Legislative Changes and Abnormal Trading around Earnings Announcements: Evidence from New Zealand Market

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Using semi-annual earnings announcement data in New Zealand from 1998 to 2014, we find evidence of significant pre-announcement price run-ups prior to "good news" announcements, which is a prima facie evidence of abnormal trading. We then investigate the effectiveness of changing regulations. Our results suggest that tightening disclosure requirements and using a centralised regulatory authority successfully reduced abnormal trading activity, however switching insider trading from a civil to a criminal offence increased such activity, likely due to the increased burden of proof needed in prosecution. Further analysis using high frequency data also supports this finding. These findings have meaningful policy implications and raise important questions on financial markets regulation.

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1 Introduction

The regulation of financial markets has been in the public eye in recent times. Hirshleifer (2008) argues that changes in financial regulation are often due to political and social pressures, not economic effectiveness. This raises a question about the effectiveness of laws to reduce the insider trading. Most paper failed to find evidence that regulations help, having weak preventative effect at best (Bhattacharya and Daouk, 2002; Walker and Simpson, 2013).

Insider trading is one aspect of financial market regulation which governments have looked to target. Bhattacharya and Daouk (2002) report that almost 80% countries have regulations making insider trading illeagal. New Zealand is no different, with an insider trading regime beginning with the Securities Markets Act 1988. Recently New Zealand has made two legislatvie changes to regulate the possible inside trading. The first change, coming into force on 1 December 2002, had two main effects: changing the institute that enforces securities market regulation from a private to a public entity, and tightening disclosure requirements surrounding inside trades. The second legislative change came into force on 29 February 2008, with the primary effect of changing insider trading from a civil offence to a criminal offence.

These changes make New Zealand a good place to test the impact of financial market regulations on market trading. The punishment from criminal sanctions is more severe if caught, however the burden of proof is higher for criminal offences than civil, with prosecutors having to prove guilt beyond reasonable doubt as opposed to on the balance of probabilities. This increased burden of proof is even more of an issue having regard to the fact that no insider trading case has ever lead to conviction within New Zealand, due to the difficulty of proving the offence.[1] Bhattacharya and Daouk (2009) also found that having laws which are

[1]There have been a few cases which may have led to prosecution but for legal loopholes or out-of-court

unlikely to be enforced can actually have a detrimental effect overall.

Investigating the presence and performance of illegal insider trading is a difficult task, due to the intentionally hidden nature of such activity and the requirement of trading account data. Therefore, we look for alternative ways by identifying the existence of abnormal trading in the New Zealand market, which has been used in many studies such as Keown and Pinkerton (1981), Ball and Kothari (1991), Cornell and Sirri (1992) and Meulbroek (1992). Keown, Pinkerton, Young and Hansen (1985) compare the price run-ups prior to a merger announcement in a successfully prosecuted case by the SEC to a comparable sample of merger target firms' price run-ups prior to public announcement, and found that the run-ups were not statistically different. This reinforces the conclusion that a key component of abnormal trading activity prior to announcements is insider trading. Ball and Kothari (1991) extended analysis on abnormal returns around quarterly earnings announcements by controlling for the fact that return variances and betas increase during announcement periods, thus increasing expected returns. They find that abnormal returns remain even after controlling for this. They also investigated whether cross-sectional variation in abnormal returns over the announcement period is a function of firrm size. They report that abnormal returns surrounding earnings announcements of smaller firms are higher than for larger firms, due to smaller firms releasing relatively more information through earnings announcements. In summary, if there exists insider trading, then we should be able to observe the abnormal trading around corporate announcement. If the law changes affect the illegal insider trading, then the abnormal trading under different law regimes will be different. The magnitude of abnormal trading will decrease if the law is effective in regulating those behaviors.

This study uses semi-annual earnings announcements to investigate the presence of abnormal trading activity in the New Zealand market. Looking at companies on the NZX All

settlements, e.g., Kerry Hoggard, Chairman of Fletcher Challenge at the time, settled out-of-court a dispute related to his heavy purchases prior to a restructuring announcement.

