Abstract
What impact do earnings and dividend announcements have on liquidity and information asymmetry in the Australian market? This thesis aims to answer this question by examining stock behaviour around the release of Preliminary Final Reports (PFR) for stocks in the S&P/ASX300 index. Both depth and bid ask spreads are observed as a measure of liquidity and the adverse selection component of the spread is observed as a measure of information asymmetry. It is hypothesised that liquidity will decrease prior to the announcement. Liquidity is expected to increase following an anticipated announcement and further decrease following an unanticipated announcement. It is hypothesised that information asymmetry will increase prior to the announcement. Information asymmetry is expected to decrease following an anticipated announcement and further increase following an unanticipated announcement. An announcement is considered to be anticipated if earnings and dividend information are accurately forecasted prior to the release of the PFR.
1. INTRODUCTION

If managers possess inside information about their firms then announcements made by managers should provide a signal to the market regarding the future for that firm. Aharony and Swary (1980) argue that earnings and dividend announcements are the two most important signals offered by management. If the market believes that these signals are important then the behaviour of stocks around such announcements should change significantly. There should be notable changes in stock returns along with the liquidity and information asymmetry for the stocks around these announcements.

Past research is consistent in showing that earnings and dividend announcements convey information to the market, as measured by abnormal returns. Abnormal returns following the release of earnings announcements can be observed in Ball and Brown (1968) and evidence on informational content of dividend announcements can be found in Pettit (1972).

Empirical evidence on liquidity and information asymmetry around earnings announcements is less conclusive. Studies looking at liquidity and information asymmetry prior to earnings announcements are mostly consistent. Liquidity is found to decrease prior to earnings announcements (Lee, Mucklow and Ready (1993) and Libby, Mathieu and Robb (2002)) and information asymmetry is found to increase prior to earnings announcements (Affleck-Graves, Callahan and Chipalkatti (2002) and Krinsky and Lee (1996)). Following earnings announcements Acker, Stalker and Tonks (2002) and Libby et al show that liquidity increases, Kanagaretnam, Lobo and Whalen (2005) find inconclusive results regarding liquidity and Yohn (1998) argues that liquidity decreases. Information asymmetry is found to increase following earnings announcements (Krinsky and Lee (1996)).

Literature examining liquidity and information asymmetry around dividend announcements find no significant market reaction prior to dividends announcements (Brooks (1994) and (1996)). Following dividend announcements Graham, Koski and Loewenstein (2006) find liquidity decreases for unanticipated announcements and liquidity remains unchanged for anticipated announcements, as expected. Information asymmetry decreases following unanticipated dividend announcements, which conflicts with the theoretical predictions of Kim and Verrecchia (1991).

This study aims to examine the changes in liquidity and information asymmetry around annual earnings and dividend announcements on the Australian Stock Exchange (ASX). Companies trading on the ASX announce earnings and dividend information in their Preliminary Final Reports (PFR). The study is motivated by the lack of consistent results found in past research. Much of the research on this topic focuses on evidence from the U.S market. There is currently no literature observing both liquidity and information asymmetry around earnings and dividend announcements, using evidence from a limit order book. This thesis examines evidence from the ASX, a market that has not previously been examined in this context. The Australian market differs from the U.S market because the ASX operates as a fully electronic, order driven trading system. Liquidity in the market is not provided by market makers, but rather investors place their bids into the limit order book and this determines the spread and depth for each stock. Because there are no market makers in the market Frino and Jones (2005) argue that the adverse selection component of the spread is likely to be higher as inventory holding costs are less relevant and order processing costs should be lower. Therefore examining liquidity and information asymmetry in the Australian market should result in different findings to similar studies conducted in the U.S. market.
The findings are also of practical relevance as they indicate to the ASX and the regulators the importance of financial disclosure to the market. This thesis investigates whether earnings and dividend announcements are timely by examining the information asymmetry and liquidity prior to the announcement. If information asymmetry (liquidity) is high (low) prior to the announcements this suggests that certain investors may have access to the information contained in the announcement from other sources that are more timely. If liquidity (information asymmetry) increases (decreases) shortly following the announcement then the market is efficient in interpreting company information.

PFRs are considered to be expected announcements, as the market is aware that an announcement is going to be made. Therefore it is expected that liquidity should decrease prior to the PFR announcement. Following anticipated announcements (announcements where the content is accurately predicted) liquidity should increase and following unanticipated announcements liquidity should decrease. Conversely, information asymmetry should increase prior to the PFR announcement. Following anticipated announcements information asymmetry should decrease and following unanticipated announcements information asymmetry should increase.

