0040***
-2	7,115	0.0659	0.0376	0.0157**	0.0070***	-0.0137***	-0.0035***
-1	1,025	0.0857	-0.0067	0.0154**	0.0074**	-0.0039***	-0.0063***
1	191,291***	0.1762***	0.8171***	-0.0085***	-0.0053***	0.0206**	-0.0041***
2	57,600***	0.1684***	0.3165***	0.0185***	0.0109**	0.0104***	-0.0034***
3	32,717***	0.1558***	0.2374***	0.0242***	0.0097***	0.0110***	-0.0050***
4	20,283***	0.1262***	0.2178***	0.0311***	0.0098***	0.0206***	-0.0028***
[1,20]	25,554***	0.0554	0.1461***	0.0147***	0.0035***	0.0154	0.0058***
[1,40]	15,370***	0.0081	0.0864***	0.0154***	0.0033***	0.0205	0.0096
[1, 80]	8,143***	-0.0274**	0.0481***	0.0188*	0.0025***	0.0192	0.0103

7. CONCLUSION

This dissertation examines the impact of *discretionary* trading halts on the trading behaviour of stocks listed on the ASX. Despite the plethora of research that have examined the impact of trading halts on overseas securities exchanges, the examination as to its effectiveness in the Australian equities market has been limited. This dissertation was primarily motivated to address this gap in the literature, especially given the significant disparity in the relative number of trading halts to the number of listed shares in Australia compared to the United States. An event study methodology is used to investigate for any abnormal changes in liquidity, volatility and returns of ASX stocks around a trading halt. Abnormal trading behaviour is assessed by comparing halted stock trading behaviour to a control sample of pseudo-halts.

The results show that both trading volume and volatility are abnormally higher immediately after a trading halt and persist afterwards for up to one trading day. This should be of concern to market participants, as trading halts are designed to protect investors around periods of high uncertainty, by means of curbing excess volatility. These results are consistent with those found in the United States by Corwin and Lipson (2000) and in Australia by Aitken, Frino and Winn (1995).

Relative bid-ask spreads are found to be immediately wider for halted stocks compared to control stocks. The spreads remain abnormally wide for up to 3 hours after a trading halt and then narrow for the remaining portion of the post-halt period. These results are slightly different to those of Aitken, Frino and Winn (1995), who find that abnormal spreads persist for up to two trading days following trading halts on the ASX. This suggests that the trading halt mechanism used by the ASX has improved, allowing for a better information

dissemination process to find the true equilibrium price for the halted stock upon trade resumption.

Order depth near the best quotes is found to be abnormally low immediately after trading halts, but total order depth is found to be abnormally high. This is partially explained by stale orders that remain on the trading system. The result is similar to the finding of Corwin and Lipson (2000), except for their finding of abnormally high order depth at the best quotes before and after a trading halt. This disparity is explained by the presence of a specialist on the NYSE, who may set their quotes wider leading up to a trading halt, because they fear holding an unwanted inventory position during the trading halt.

An examination of abnormal returns for halted stocks reveals that a significant amount of 'price discovery' occurs around a trading halt. This suggests the presence of anticipatory trading behaviour in the lead up to a trading halt. Abnormal returns are found to be significant during the halt and also for up to a trading day following the halt. This confirms that trading halts do not allow for a complete dissemination of information during the trading halt and is consistent with the findings of wider relative bid-ask spreads in the post-halt period. Nonetheless, it can be said that the trading halt mechanism does the job of finding a reasonable Figure for the true equilibrium post-halt stock price, where no price reversal is detected after the trading halt.

The type of news announcement during a trading halt does not significantly alter the impact of trading halts. Rather, the results reveal that the impact of trading halts is a function of various exogenous variables including firm size and trading halt duration. Trading halts on larger stocks lead to narrower spreads, lower volatility and lower abnormal returns in the post-halt trading period. This can be explained by lower uncertainty and asymmetric

information in larger stocks that are widely followed by analysts. This suggests that market regulators should consider the size of the firm when making the decision of whether to implement a trading halt. Trading halt duration is also found to alter the effectiveness of trading halts in reducing volatility and liquidity. Trading halts of longer durations result in higher volatility and wider bid-ask spreads immediately following a trading halt.