Index during the period January 1998 - March 2014, we identify the existence of significant abnormal price run-ups in the 7 days prior to "good news" announcements, resulting in average pre-announcement cumulative abnormal returns (CAR) of 0.58%. We use this as evidence of the market reacting to the presence of abnormal trading activity based on non-public information. These traders are able to earn an average abnormal return of 1.59% in the window 7 days before to 7 days after earnings announcements.

We extend the analysis to look at the effectiveness of two legislative changes on the insider trading regime within New Zealand during the period, and whether they have successfully reduced abnormal trading prior to earnings announcements. Our findings suggest that the first legislative change, which created a centralised investments regulator and increased disclosure requirements, was successful in reducing abnormal trading activity. However the second legislative change in the period, which changed insider trading from a civil to a criminal offense, appears to have had a detrimental effect on the market by increasing the burden of proof required to prove insider trading. We then employ the volume-synchronized probability of informed trading (VPIN) to examine the change of informed trading probability before the announcement date. We find that consistent with the results of CAR, there is an increase of probability of informed trading between 7-5 days before and 4-1 day before the announcement. The increase of VPIN after the second legislative change is more significant than between the first and second legislative change. We also look at the effect liquidity has on abnormal trading activity, finding that abnormal trading activity appears to be more significant for illiquid firms. Finally, we investigate whether there is any significant cross-industry variation, and identify that abnormal trading activity appears to be more prevalent within certain industries, particularly the Goods industry.

The relevant studies using New Zealand data are Frijns, Gilbert and Tourani-Rad (2008,

2013).[2] They investigate the impact of two legislatve changes on the aggregate market quality. They employed Madhavan, Richardson and Roomans (1997) model to decompose the bid-ask spread into an information asymmetry component, which represents the risk premium liquidity providers demand as a result of trading with potentially better informed investors. Frijns, Gilbert and Tourani-Rad (2008) found that, comparing an 18 month window either side of the first legislative change, the bid-ask ask spread, and specifically the information asymmetry component, decreased. This decrease in bid-ask spread signals that the cost of trading had decreased and market makers perceived there to be less informed investors. Frijns, Gilbert and Tourani-Rad (2013), however, found that in the 12 month window either side of the second regulatory change, the bid-ask spread and information asymmetry worsened, indicating the change lead to a decrease in market quality. This paper is different from theirs on research question and empirical methodology. We focus on the abnormal trading arround earnings announcments, while they examine the impact on the aggregate market quality. Using the particular earning announcement event enables us to better control the impact of other factors on the aggregate market, and provide a direct test about financial market regulation and possible insider trading around earnings announcements. We also use a different approach to estimate the information asymmetry level. We empoly a volume-synchronized probability of informed trading (VPIN) measure recently proposed by Easley, López de Prado and O'Hara (2012). VPIN does not require the intermediate estimation of non-observable parameters or the application of numerical methods, and overcome the convergence problems when the number of observations is not big enough or the market is very volatile.

[2]In a similar study, Duncan and Etebari (1990) investigated information leakage and pre-announcement price run-ups for all types of corporate announcements in the New Zealand market. They also found strong evidence of pre-announcement price run-ups and trade volume changes in the New Zealand market, concluding that abnormal trading activity prior to corporate announcements was present during their sample period.

The remainder of the paper is organized as follows. Section 2 presents the methodology for the even study. Section 3 discusses data and presents empirical results. Section 4 provides other extension tests. Finally, Section 5 summarizes the findings and concludes the paper.

2 The legislative background and methodology

In this section, we present first the legislative background in New Zealand, the event study methodology outlined by MacKinlay (1997), then volume-synchronized probability of informed trading (VPIN) measure proposed by Easley et al. (2012).

2.1 Legislative change about insider trading in New Zealand

The first major attempt at statutory control over insider trading in New Zealand was made in 1988 with the enactment of the Securities Markets Act.[3] The general consensus on New Zealand's insider trading regime is that it has failed (Walker and Simpson, 2013), as embodied by the fact that not one person has been successfully prosecuted. That said, various legislative reforms have been undertaken since 1988 in an effort to improve the regulation of insider trading.