2. LITERATURE REVIEW

Market reaction to company announcements is an area of interest to both academics and practitioners. Empirical analysis suggests that company announcements contain information; this is evident from the large price changes and abnormal returns observed after announcements. Theoretical studies predict that liquidity (information asymmetry) should decrease (increase) prior to expected announcements, which is supported by much of the empirical evidence in this area. Following announcements theoretical studies predict liquidity (information asymmetry) will increase (decrease) for anticipated announcements and decrease (increase) for unanticipated announcements. Empirical analysis regarding liquidity and information asymmetry after company announcements is inconclusive suggesting that further research should be undertaken in this area.

2.1 Information Content of Company Announcements

Extensive research on abnormal returns around company announcements concludes that company announcements contain significant information about the value of a firm. Studies by Beaver (1968) and Ball and Brown (1968) find evidence that earnings announcements contain information about a firm. Beaver examines information content of earnings announcements by observing changes in stock price and volume traded around the announcements. The dramatic price and volume reaction around earnings announcements, in this study, demonstrate that these announcements contain significant information content. Ball and Brown examine market expectations and observe how the market reacts when their expectations are not realised. The study concludes there are positive abnormal returns when earnings exceed market expectations and negative abnormal returns when earnings are below market expectations, consistent with the hypothesis that earnings announcements provide valuable information to the market.

Dividend announcements also provide information to the market about the value of the firm. Pettit (1972) examines the effect of changes in dividend announcements on stock price and finds decreases in dividends result in negative abnormal returns and conversely increases in dividends result in a positive abnormal return. Aharony and Swary (1980), after examining the effect of dividend announcements on the market in conjunction with earnings announcements, discover that dividend announcements provide information to the market beyond what is already provided by earnings announcements.
Evidence on the Australian market by Aitken, Brown, Frino and Walter (1995) support the argument that earnings and dividend announcements convey information to the market, finding abnormal returns around these announcements. The paper partitions the sample according to whether announcements are good or bad news and finds that the information conveyed in the announcement is rapidly impounded into the stock price, regardless of the type of news conveyed by the announcement. As earnings and dividend announcements are released simultaneously in the Australian market the study excludes any stocks with conflicting earnings and dividend announcements. The combined effect of dividend and earnings information is then examined.

2.2 Theoretical Findings on Liquidity and Information Asymmetry Around Company Announcements

Market participants react to the public disclosure of company information, as seen through the abnormal returns surrounding company announcements. Theoretical models, such as Kim and Verrecchia (1991) and (1994), examine the potential effects of company announcements on information asymmetry and market liquidity.

Kim and Verrecchia (1991) examine how the expectation of a company announcement affects market reaction to the announcement. This paper focuses on three aspects of market reaction; price change, volume and information asymmetry among market participants. It is argued that there will be greater information asymmetry prior to an expected announcement as investors attempt to gather and trade on private information before the announcement is released to the entire market. Volume is also expected to increase prior to the announcements due to increased trading by more informed traders. The announcement should be followed by a reduction in information asymmetry, under the assumption that the content of the announcement is accurately forecasted i.e. the announcement is anticipated. If the announcement is not anticipated then it is argued that information asymmetry will further increase following the announcement. Price change, following the announcement, will depend on market anticipation; if the announcement is anticipated then price change will be relatively small, if the announcement is unanticipated and comes as a surprise to the market then price change will be large.

Kim and Verrecchia (1994) focus on the effects of earnings announcements on liquidity. The paper intuitively argues that earnings announcements have the potential to increase liquidity and decrease information asymmetry as they remove the information advantage of informed traders and place all traders on a level playing field. The theoretical proof of the paper predicts otherwise, arguing that earnings announcements further increase information asymmetry in the market. This is because the earnings announcements are of greater advantage to investors with more advanced information processing skills who have the resources to process the information provided in the announcement more quickly than market makers and other investors. Market makers respond by increasing their spreads following earnings announcements, resulting in a decrease in liquidity.

Copeland and Galai (1983) propose that market makers set their bid ask spread in order to trade off expected losses to informed traders with the expected gains from liquidity traders. Glosten and Milgrom (1985) further support the idea that the bid ask spread can be used as a measure of information asymmetry, the paper acknowledges that adverse selection costs do not make up the entirety of the spread, however it does influence the size of the spread. Kim and Verrecchia (1994) predict that unanticipated earnings announcements should result in a decrease in market liquidity, following the announcement, when market makers are present in the market. Kim and Verrecchia (1994) do not make any predictions regarding information asymmetry nor liquidity if market makers are not present in the market. They only examine bid ask spreads at the time of the earnings announcement and do not model the changes in spread prior to the announcement. Kim and Verrecchia
(1994) do, however, argue that logically one would expect the spreads to increase prior to earnings announcements to protect themselves from any investors with access to ‘leaked’ information regarding the earnings announcement.