Overall, the results of this study show that trading halts are associated with lower levels of liquidity, higher levels of volatility and significant abnormal returns following a trading halt. These findings indicate that trading halts do not improve market quality compared to the alternative of continuous trading (as measured by pseudo-halts). It appears that, market quality following a trading halt is affected by factors other than the magnitude of the price move. A potential candidate for explaining the remaining portion is the 'learn-by-trading' class of models, which suggest that the act of calling a trading halt is detrimental to market quality. It should be recognised that care must be taken in applying the results of this study due to the pseudo-halt methodology used, which excludes trading halts with extreme price moves. Therefore, the resulting selection bias, narrows the scope of the conclusions to trading halts with relatively small halt returns. It is also possible that some other fundamental, but unidentified, differences exist between events that lead to a trading halt and those that do not.

The results from this dissertation provide several potential future research directions. To further investigate liquidity around trading halts on the ASX, it would be necessary to examine the amount of order submissions and cancellations. This would provide a more complete understanding as to whether increases in total order depth after a trading halt are associated with stale orders. Another possible research area would involve examining the trading behaviour of different types of investors around trading halts. Trading halts are designed to protect small investors by allowing time for information to be disseminated.

Bildik (2004) is the only study to investigate whether institutional investors take advantage over retail investors during a trading halt. More work is needed in this area to determine if these results hold on other equities markets. Overall, this study provides a more comprehensive understanding of the impact of trading halts on market quality, which can allow ASX exchange officials and securities market regulators to appropriately assess whether changes to the current trading halt procedure are needed.

REFERENCES

Admati, A.R., and P. Pfleiderer, 1988, A Theory of Intraday Patterns: Volume and Price Variability, *The Review of Financial Studies* 1, 3-38.

Aitken, M., P. Brown, and T. Walter, 1994, Intraday Patterns in Returns, Trading Volume, Volatility, and Trading Frequency on SEATS, *Working paper, University of Sydney*.

Aitken, M., A. Frino, and R. Winn, 1995, The effect of informational motivated trading halts on price discovery: Evidence from the Australian Stock Exchange, *Working paper, University of Sydney*.

ASX, 2007, Monthly Trading Report for June 2007, *available at: www.asx.com.au*.

Bhattacharya, U., and M. Spiegel, 1998, Anatomy of a market failure: NYSE trading suspensions, *Journal of Business & Economic Statistics* 16, 216-226.

Bildik, R., 2004, The Effects of Trading Halts and the Advantage of Institutional Investors: Evidence from the Istanbul Stock Exchange, *Working paper from SSRN*.

Brockman, P., and D. Chung, 1999, An analysis of depth behavior in an electronic, order-driven environment, *Journal of Banking & Finance* 23, 1861-1886.

Brown, J.S., and B.J. Warner, 1980, Measuring Security Price Performance, *Journal of Financial Economics* 8, 205-258.

Brown, P., G. Clinch, and G. Foster, 1992, Market Microstructure and Capital Market Information Content Research, *Studies in Accounting Research* 32.

Brown, P.D., and H.R. Jennings, 1989, On Technical Analysis, *The Review of Financial Studies* 2, 527-552.

Chen, H., H. Chen, and N. Valerio, 2003, The effects of trading halts on price discovery for NYSE stocks, *Applied Economics* 35, 91-97.

Christie, G.W., A.S. Corwin, and H.J. Harris, 2002, Nasdaq trading halts: The impact of market mechanisms on prices, trading activity, and execution costs, *The Journal of Finance* 57, 1443-1478.

Chung, K.H., B.F. Van Neese, and R.A. Van Ness, 1999, Limit orders and the bid-ask spread, *Journal of Financial Economics* 53, 255-287.

Corwin, A.S., and L.M. Lipson, 2000, Order flow and liquidity around NYSE trading halts Discussion, *The Journal of Finance* 55, 1771-1801.

DeRidder, 1990, Trading Suspensions and Trading Activity at the Stockholm Stock Exchange, *Skandinaviska Enskilda Banken Quarterly Review* 36-41.

Engelen, P.J., and R. Kabir, 2006, Empirical Evidence on the Role of Trading Suspensions in Disseminating New Information to the Capital Market, *Journal of Business Finance & Accounting* 33(7) & (8), 1142-1167.

Fabozzi, F.J., and C.K. Ma, 1988, The Over-the-Counter Market and New York Stock Exchange Trading Halts, *The Financial Review* 23, 427-438.

Fama, E.F., 1989, Perspectives on October 1987, Or, What Did We Learn from the Crash?, *Black Monday and the Future of Financial Markets: Mid America Institute for Public Policy Research* 71-82.