The first change, coming into force on 1 December 2002 through the Securities Markets Amendment Act 2002 (SMAA 2002), was enacted to address two main weaknesses in the current legislation. The first was changing the institute that enforces securities market regulation from private persons to a public entity, giving the Securities Commission the power to prosecute insider trading. Enforcement had been very weak previously, with the onus of taking action and gathering information on the party that had been wronged by the insider. The second weakness targeted by the SMAA 2002 was having minimal disclosure requirements surrounding inside trades, which were tightened. Prior to the change, only

[3]The Securities Act 1978 was New Zealand's first legislation aimed at regulating the market, but the legislation was not aimed at insider trading.

substantial shareholders with over 5% holdings were required to disclose their trades within 5 days, while other insiders, such as directors, only had to disclose their trades in their company's annual report. After the change, all insiders had to disclose their trades within 5 days. The combined effect of these two main changes should lead to a decrease in insider trading activity due to an increased probability of getting caught and a reduction in the abnormal profits available from insider trading.

The second change had the primary effect of changing insider trading from a civil to a criminal offence, and came into force on 29 February 2008 through the Securities Markets Amendment Act 2006 (SMAA 2006). The motivation behind changing insider trading to a criminal offence is clear; it is a stronger punishment so should act as a bigger deterrent (ceteris paribus), while being attractive from political and social points of view. However, this causes the burden of proof required to prosecute to increase, needing to prove guilt "beyond reasonable doubt" as opposed to "on the balance of probabilities". Further, with the already poor enforcement record of authorities due to the difficulty of proving insider trading has occured, the change may have had the opposite effect to what was desired.

2.2 Event study

To look for pre-announcement price run-ups, the event study methodology outlined by MacKinlay (1997) is employed. For each of the earning announcements, we look at the period 7 days before until 7 days after the announcement. The share price data was first used to calculate daily returns for each day t in the event window, for each earnings announcement event j, using the formula:

$$R_{j,t} = log\frac{S_{t,j}}{S_{t-1,j}}. \tag{1}$$

We then adjust these daily stock returns to find the abnormal returns, first using the standard market model to get the expected returns, $\hat{R}_{j,t}$, as outlined by MacKinlay (1997),

where the β_j and α_j for each event was estimated using data on that company 2 years prior to the event window beginning [4]:

$$\hat{R}_{j,t} = \alpha_j + \beta_j R_{m,t}. \tag{2}$$

The abnormal return (AR) is then given by subtracting the expected returns from the actual observed return, $R_{j,t}$:

$$AR_{j,t} = R_{j,t} - \hat{R}_{j,t}. \tag{3}$$

The abnormal returns are accumulated for each day of the event period, t, to find the cumulative abnormal return (CAR) for each announcement:

$$CAR_{j,t} = \sum_{i=-7}^{t} AR_{j,i}. \tag{4}$$

We then average the invididual CAR across all announcements to find the mean CAR of the sample:

$$CAR_t = \frac{1}{N} \sum_{j=1}^{N} CAR_{j,t}. \tag{5}$$

A t-statistic is then calculated for each day of the event window. If the CAR_t is positive in the days leading up to good news announcements and negative for bad news announcements, this is evidence of abnormal trading activity.[5] If the earnings per share (EPS) announced by a company beats the market's expected EPS, it will be regarded as good news, and if it is below the market's expectation it will be regarded as bad news. Financial analysts' forecasted EPS is typically used as a proxy for the market's expectation, however there

[4]We also use the constant return model and market adjusted return model to calculate the abnormal return. The results are very close to those using market model.

[5]We use one-sided test since the reseach hypothesis not only predicts that the CAR_t is different from zero, but that it would be different in a specific direction.

are too few financial analysts in New Zealand to provide accurate EPS forecasts for each company. With such data unavailable, we have used a different method to come up with a proxy for good news and bad news announcements by looking at the change in earnings from one period to the next. We first calculated the earnings change for each announcement as:

$$Earnings\,change_j = EPS_j - EPS_{j-1}. \tag{6}$$

We then adjust for market wide changes on a year-by-year basis to account for business cycle effects, such as the Global Financial Crisis. This was done by first finding the average change in earnings for each year across all companies in the sample, $Earnings\,change_{year}$, and using this as our proxy for market-wide earnings change. These are then subtracted from each corresponding $Earningschange_j$ to give an abnormal change in earnings for each announcement:

$$Abnormal\,earnings\,change_j = Earnings\,change_j - Earnings\,change_{year}. \tag{7}$$

Each event is then split into quintiles based on abnormal earnings changes for that year, with the top quintile representing the largest abnormal earnings changes and thus used as our proxy for good news, and the bottom quintile representing bad news announcements.