2.3 Empirical Evidence on Liquidity and Information Asymmetry Prior to Earnings and Dividend Announcements

The empirical evidence regarding liquidity and information asymmetry prior to company announcements has remained fairly consistent across the various studies. It is argued that the timing of earnings announcements can be accurately predicted; therefore these announcements are considered to be expected announcements.

2.3.1 Liquidity Prior to Earnings Announcements

Consistent with the predictions of Kim and Verrecchia (1994), Lee, Mucklow and Ready (1993) find that market makers increase their bid ask spread, and decrease their depth, for the full day before earnings announcements. They concentrate on both depth and bid ask spreads because market liquidity consists of a price dimension, as measured by spreads and a quantity dimension, as measured by depth. The study is conducted using evidence from the New York Stock Exchange (NYSE), because spreads increase and depth decreases, the paper concludes that overall liquidity falls prior to the announcement, after controlling for trading activity. Atiase and Bamber (1994) demonstrate the importance of controlling for trading activity surrounding earnings announcements. They find that trading activity prior to announcements increases as the pre-disclosure information asymmetry in the market increases.

Lee et al use intraday data in observing the behaviour of spreads and depth to ensure that the results are not influenced by the intraday patterns in bid ask spreads, as observed by McInish and Wood (1992). Libby, Mathieu and Robb (2002) also use intraday data on the Toronto Stock Exchange (TSX) and similarly find that liquidity decreases prior to both quarterly and annual earnings announcements. Dupont (2000) demonstrates that specialists may adjust either spreads or depth in response to potential information risk. Libby et al deals with this problem by controlling for depth when examining changes in the bid ask spread and by controlling for spreads when measuring changes in depth. Yohn (1998) also finds bid ask spreads increase, showing that the bid ask spread gradually increases up to four days prior to earnings announcements. On the day prior to the announcement there is a sharp increase in spreads. Yohn finds that spreads are negatively related to analyst following, suggesting that information asymmetry (liquidity), as measured by spreads, is greater (lower) in firms with less public information. The paper demonstrates that analyst activity has a significant influence on market behaviour prior to earnings announcements.

Disagreements in analysts’ earnings forecasts are also an important determinant of the bid ask spread according to Gregoriou, Ioannidis and Skerratt (2005). Their paper examines the various factors that influence the spreads set by specialists, observing companies trading in the FTSE index. It is found that variance of analysts’ forecasts, used to proxy disagreements amongst traders’ outlook for the stock, is significant and positive. The paper argues that market makers use the spread to protect themselves from temporarily informed investors.

2.3.2 Information Asymmetry Prior to Earnings Announcements

Analyst information can also be used to determine the extent to which announcements are anticipated, as demonstrated by Affleck-Graves, Callahan and Chipalkatti (2002). Using data from the Nasdaq, both the standardised absolute forecast error (SAFE) and the standard deviation of analysts’ forecast (DAF) are examined. Using this information the sample is partitioned into three groups including stocks with high predictability, mixed predictability and low predictability. Information asymmetry around
announcements is then examined for each of the groups separately. The study finds that there is an increase in information asymmetry the day prior to quarterly earnings announcements for firms with unanticipated announcements, however there is no change in information asymmetry prior to anticipated announcements.

Unlike much of the literature in this area, Affleck-Graves et al do not rely on total spreads as a measure for information asymmetry, but rather focus on the adverse selection component of the bid ask spread. Bid ask spreads can be split into two components according to Glosten (1987). The first component of the spread, the adverse selection component, is due to information asymmetry in the market and the second component is due to other aspects such as monopoly power, clearing costs and inventory carrying costs. Examining the adverse selection component of the spread should provide a more accurate estimation of information asymmetry for that particular stock. Stoll (1989) outlines a method for determining three components of the bid ask spread including adverse selection costs, inventory holding costs and order processing costs. This method allows the spread to be broken down into both proportions of the spread and cent value of the spread.

The Stoll (1989) method of decomposing the bid ask spread is used by Krinsky and Lee (1996). Krinsky and Lee observe the adverse selection component of the spread around quarterly earnings announcements. The study shows that the adverse selection component of the spread increases prior to quarterly earnings announcements, the other two components of the spread decrease. This result suggests that observing the total spread as a measure for information asymmetry, as many of the earlier studies have done, may result in inaccurate results due to the differing reaction to earnings announcements by the separate components of the spread. Brooks (1994) also examines the adverse selection component of the spread surrounding earnings announcements and similarly finds that information asymmetry increases a whole day prior to earnings announcements. This result holds true after controlling for firm size.