Ferris, S.P., R. Kumar, and G.A. Wolfe, 1992, The Effect of SEC-Ordered Suspensions on Returns, Volatility, and Trading Volume, *The Financial Review* 27, 1-35.

Fong, W.M., 1996, New York Stock Exchange trading halts and volatility, *International Review of Economics and Finance* 3, 243-257.

French, K., and R. Roll, 1986, Stock Return Variances: The Arrival of Information and the Reaction of Traders, *Journal of Financial Economics* 17, 5-26.

Gerety, M.S., and J.H. Mulherin, 1992, Trading Halts and Market Activity: An Analysis of Volume at the Open and the Close, *The Journal of Finance* 47, 1765-1785.

Gerety, M.S., and J.H. Mulherin, 1994, Price Formation on Stock Exchanges: The Evolution of Trading within the Day, *The Review of Financial Studies* 7, 609-630.

Glosten, L.R., and P.R. Milgrom, 1985, Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders, *Journal of Financial Economics* 14, 71-101.

Greenwald, B.C., and J.C. Stein, 1991, Transactional Risk, Market Crashes, and the Role of Circuit, *The Journal of Business* 64, 443-463.

Grundy, D.B., and M. McNichols, 1989, Trade and the Revelation of Information through Prices and Direct Disclosure, *The Review of Financial Studies* 2, 495-427.

Harris, L., 1986, A Transaction Data Study of Weekly and Intradaily Patterns in Stock Returns, *Journal of Financial Economics* 16, 99-117.

Hauser, S., H. Kedar-Levy, B. Pilo, and I. Shurki, 2006, The Effect of Trading Halts on the Speed of Price Discovery, *Journal of Financial Services Research* 29, 83-99.

Hopewell, M.H., and A.L. Schwartz, Jr., 1978, Temporary Trading Suspensions in Individual NYSE Securities, *The Journal of Finance* 33, 1355-1373.

Hopewell, M.H., and A.L.J. Schwartz, 1976, Stock Price Movement Associated with Temporary Trading Suspensions - Bear Market Versus Bull Market, *Journal of Financial and Quantitative Analysis* 11.

Howe, J.S., and G.G. Schlarbaum, 1986, SEC Trading Suspensions: Empirical Evidence, *Journal of Financial and Quantitative Analysis* 21, 323-334.

IOSCO, 2002, Report on Trading Halts and Market Closures, *Technical Committee of the International Organization of Securities Commissions* October.

Kabir, R., 1994, Share price behaviour around trading suspensions on the London Stock Exchange, *Applied Financial Economics* 24, 289-295.

Kim, A.K., and S.G. Rhee, 1997, Price limit performance: Evidence from the Tokyo Stock Exchange, *The Journal of Finance* 52, 885-901.

Kim, H.Y., and J.J. Yang, 2004, What Makes Circuit Breakers Attractive to Financial Markets? A Survey, *Financial Markets, Institutions & Instruments* 13, 109-146.

Kim, O., and R.E. Verrecchia, 1991, Trading Volume and Price Reactions to Public Announcements, *Journal of Accounting Research* 29, 302-321.

Kim, Y.H., J. Yagüe, and J.J. Yang, 2007, Relative performance of trading halts and price limits: Evidence from the Spanish Stock Exchange, *International Review of Economics and Finance*.

Kryzanowski, L., 1979, The Efficacy of Trading Suspensions: A Regulatory Action Designed to Prevent the Exploitation of Monopoly Information, *The Journal of Finance* 34, 1187-1199.

Kryzanowski, L., and H. Nemiroff, 1998, Price discovery around trading halts on the Montreal Exchange using trade-by-trade data, *The Financial Review* 33, 195-212.

Kryzanowski, L., and H. Nemiroff, 2001, Market quote and spread component cost behavior around trading halts for stocks interlisted on the Montreal and Toronto Stock Exchanges, *The Financial Review* 36, 115-138.

Leach, J., and A. Madhavan, 1993, Price Experimentation and Security Market Structure, *Review of Financial Studies* 6, 375-404.

Lee, C.M.C., M.J. Ready, and P.J. Seguin, 1994, Volume, volatility, and New York Stock Exchange trading halts, *The Journal of Finance* 49, 183-215.

Madhavan, A., 1992, Trading Mechanisms in Securities Markets, *The Journal of Finance* 47, 607-642.