2.3 Volume-synchronized probability of informed trading (VPIN)

Among the literature of market microstructure, there are many methods that could be used to exract the component of informed trading in high frequency data, for example Madhavan, Richardson and Roomans (1997) and Easley, Kiefe, O'Hara and Paperman (1996). However, these models generally require the estimation of unobservable parameters and might have convergence problems if the market is illiquid and the number of transaction is

limited. Recently, Easley et al. (2012) proposed a volume-synchronized probability of informed trading (VPIN) to overcome this by calculating the probability of informed trading directly from the trasaction data. It does not require the intermediate numerical estimation of non-observable parameters. We shall use the VPIN measure in the empirical analysis and explain it in the following.

Firstly, for each earning announcment event j, we calculate the buy and sell volume ($V_{j,t}^B$ and $V_{j,t}^S$) using one-hour time bars at day t, i.e.,

$$V_{j,t}^B = \sum_{i=1}^{M} V_{j,i,t} \cdot Z(\frac{P_{j,i,t} - P_{j,i-1,t}}{\sigma_{\Delta P_j}}) \tag{8}$$

$$V_{j,t}^S = \sum_{i=1}^{M} V_{j,i,t} \cdot [1 - Z(\frac{P_{j,i,t} - P_{j,i-1,t}}{\sigma_{\Delta P_j}})] = V_{j,t} - V_{j,t}^B, \tag{9}$$

where i is the index of ith-hour in day t, V_i is the trading volume of the ith-hour, $Z(.)$ is the cumulative distribution function of the standard normal distribution, and $\sigma_{\Delta P_j}$ is the estimate of standard deviation of price changes between time bars. Following Easley et al. (2012), the VPIN of day t is approxiamted by

$$VPIN_{j,t} \approx \frac{|V_{j,t}^B - V_{j,t}^S|}{V_{j,t}} \tag{10}$$

We average the individual $VPIN_{j,t}$ across all announcements to find the mean VPIN of the sample:

$$VPIN_t = \sum_{j=1}^{N} VPIN_{j,t} \tag{11}$$

In the empirical study, we calculate the daily VPIN of each event from seven days to one day before the earning annoucement, and compare the change of VPIN between $[-7, -5]$

and $[-4, -1]$ windows. If the abnormal trading one week prior is partly due to the informed trading, we will observe the change of VPIN during these two time windows.

3 Empirical results

3.1 Data

To construct the sample of companies, we first manually collected semi-annual earnings data from January 1998 to March 2014 for 111 companies listed on the NZX All index via the NZX Company Research historical announcements database. Ideally, quarterly earnings data would have been collected to give more data points, but very few New Zealand companies release quarterly earnings information. Semi-annual data was used as the best alternative. The data collected was earnings per share (EPS) and the date used was the date the information was announced to the public. January 1998 was used as the start point to ensure the sample had enough data to analyse the effect of the first legislative change in 2002.

Daily share price (at close), bid and ask prices, volumes traded and market capitalisation data were then collected from the Sirca Portal and Thomson Reuters Tick History for these 111 companies over the sample period. Daily share price data was missing for a few small sections, and in this case we use the share price at the last available data point. The companies had to be listed at March 2014 to be included, so had to either last the whole period or become listed during the period - those that delisted during the period are not included.[6] The NZX All Index daily values were collected from the NZX Company Research historical database, and are used as a proxy for market return. Table 1 provides summary statistics of

[6]This creates a survivorship bias within the data by not including some companies that have either performed badly or merged within the sample period and thus have delisted. However, this will not significantly affect our results, as we focus on insider trading prior to "good news" announcements and those firms that delisted are not likely to have many observations within the "good news" sample.

the companies included in our sample. Our sample covers nine industries including Finance, Consumer, Transport, Investment, Property, Goods, Energy, Media & Telecomms and Primary. On average, the firms in Finance industry have the largest capitalization, while the firms in Goods industry have the smallest market capitalization.