All of the previously discussed studies have concentrated on markets where there is a market maker present; Kavajecz (1999) investigates whether similar patterns in depth around earnings announcements are observed in a limit order book. The paper, using data from the NYSE, finds that both specialists and the limit order book reduce depth prior to earnings announcements. Kavajecz concludes that the limit order book has a larger reduction in depth, prior to announcements, compared to specialist quotes.

2.3.3 Liquidity and Information Asymmetry Prior to Dividend Announcements
Brooks (1994) also examines information asymmetry prior to dividend announcements. The results of the paper are not statistically significant and the paper concludes that dividend announcements do not convey significant information to the market. Brooks (1996) further supports the idea that dividend announcements do not result in significant changes in information asymmetry. Neither paper considers the relationship between the earnings and dividend announcements, which could have a significant influence on the market reaction.

Venkatesh and Chiang (1986) examine the effects of the timing of the dividend and earnings announcements in relation to each other and how the timing of the announcements affects the information asymmetry in the market. The paper partitions the announcements into three sub-samples: earnings and dividend announcements made simultaneously, earnings or dividend announcements made separately and prior to the first announcement and announcements made separately following the first announcement. This study finds that there is a significant increase in spreads prior to the second announcement, regardless of whether it is an earnings or dividend announcement; however there is no
increase in spreads prior to any of the other announcements. This paper demonstrates that it is not the type of announcement that causes the market reaction, but rather the order in which the announcements are released to the market. The intuition behind this finding is that if the announcements are separated then the market anticipates the second announcement to be a non-routine announcement. Specialists widen their bid ask spread to account for the increase in information asymmetry prior to the non-routine announcement and therefore spreads increase prior to the second announcement regardless of whether the announcement is an earnings or dividend announcement.

Graham, Koski and Loewenstein (2006) further examine the effects of dividend announcements on liquidity and information asymmetry. This paper separates the data according to whether the timing of the dividend announcement is expected or unexpected. This is achieved by observing dividend payments across several years. Consistent with the previous studies the results show that, after controlling for volume, both expected and unexpected dividend announcements display insignificant changes in the bid ask spread and depth prior to the announcement. After decomposing the spread, the results indicate that the adverse selection component of the spread is lower prior to expected dividend announcements. This finding is inconsistent with Kim and Verrecchia (1991).

Much of the literature on earnings announcements conclude that liquidity (information asymmetry) decreases (increases) prior to the announcement. Results are less conclusive for dividend announcements.

2.4 Empirical Evidence on Liquidity and Information Asymmetry Following Earnings and Dividend Announcements
The current literature on liquidity and information asymmetry following earnings and dividend announcements fails to provide consistent results. This is primarily to do with the methodology used and the classification of whether an announcement is anticipated or not.

2.4.1 Liquidity Following Earnings Announcements
Morse and Ushman (1983) are unable to find any significant changes in quoted bid ask spreads following earnings announcements. This study is conducted using daily data and quoted spreads are determined through examination of the closing bid and ask prices. Spreads are found to increase following large price changes, used as a proxy for unexpected information events. This finding is consistent with Kim and Verrechia (1994) that there is less liquidity following unexpected announcements. Also using daily data Yohn (1998) finds a significant increase in spreads on the day of and the day following earnings announcements. This result is found after controlling for the predictability of the earnings announcement. Lee, Mucklow and Ready (1993) find similar results using intraday data. After controlling for volume, their paper finds quoted bid ask spreads increase immediately following earnings announcements and remain wider for the rest of the day.

According to Acker, Stalker and Tonks (2002) the above papers all focus on quoted spreads of market makers and do not examine the inside spread. Acker et al. observe the inside spread for stocks trading on the London Stock Exchange following earnings announcements. Using daily data their paper argues that bid ask spreads decrease following earnings announcements. It is suggested that spreads decrease due to a reduced information asymmetry along with smaller inventory holding costs as a result of the increase in volume traded. Kavajecz (1999) also finds an increase in liquidity following earnings announcements. This paper examines quoted depth on the NYSE and shows that both depth quoted by specialists and depth quoted in the limit order book increase following earnings announcements.
The above studies draw conclusions about market liquidity by observing only half of the picture. Libby, Mathieu and Robb (2002) show that overall liquidity increases following earnings announcements as seen by the decrease in bid ask spreads and simultaneous increase in depth, when compared to a benchmark period outside the four day event window. This study controls for volume and whether an announcement was made during trading hours or outside trading hours. Kanagaretnam, Lobo and Whalen (2005) also examine both depth and bid ask spreads after controlling for analyst behaviour. Consistent with Libby et al, their paper find bid ask spreads decrease following earnings announcements, however depth is also found to decrease. These results prevent the paper from making any overall conclusions about market liquidity following earnings announcements.