Madura, J., N. Richie, and A.L. Tucker, 2006, Trading Halts and Price Discovery, *Journal of Financial Services Research* 30, 311-328.

Masulis, W.R., and L. Shivakumar, 2002, Does market structure affect the immediacy of stock price responses to news?, *Journal of Financial and Quantitative Analysis* 37, 617-648.

Schwert, G.W., 1989, Why Does Stock Market Volatility Change Over Time?, *The Journal of Finance* 44, 1115-1155.

Spiegel, M., and A. Subrahmanyam, 2000, Asymmetric Information and News Disclosure Rules, *Journal of Financial Intermediation* Vol. 9, 363-403.

Stigler, J.G., 1964, Public Regulation of the Securities Markets, *The Journal of Business (pre-1986)* 37, 117-144.

Stoll, R.H., and E.R. Whaley, 1990, Stock Market Structure and Volatility, *The Review of Financial Studies* 3, 37-72.

Subrahmanyam, A., 1997, The Ex Ante Effects of Trade Halting Rules on Informed Trading Strategies and Market Liquidity, *Review of Financial Economics* 6, 1-14.

Tan, R.S.K., and W.Y. Yeo, 2003, Voluntary trading suspensions in Singapore, *Applied Financial Economics* 13, 517-523.

Venkatesh, P., 1992, Empirical evidence on the impact of the bid-ask spread on the characteristics of CRSP daily returns, *Journal of Financial Research* 15, 113-125.

Wu, L., 1998, Market reactions to the Hong Kong trading suspensions: mandatory versus voluntary, *Journal of Business Finance & Accounting* 25, 419-437.

APPENDIX: COMPANY ANNOUNCMENT REPORT CODES

For a company to list, and stay listed, on the Australian Stock Exchange, various rules and regulations need to be followed. As part of these listing requirements, various documentation (or company announcements) needs to be presented to the ASX Companies Department.

As a means of enabling Subscribers to categorise the Company Announcements, each Company Announcement Alert Header (RB message type) has a field called "Report Code". Outlined below are details of the Primary Report Codes and Sub Codes for more specific identification of the report type.

PRIMARY REPORT CODE	SUB REPORT CODE	PRIMARY/SUB CODE DESCRIPTION
01	000	TAKEOVER ANNOUNCEMENT
	001	Intention to Make Takeover offer
	002	Part A statement
	003	Part B statement
	004	Part C statement
	005	Part D statement
	006	Takeover Offer Document
	007	Takeover Offeree Directors' Statement
	008	Variation of Takeover Offer
	009	Takeover - Other
	010 - 011	Reserved For Future Use
02	000	SHAREHOLDER DETAILS
	001	Form 603 - Becoming a substantial shareholder
	002	Form 604 - Change in substantial shareholding
	003	Form 605 - Ceasing to be a substantial shareholder
	004	Part 6.8 Beneficial ownership
	005	Section 689 - Notice
	006	Shareholder Details - Other
	007	Section 235 Notice - Director's Interests
	008 - 012	Reserved For Future Use
03	000	PERIODIC REPORTS
	001	Annual Report
	002	Top 20 Shareholders
	003	Preliminary - Final Statement
	004	Half - Yearly Report
	005	Annual Report - confirmation of despatch
	006	Trust 6 month accounts
	007	Trust 12 month accounts
	008	Loan securities on issue
	009	Half Yearly Audit Review
	010	Half Yearly Directors' Statement
	011	ASC Annual Audited A/Cs
	012	ASC Annual Audit Review
	013	ASC Annual Directors' Statement
	014	Periodic Reports - Other
	015	ASC Half-Yearly Audited Accounts
	016	Net Tangible Asset Backing
	017 - 021	Reserved For Future Use

PRIMARY REPORT CODE	SUB REPORT CODE	PRIMARY/SUB CODE DESCRIPTION
04	000	QUARTERLY ACTIVITIES REPORT
	001	First Quarter Activities Report