[Insert Table 1 here]

Using Eq. (7), each event is split into quintiles based on abnormal earnings changes for that year, with the top quintile representing the largest abnormal earnings changes and thus used as our proxy for "good news", and the bottom quintile representing "bad news" announcements. Table 2 provides summary statistics on the earnings announcements and results of sorting the data into "good and bad news" categories. Consistent with the business cycle, the aggregate change of EPS is negative in 2000 and 2001 (Internet bubble crash), 2008 and 2009 (subprime financial crisis) and 2012 (Eupopean debt crisis). Overall, EPS looks very stable and does not grow much over the time.

[Insert Table 2 here]

3.2 Empirical results

3.2.1 CAR results of full sample

Table 3 reports the average abnormal returns (AR) and cumulative abnormal returns (CAR) for each day during the 15 day announcement period for both the "good news" and "bad news" announcements.

First we assess the effectiveness of our "good news" and "bad news" proxies by looking at the CAR_t across the entire event window. We observe a CAR_{+7} of -0.57%, significant at

the 10% level, for our "bad news" sample, and a 1.59% CAR_{+7}, significant at the 1% level, for our "good news" sample. These results indicate that our proxies are applicable, with the market reacting in the way we would expect following such announcements.

We now look for the presence of price run-ups (run-downs) prior to the announcement of good (bad) news, which is evidence of abnormal trading. We observe significant difference between the market's reaction to good and bad news announcements. Prior to announcements considered to be good news by the market, we observe a CAR_{-1} of 0.58%, significant at the 1% level. Such a pattern is what we would expect to see if inside information had been traded on prior to the good announcement, with the market recognising an increased demand for shares and increasing the price accordingly. The results also show that insiders buying stock 7 days before a good announcement can make an abnormal return of 1.59% on average over the 15 day window (almost 40% annualised), which is economically significant. Prior to bad announcements, however, we do not find any evidence of information leakage, with a negligible CAR_{-1} found. This can be explained by the lack of short-selling in the New Zealand market (Fabozzi and Asness, 2004) with short-selling only becoming possible for the average private investor after 2006 (Wiggs, 2007), and the depth of the short-selling market still severely lacking today.

[Insert Table 3 here]

Figure 1 depicts the CAR_t for each category. There is a singificant difference of price impact between "good news" and "bad news" event. For good announcements, the market seems to react slowly before the announcement, react instantly to the release of the better-than-expected EPS information on day 0 with an average abnormal return of 0.71%, followed by 0.18% on day 1 and then negligible daily abnormal returns for the rest of the window. However, following bad announcements it appears to take up to 5 days on average before

the share price levels out and fully incorporates the worse-than-expected results. This is consistent with the findings of Lakonishok and Lee (2001).

[Insert Figure 1 here]

3.2.2 CAR and legislative change

To investigate the effect of two legislative changes, we split our sample into three categories: pre-legislative changes (before 1 December 2002), post-first and pre-second legislative change (between 2 December 2002 and 29 February 2008), and post-second legislative change (after 1 March 2008). We focus on the "good news" announcements for the reasons stated in the above section.

Table 4 shows the CAR_t for semi-annual earnings announcements before the SMAA 2002 came into force. A CAR_{-1} of 0.61%, statistically significant at the 5% level, for the 7 days prior to a "good news" announcement indicates that there was significant abnormal trading during the period Jan 1998 - December 2002 and as such, the recognition of the need to improve the insider trading regime was well founded. Figure 2 plots the CAR_t of good news and bad news categories during the pre-legislative change period. The findings are similar to those in Table 4.

[Insert Table 4 here]

[Insert Figure 2 here]

Following the SMAA 2002 coming into force, we find that the CAR_t for the 7 days prior to announcement has decreased to only 0.17%, and is not statistically significant, for the period 2 December 2002 - 29 February 2008 (see Table 5). This is evidence that the move to a public enforcement agency and increasing the disclosure requirements from the SMAA

2002 significantly reduced the presence of abnormal trading activity in the New Zealand market, and is consistent with the findings of Frijns, Gilbert and Tourani-Rad (2008). Similar findings could be also drawed from Figure 3, which plots the CAR_t of good news and bad news categories during the post-first and pre-second legislative change period.