2.4.2 Information Asymmetry Following Earnings Announcements
Affleck-Graves, Callahan and Chipalkatti (2002) use analyst information to partition their sample according to anticipated and unanticipated earnings announcements and then examine changes in information asymmetry as measured by the adverse selection component of the bid ask spread. Their results indicate that there is no significant change in information asymmetry following anticipated earnings announcements, whereas unanticipated announcements are followed by an increase in information asymmetry. Krinsky and Lee (1996) demonstrate that information asymmetry increases following all earnings announcements, without partitioning the sample according to anticipated and unanticipated announcements. It can be argued that earnings announcements provide an information advantage to market participants with the skills to interpret the information more quickly than other market participants, making them informed traders. Market makers are aware their information processing skills are not as advanced as other traders and set a wide spread to offset losses to informed traders with gains from liquidity traders.

Brooks (1996) shows a fall in information asymmetry following earnings announcements. These conflicting results may be a result of how the samples in each study are partitioned. Brooks is partitioned according to firm size; however no attempt is made to distinguish between anticipated and unanticipated announcements as in Affleck-Graves et al. Similarly Krinsky and Lee do not account for announcement anticipation. The results of Affleck et al suggest that the level of anticipation of the announcement has a significant effect on information asymmetry following the announcement and this may explain the differing results between the studies. Also each study uses a different method to decompose the spread and determine adverse selection costs. Information asymmetry is inferred from the adverse selection component of the spread. According to Van Ness, Van Ness and Warr (2001) many of the models used to determine the adverse selection component of the spread do not provide a good proxy for information asymmetry in the market. Van Ness et al demonstrate how the components of the spread differ across the models. This is a possible explanation for the contradictory results found in the literature when the adverse selection component of the spread is examined.

2.4.3 Liquidity and Information Asymmetry Following Dividend Announcements
Empirical evidence indicates that liquidity and information asymmetry is less affected by dividend announcements than earnings announcements. Rubio and Tapia (1996) demonstrate, using evidence from the Spanish Stock Exchange, there is no significant change in spreads quoted in the limit order book following dividend announcements. This study is unique in that it focuses on spreads around announcements in a limit order book, whereas much of the literature is examined in the presence of market makers. Spreads are considered to be a proxy for liquidity and the paper argues that they also proxy for information asymmetry, therefore both liquidity and information asymmetry remain unchanged following dividend announcements. Graham, Loewenstein and Koski (2006) similarly find no changes in liquidity, as measured by bid ask spreads and depth, following expected dividend announcements. Graham et al show that liquidity falls following unexpected dividend announcements.
In contrast to the above findings Graham et al demonstrate that information asymmetry falls following unexpected dividend announcements. This result could be attributed to the problems encountered in decomposing the spread, as discussed earlier. Brooks (1996), examining both anticipated and unanticipated dividend announcements collectively, finds no change in information asymmetry following announcements.

2.5 Empirical Evidence on Liquidity and Information Asymmetry around Other Announcements

The above studies have concentrated on liquidity and information asymmetry around earnings and dividend announcements. Studies have been conducted on other announcements such as takeovers and equity issues. Jennings (1994) finds that there is no significant change in spreads in the lead up to takeover announcements. Similarly Brooks and Patel (2000) find that spreads do not significantly change prior to debt or equity issue announcements. This may be a result of these announcements being unexpected by the market.

Following equity issue announcements it is found by Dierkens (1991) that information asymmetry falls. Takeover announcements show no significant changes in adverse selection costs following the announcement, according to Jennings (1994). However Jennings finds that spreads do increase following takeover announcements. Brooks, Patel and Su (2003) illustrate that spreads increase following unexpected news events. The study examines events ranging from the death of a CEO to a plant explosion.

Assuming that both takeover and equity issue announcements are unexpected by the market, the results indicate that there is no significant change in liquidity prior to unexpected announcements. Liquidity is found to decrease following unexpected announcements. There are no conclusive results regarding information asymmetry following unexpected announcements.

3. INSTITUTIONAL DETAIL

3.1 The Australian Securities Exchange

The ASX operates as a fully electronic order driven trading system based on a price then time priority in a continuous auction. The market opens and closes with a call auction. For further information regarding trading mechanisms refer to Comerton-Forde and Rydge (2006).