002	Second Quarter Activities Report	
	003	Third Quarter Activities Report
	004	Fourth Quarter Activities Report
	005	Quarterly Activities Report - Other
	006 - 010	Reserved For Future Use
05	000	QUARTERLY CASH FLOW REPORT
	001	First Quarter Cashflow Report
	002	Second Quarter Cashflow Report
	003	Third Quarter Cashflow Report
	004	Fourth Quarter Cashflow Report
	005	Quarterly Cashflow Report - Other
	006 - 010	Reserved For Future Use
06	000	ISSUED CAPITAL
	001	Renounceable Issue
	002	Bonus Issue
	003	Placement
	004	Issues to the Public
	005	Capital Reconstruction
	006	New Issue Letter of Offer & Acc. Form
	007	Alteration to issued capital
	008	Non-Renounceable Issue
	009	Issued Capital - Other
	010	Prospectus
	011	On-Market Buy-Back Scheme
	012 - 016	Reserved For Future Use
07	000	ASSET ACQUISITION & DISPOSAL
	001	Asset Acquisition
	002	Asset Disposal
	003	Other
	004 - 009	Reserved For Future Use
08	000	NOTICE OF MEETING
	001	Notice of Annual Meeting
	002	Notice of Extraordinary Meeting
	003	Results of Meeting
	004	Proxy Form
	005	Alteration to Notice of Meeting
	006	Notice of Meeting - Other
	007 - 008	Reserved For Future Use

PRIMARY REPORT CODE	**SUB REPORT CODE**	**PRIMARY/SUB CODE DESCRIPTION**
09	000	STOCK EXCHANGE ANNOUNCEMENT
	001	Suspension from Official Quotation
	002	Reinstatement to Official Quotation
	003	Removal from Official List
	004	Stock Exchange Query
	005	Notice Pending
	006	Change in Basis of Quotation
	007	Trading Halt
	008	Admission to Official List
	009	Commencement of Official Quotation
	010	Stock Exchange Announcement - Other
	011 - 015	Reserved For Future Use
10	000	DIVIDEND ANNOUNCEMENT

001	Dividend Books Closing	
	002	Dividend Pay Date
	003	Dividend Rate
	004	Dividend Alteration
	005	Dividend - Other
	006 - 010	Reserved For Future Use
11	000	PROGRESS REPORT
	001	Progress Report
	002	Progress Report - Other
	003 - 007	Reserved For Future Use
12	000	COMPANY ADMINISTRATION
	001	Director Appointment/Resignation
	002	Details of Company Address
	003	Details of Registered office address
	004	Details of Share Registry address
	005	Trustee Appointment/Resignation
	006	Trust Manager Appointment/Resignation
	007	Company Secretary Appointment/Resignation
	008	Company Administration - Other
	009	Change of Balance Date
	010	Trust Deed
	011	Articles of Association
	012 - 017	Reserved For Future Use
13	000	NOTICE OF CALL (Contributing Shares)
	001	Announcement of Call
	002	Notice of Call to shareholders
	003	Notice of Call - Other
	004 - 008	Reserved For Future Use
14	000	OTHER
	001	Other
	002 - 006	Reserved For Future Use
	100	CAP Test

PRIMARY REPORT CODE	**SUB REPORT CODE**	**PRIMARY/SUB CODE DESCRIPTION**
15	000	CHAIRMAN'S ADDRESS
	001	Chairman's Address - Other
	002	Chairman's Address
	003 - 008	Reserved For Future Use
16	000	LETTER TO SHAREHOLDERS
	001	Letter to Shareholders - Other
	002	Letter to Shareholders
	003 - 008	Reserved For Future Use
17	000	ASX QUERY
	001	ASX Query - Other
	002	ASX Query
	003	Response to ASX Query
	004 - 009	Reserved For Future Use
18	000	WARRANTS
	001	Other
	002	Warrant Report
	003 - 008	Reserved for Future Use
19	000	RESERVED FOR FUTURE USE
	001 - 005	Reserved For Future Use

The nineteen categories are reduced to seven categories based on similar characteristics. The eight groupings are:

1. Asset acquisition/ Disposal: Includes announcement types associated with asset acquisitions and asset disposals
2. ASX announcement/query: Includes both ASX announcements and ASX queries relating to the listed company subject to a trading halt.
3. Financial Information: Includes all announcement types associated with financial information. This includes dividends announcements, periodic reports, quarterly activity reports and quarterly cash flow reports.
4. Miscellaneous: Includes all announcement types that are not expected to have a significant impact on prices. These include announcements about shareholder details, company meetings, company administrative notices, call notices (Contributing Shares), chairman's address, letters to shareholders, warrants and others.
5. Progress Report: Includes only Progress Reports by the listed company.
6. Share issue: Includes any announcement types related to the issue of capital by the listed company.
7. Takeover related: Includes announcement types related to all forms of takeover announcements.