[Insert Table 5 here]

[Insert Figure 3 here]

However, the results for the post-second legislative change (post-SMAA 2006) period tell a different story (see Table 6). For the post-SMAA 2006 period (2008-2014), we find a CAR_{-1} for the 7 days prior to announcement of 0.88%, significant at the 1% level, over four times higher than prior to the change, and 50% higher than before the first legislative change, reversing the good effects of the SMAA 2002. Among the AR results, AR_{-6} is highly significant, and is the driving factor of the significance of CAR. This is also much earlier than those during the first period (before legislative change) and the second period (post-first and pre-second legislative change). For example, during the first period, AR_{-4} becomes positive and the CAR becomes significantly positive only one day before (CAR_{-1}). During the second period, none of AR and CAR is significant. These results are again consistent with the findings of Frijns, Gilbert and Tourani-Rad (2013), and provide further evidence supporting Bhattacharya and Daouk (2009)'s theory that a good law that is unenforced is worse than having no law at all. This raises the question as to whether the criminalisation of the insider trading offence in New Zealand should be re-assessed by the regulatory authorities. The government is, however, likely to be averse to reversing the change. From a political standpoint, public opinion is still very much focused on the financial markets, and the government does not want to be seen as going easy on those manipulating the market by reducing the punishment for engaging in insider trading activity. The first case that is

successfully prosecuted by the FMA may set a precedent and provide credibility to the threat of criminal prosecution, increasing the risk of engaging in insider trading activity.

[Insert Table 6 here]

[Insert Figure 4 here]

3.2.3 VPIN results

In order to test whether there is a change of informed trading before earnings announcements, we calculate the daily VPIN for the period beginning 7 days before the announcement and ending 1 day before. Table 7 reports the VPIN results during two time windows, [-7, -5] and [-4, -1]. Similarly, we only report the results of "bad news" and "good news" group. The first panel reports the results of full sample. There is an increase of informed trading during [-4, -1] compared with [-7, -5] for both groups. The increase of "bad news" group is significant at 10% level, while the increase of "good news" group is significant at 1% level. This is consistent with the positive CAR returns during this period for the full sample in Table 2, especially for the "good news" group. This suggests that there exists not only significant positive CAR returns , but also signfifcant increase of informed trading before earnings announcements.

Moving to the results of three sub-periods, we find that the change of informed trading is not significant during the first period, which is partly due to the small sample size. The change of informed trading for the "bad news" group is not significant in any periods, suggesting there is no significant change of informed trading before the earnings annoucements for those companies. This is consistent with the results of CAR analysis. The change of informed trading for the "good news" category is significant at 10% level during the period 2 but is signifciant at 5% during the period 3. This again shows that after the second legislative change, the informed trading increases more significantly before earnings annoucements.

This is also consistent with the CAR results. In all, the VPIN results suggest that there exists an significant increase of informed trading before earnings annoucements in New Zealand stock market. The second legislative change is not as effective in reducing such informed trading as the first legislative change.

[Insert Table 7 here]

4 Extended test

Besides the change of abnormal trading under different legilsative change, it is also interesting to examine the relationship between firm characteristic and abnormal trading. For example, what kinds of firms tend to have more significant abnormal trading? In order to address this question, we use relative bid-ask spread and market capitalization to sort the firms into five groups and examine the CAR of "bad news" and "good news" for each group. The relative bid-ask spread is calculated as $\sum_{t=-7}^{-1} \frac{(Ask_t - Bid_t)}{\frac{Ask_t + Bid_t}{2}}$, where Ask_t and Bid_t are the ask and bid price of the stock in day t. High bid-ask spread or small size group represent low liquidity stocks while low bid-ask spread or large size group represent high liquidity stocks. Literature shows that abnormal returns surrounding price sensitive announcements are higher for small firms (Ball and Kothari, 1991), and illiquid firms are more vulnerable to insider trading (Easley et al., 1996; Gregory, Matatko and Tonks, 1997).