3.2 S&P/ASX Indices

There are several indices that benchmark the movements in the Australian equity market. The S&P/ASX300 includes the S&P/ASX200 stocks as well as up to a further 100 small-cap stocks.¹ This index accounts for approximately 91% of the total market capitalisation for the Australian equity market.²

¹ Australian Securities Exchange, June 2007, [Online]
http://www2.standardandpoors.com/portal/site/sp/en/au/page.topic/indices_asx300/2,3,2,8,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0.html (Accessed: June 2007)

² ShareAnalysis.com, July 2007 [Online]
3.3 Continuous Disclosure Requirements

ASX listed entities are required to continuously disclose any material information to ensure the market if fully informed and no investor is disadvantaged when making investment decisions. Periodic disclosure is also required under Chapter 4 of the ASX Listing Rules, including the disclosure of Preliminary Final Reports (PFR).

The PFR contains the contemporaneous release of dividend and earnings announcements prior to the release of the annual report (Emanuel (1989)). Prior to June 2004 every entity listed on the ASX, with the exception of mining exploration entities, was required to provide the ASX with a PFR within 75 days of the end of the company’s accounting period, since June 2004 entities are required to provide the report no later than two months following the end of the companies’ accounting period. Mining and exploration entities follow different disclosure rules. The release of a PFR is followed by a 10 minute trading halt on the ASX.

4. HYPOTHESES

This thesis examines liquidity and information asymmetry around earnings and dividend announcements, using evidence from the Australian Stock Exchange. In Australia a company’s annual earnings and dividend information must be included in the Preliminary Final Report (PFR). Since June 2004 the PFR must be released within two months of the end of the company’s accounting period. The announcement is expected by the market and according to Kim and Verrecchia (1991) information asymmetry increases prior to expected company announcements. This is because investors are able to search for and trade on information they receive prior to the public announcement. Kim and Verrecchia (1991) argue that information asymmetry will decrease following announcements with anticipated contents and increase following announcements with unanticipated contents. Unanticipated announcements provide an information advantage to market participants with better information processing skills. The model considers markets where market makers are present; however Kavajezc (1999) finds similar results when examining depth for both market makers and the limit order book. This evidence leads to the first three hypotheses:

H1: Information asymmetry will increase prior to the release of the company’s PFR
H2: Information asymmetry will decrease following a PFR with anticipated contents
H3: Information asymmetry will increase following a PFR with unanticipated contents

Kim and Verrecchia (1994) argue that liquidity will decrease prior to earnings announcements. Intuitively it is suggested by Kim and Verrecchia (1994) that liquidity increases following anticipated announcements as the announcement ‘levels the playing field’ for investors. The model predicts that unanticipated earnings announcements should be followed by a decrease in liquidity. This leads to the next three hypotheses:

H1: Liquidity will decrease prior to the release of the company’s PFR

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4 For more information see; Chapter 4: Periodic Disclosure, June 2005 [Online]
5 Chapter 4: Periodic Disclosure, June 2005, [Online]
6 Chapter 5: Additional reporting on mining and exploration activities, September 2001, [Online]
H2: Liquidity will increase following a PFR with anticipated contents
H3: Liquidity will decrease following a PFR with unanticipated contents

5. DATA AND RESEARCH DESIGN

5.1 Data
Data are obtained from the Securities Industry Research Centre of Asia-Pacific (SIRCA) and the DataStream Database. The dates and times of Preliminary Final Reports (PFR) are obtained for the S&P/ASX300 Index over the period 2000 to 2006, with every announcement time stamped to the nearest minute from SIRCA’s Company Announcements database. The S&P/ASX300 index is examined as it represents over 90% of the Australian equity market, however the stocks included in the index are sufficiently liquid for statistical analysis.

Intraday and daily order details, trade details and market index data are obtained for the three weeks before and after the PFR date. Intraday data are observed over half hour intervals around the announcement, which is time stamped to the nearest minute.

Mining and exploration stocks are removed from the sample due to their differing reporting requirements. Additionally any entity that delisted prior to its PFR announcement is also removed from the sample. This results in a final sample 1945 announcements for 564 stocks.

The DataStream Database is used to obtain information regarding analyst followings of the stocks. Data are collected on the number of analysts following a stock and the consensus earnings announcement provided by these analysts prior to the announcement of the PFR.

5.2 Research Design

5.2.1 Event Window
A traditional event study methodology is used to determine the impact of the simultaneous release of earnings and dividend announcements on information asymmetry and liquidity. The PFR, as outlined earlier, is the announcement of interest in this thesis and therefore intraday and daily data is observed three weeks prior to and following each of these announcements in the sample. The intraday data is broken down into half hour intervals for the time series analysis and univariate tests. Depending on their results tests it may be necessary to further divide the intervals of the larger more liquid stocks to 5 minute intervals surrounding the announcements.