The first two panels of Table 8 reports the CAR results. For simplicity, we only report the results of low and high bid-ask spread group for bid-ask spread variable, and the results of small and large group for market capitalization variable. We only report the results of CAR_{-1}, i.e., the cumulative abnormal returns beginning 7 days before the announcement and ending 1 day before. For the "good news" event, the CAR of high bid-ask spread portfolio or small portfolio is higher than that of low bid-ask spread portfolio or large portfolio. This

suggests that less liquid stocks tend to have more signficiant CAR. The impact of abnormal trading on the less liquid stocks is more significant.[7]

We then examine the CAR across different industries. We categorize each stock based on its NZX industry classification. The last Panel of Table 8 reports the results. The Finance, Consumer, Investment and, in particular, Goods industries all display average cumulative abnormal returns prior to the earnings announcements much higher than the full sample average, with all values statistically significant at at least the 5% level. The Goods industry stands out with an average price-run up of 1.22% prior to "good news" announcements. The average company in the Goods industry has a market capitalisation in the smaller end of our sample, however it is unlikely this fully explains the big difference in the CAR observed. Apart from company sizes, some (non-exhaustive) reasons for the cross-industry variations could be differing company structures, quality of corporate governance, company cultures and policies, or regulatory environments. This could provide an interesting opportunity for future research.

[Insert Table 8 here]

5 Conclusion

Using an event study methodology, we investigate the price run-ups prior to earnings announcements in the New Zealand market from January 1998 - March 2014. We found statistically significant evidence that abnormal trading activity occurred prior to announcements that are considered "good news" through the existence of pre-announcement price run ups. The trading appears to be more prevalent in less liquid firms and within some industries.

[7]The appendix reports the abnormal and cumulative abnormal returns for the period beginning 7 days before the announcement and ending 7 days after for companies on the NZX All index for these groups.

Following on from this analysis, we examine the effect of two legislative changes which occurred during the period and aimed to reduce insider trading in New Zealand. The first change created a public watchdog and increased disclosure requirements, and appears to have had some success in decreasing insider trading activity. The introduction of criminal sanctions on insider trading through the second legislative change appears to have had a detrimental effect. The increased burden of proof on prosecutors results in a decreased chance of being prosecuted for insider trading, which was already low to begin with. Our findings provide important insights into the effectiveness of different regulatory strategies, particularly the use of criminal sanctions. We also use the VPIN to examine the change of informed trading before the earnings announcements, and obtain similar results.

There are several questions that are worthwhile for future research in New Zealand. We find that the abnormal trading only happens within some industries. It is an interesting question to find the reasons. Further research could be done to link the coporate governance efficiency with the abnormal trading. For example, the companies with better governance structure have better control of information leakage and are possibly less subject to abnormal trading. More direct evidence of insider trading could be tested by investigating the individual account data and find out the source of abnormal trading behavior.

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Table 1: Summary statistics of company sizes in sample

This table reports summary statistics on the size of the 111 companies on the NZX All index for the period January 1998 - March 2014 . The full sample and subsamples split into industries, as classified by the NZX are provided. Observations is the number of companies in each sample. Mean is computed as the cross-sectional average of average daily market capitalisation for each sample. Standard deviation is the standard deviation of the average daily market capitalisation for each sample. Median is the cross-sectional median of average daily market capitalisation. Lowest quintile is the value that 20% of the companies in each sample have average daily market capitalisation values below, while Highest quintile is the value that 20% of the companies are above. All values (except Observations) are in NZD $000's.

	Observations	Mean	Standard deviation	Median	Lowest quintile	Highest quintile
Full sample	111	1,336,702	6,038,900	195,207	30,529	723,842
Industry separations						
Finance	23	4,185,943	12,889,606	201,505	14,793	760,000
Consumer	17	171,259	298,362	57,867	22,242	265,956
Transport	9	636,216	747,276	446,329	88,418	1,175,410
Investment	10	241,732	402,074	53,625	3,438	471,434
Property	10	324,408	236,113	290,077	76,166	621,271
Goods	14	224,535	327,516	138,390	19,641	295,298
Energy	9	1,585,276	1,196,947	1,459,692	89,969	2,520,000
Media & Telecomms.	7	1,954,337	3,159,577	1,065,429	95,480	4,192,696
Primary	12	558,928	1,023,619	244,691	34,650	468,553