5.2.2 Variables of Interest
The primary focus of the thesis is information asymmetry and liquidity surrounding earnings and dividend announcements. Neither of these variables is directly observable and therefore proxies are introduced to measure changes in information asymmetry and liquidity. Consistent with prior literature, (Lee et al (1993) and Libby et al (2002)), both spreads and depth are examined as proxies for liquidity and the adverse selection component of the spread is used as a measure of information asymmetry.

According to Copeland and Galai (1983) dealers adjust their bid ask spread depending on the level of information they have access to. It is expected that spreads should change around announcements as investors gain more information on the stock. This thesis focuses on the time weighted spread, as used in McInish and Wood (1992). This measure is calculated every 30 minutes using the following equation:
\[
RelativeSpreads_t = \frac{\sum_{t=1}^{n} \{(Ask_t - Bid_t) / ((Ask_t + Bid_t) / 2) \times T_t \}}{\sum_{t=1}^{n} T_t} \times 100
\]

Lee, Mucklow and Ready (1993) suggest that dealers also adjust their depth in accordance with the information they obtain.

The time weighted quoted depth is observed, calculated as follows:

\[
Depth_t = \frac{\sum_{t=1}^{n} \{(Volume_{BestAsk} + Volume_{BestBid}) \times T_t \}}{\sum_{t=1}^{n} T_t} \times 100
\]

Glosten and Harris (1988) argue that the bid ask spread can be split into two components; the first component consists of asymmetric information the second component deals with inventory holding costs, order processing costs and specialist monopoly power. The main concern of this thesis is information asymmetry and therefore the quoted spread is decomposed to determine the adverse selection component of the spread. The spread is decomposed according to the method outlined in Lin, Sanger and Booth (1995). This method is appropriate for decomposing the spread of stocks trading with a limit order book as it is “based on an assumption of negligible inventory holding costs” (Brockman and Chung (1999, p237)). The adverse selection component of the spread is calculated as follows:

\[
\Delta Q_{t+1} = \lambda z_t + e_{t+1}
\]

Q = Bid ask spread midpoint in logarithms
z = Difference between the transaction price in logarithms
\(\lambda\) = Adverse Selection Component of the spread

Additionally log stock returns are examined surrounding the announcement in order to determine whether the information provided by the announcement is considered, by the market, to be good or bad news. Returns are calculated as follows:

\[
StockReturn = ln \left( \frac{P_{t+1}}{P_{t-1}} \right)
\]

Kavajecz (1999) suggests that liquidity surrounding an announcement may be dependent upon the direction of the news contained in the announcement. Therefore the sample is partitioned according to whether the announcement is considered to display good news, bad news or no news. In order to determine the direction of the announcement abnormal returns are calculated, where the abnormal return equals the difference between the stock return and the index return for the same period, this is consistent with Brooks and Patel (2000). Calculated as follows:

\[
AbnormalReturn = StockReturn - IndexReturn
\]

If the abnormal return is statistically greater than zero then the announcement is considered to be good news, if it is statistically less than zero then the announcement is considered to be bad news and if it is not statistically different from zero then the announcement is considered to display no news to the market.

5.2.3 Univariate Analysis

The sample is further partitioned according to whether the announcement is made when the market is opened or closed. Brooks Patel and Su (2003) argue that such a partition is necessary to determine whether the market responds differently to announcements when it is able to trade immediately.
compared to when the market has time to absorb the information prior to trading. The data is also partitioned according to whether the spread is constrained by the minimum tick size, as it is possible for highly liquid stocks to trade at their minimum tick size.

Returns, quoted bid ask spreads, the adverse selection component of the spread and quoted depth are observed for the 26 hours prior to and following the event, resulting in a 52 hour event window, these observations are then compared to a benchmark period. This benchmark period is also 52 hours exactly two weeks prior to the event window, consistent with the method used in Krinsky and Lee (1996). This ensures that intervals are matched according to the time of the day and the day of the week and the results are not biased by intraday patterns that occur in the spread and depth of limit order books as recognised by Li, Van Ness and Van Ness (2005). The statistical significance of the difference in means between the pre-announcement, the benchmark and the post-announcement period is tested for each of the variables of interest using the conventional t-statistics. This analysis is then run using daily data and examining the two days prior to and following the announcement compared to a four day benchmark period two weeks prior to the announcement.

5.2.4 Multivariate Analysis

The univariate analyses of the variables of interest fail to control for other factors that may have a significant impact on the variables unrelated to the earnings announcement. Therefore multivariate analysis is conducted through the use of three main regression models.

The following regression model is run three times with the bid ask spread (spread), the quoted depth (depth) and the adverse selection component of the spread (λ) as the dependent variable.

\[
\text{spread}_i = \alpha + \beta_1 \text{PreD} + \beta_2 \text{PostD} + \beta_3 \text{Volatility} + \beta_4 \text{Volume} \\
+ \beta_5 \text{MarketValue} + \beta_6 \text{SAFE} + \beta_7 \text{DivChange} + \epsilon_i
\]  

(5)

The main explanatory variables of interest in the regression models are the dummy variables that distinguish between the pre-announcement, PreD, and the post-announcement, PostD, period. The \( \text{PreD} \) equals one when in the pre-announcement period and zero otherwise and the \( \text{PostD} \) equals one for the post-announcement period and zero otherwise. These variables measure the change in the spread, depth and adverse selection cost from the benchmark period to the pre- and post-announcement periods.

It is widely documented that there are several other factors that affect the spread, including volatility, trading volume and market value (Atkins and Dyl (1997); Glosten and Harris (1988) and Menyah and Paudyal (2000)). Therefore these variables are controlled for in the models.

\( \text{Volatility} \) is measured as the standard deviation of percentage changes in bid ask spread midpoints, consistent with the measure used in Brook, Patel and Su (2003). It is calculated as follows:

\[
\text{Volatility} = \frac{\sum_{i=1}^{N} (r_i - \bar{r})^2}{N}
\]

where \( r_i = \left( \frac{P_i - P_{i-1}}{P_{i-1}} \right) \times 100\% \)

\( \bar{r} = \text{the mean of } r_i \)

\( \text{Volume} \) is used as a proxy for trading activity and this is measured as the number of shares traded in an interval, a separate regression is also run using the dollar volume of trades in an interval as in Lee,
Mucklow and Ready (1993). *MarketValue* is used as a proxy for firm size; this is the equity value of the firm at the end of the day. This measure follows that of Brooks (1994). It is calculated as follows:

\[
\text{MarketValue} = \text{ClosingPrice} \times \text{Closing Number of shares}
\]  

(7)

Kim and Verrecchia (1991) and (1994) predict different outcomes for information asymmetry and liquidity surrounding earnings announcements dependent on the level of predictability of the announcement. Therefore it is important to control for announcement predictability when analysing information asymmetry and liquidity. Morse and Ushman (1983) is one of the first papers that attempts to distinguish between anticipated and unanticipated announcements and does so through examining large price changes, *PriceChange*. It is expected that the greater the shock of an announcement (the more unanticipated it is) the larger the price change in the market. *PriceChange* is measured as the percentage change in the price from one interval to the next and is calculated as follows:

\[
\text{PriceChange} = \left( \frac{P_t - P_{t-1}}{P_{t-1}} \right) \times 100\%
\]  

(8)

It is later suggested by Kim and Verrecchia (1994) that analyst forecast error could be used as an alternative proxy for unanticipated events. Analysts forecast error is measured using the Standardised Absolute Forecast Error, *SAFE*, as outlined in Affleck-Graves, Callahan and Chipalkatti (2002). *SAFE* measures the difference between the analysts consensus forecast and the actual earnings, divided by the consensus forecast. It is calculated as follows:

\[
\text{SAFE} = \left| \frac{\text{CYF}_{i,y} - \text{AEPS}_{i,y}}{\text{AEPS}_{i,y}} \right|
\]  

(9)

where:

- \(\text{CYF}_{i,y}\) = Consensus Analyst Forecast for firm \(i\) in year \(y\)
- \(\text{AEPS}_{i,y}\) = Annual Earnings Per Share for firm \(i\) in year \(y\)

Yohn (1998) finds that the number of analysts, *Analysts*, following a stock has a significant impact on the spread around announcements.

It is expected that the three variables *PriceChange*, *SAFE* and *Analysts* are highly correlated as they all attempt to proxy announcement anticipation. The stated regression model, equation (6), controls for *SAFE* only, however the other variables are examined and the correlation amongst the variables are observed.

As earnings and dividend announcements are released simultaneously in the Australian market in the Preliminary Final Report (PRF), a final control variable is introduced in the model to capture the percentage change in dividends from the previous year in an attempt to isolate the effect of earnings announcements on the three dependent variables.

\[
\text{DivChange} = \left( \frac{\text{Div}_t - \text{Div}_{t-1}}{\text{Div}_{t-1}} \right) \times 100\%
\]  

(10)

where:

- \(\text{Div}_t\) = Dividends for the current year
- \(\text{Div}_{t-1}\) = Dividends for the previous year

It is possible that certain variables in the regression model are correlated with each other and therefore a correlation matrix is observed to determine the severity of the collinearity amongst the variables.
6. REFERENCES


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