Table 2: Summary statistics of earnings per share (EPS)

This table reports statistics of semi-annual earnings per share (EPS) for the period January 1998 - March 2014 for the 111 companies on the NZX All index. Statistics for the full sample are reported, as well as the "bad news" and "good news" categories. Obs. is the number of announcements in each sample for each year. For each company's announcement j, the change in earnings is calculated as the EPS less last announcement's EPS: $Earnings\,change_j = EPS_j - EPS_{j-1}$. *Earnings change* is then calculated as the cross-sectional average of the earnings change for announcements in each year of the sample, giving our proxy for market earnings change per year. $Abnormal\,earnings\,change_j$ is calculated for each announcement by subtracting the corresponding year's *Earnings change* from the $Earnings\,change_j$. The firms are split into quintiles using $Abnormal\,earnings\,change_j$, with the lowest 20% representing our "bad news" category, and the highest 20% representing our "good news" category. *Abnormal earnings change* is the average abnormal change in earnings per year in each category. S.D. is the standard deviation of $Earnings\,change_j$ in each category. All values (except Obs.) are in NZD per share.

				Announcement Type:					
		Full Sample			Bad news			Good news	
Year	Obs.	*Earnings change*	S.D.	Obs.	*Abnormal earnings change*	S.D.	Obs.	*Abnormal earnings change*	S.D.
1998	52	-0.0114	0.0739	11	-0.1113	0.0896	10	0.0677	0.0443
1999	83	0.0128	0.0742	17	-0.0766	0.0475	16	0.1218	0.0680
2000	93	-0.0165	0.1637	19	-0.1493	0.3286	18	0.0683	0.0431
2001	96	-0.0100	0.2625	20	-0.2027	0.4477	18	0.1558	0.2944
2002	111	0.0095	0.2112	23	-0.1624	0.2030	22	0.1982	0.3454
2003	111	0.0164	0.1361	23	-0.0916	0.0885	22	0.1595	0.2312
2004	129	0.0010	0.0557	26	-0.0721	0.0547	25	0.0699	0.0466
2005	145	0.0000	0.1035	29	-0.1092	0.1417	29	0.1056	0.1028
2006	163	0.0016	0.1230	33	-0.1272	0.1654	32	0.1288	0.1248
2007	166	0.0146	0.2037	34	-0.1720	0.2189	33	0.2390	0.2728
2008	177	-0.0249	0.1691	36	-0.2290	0.2181	35	0.1336	0.1632
2009	176	-0.0188	0.2135	36	-0.2561	0.2410	33	0.2000	0.2652
2010	181	0.0056	0.3887	37	-0.2430	0.5664	36	0.2781	0.5515
2011	181	0.0281	0.2172	37	-0.1393	0.1779	36	0.2644	0.3463
2012	189	-0.0135	0.185	38	-0.1975	0.2881	37	0.1264	0.1885
2013	195	0.0103	0.1546	39	-0.1275	0.1313	39	0.1628	0.2457
2014	66	-0.0086	0.0991	14	-0.1155	0.1310	13	0.0854	0.1027

Table 3: Abnormal trading: Full sample

This table reports average abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period January 1998 - March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the market model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event	Bad news				Good news			
day	Obs.	R_t (%)	CAR_t (%)	S.D. (%)	Obs.	AR_t (%)	CAR_t (%)	S.D.(%)
-7	441	-0.1049	-0.1049	2.1234	426	0.0331	0.0331	1.9504
-6	450	-0.1581	-0.2630**	3.0037	445	0.0705	0.1037	2.3085
-5	455	-0.0052	-0.2681**	3.3255	448	0.0586	0.1622	2.7367
-4	463	0.0621	-0.2061	3.6785	449	0.1358	0.2980**	3.13036
-3	466	0.0773	-0.1287	4.0059	452	-0.0028	0.2952**	3.1304
-2	467	-0.0708	-0.1996	4.4186	453	0.0572	0.3524**	3.2992
-1	468	0.2034	0.0038	4.6704	453	0.2249	0.5774***	3.4995
0	468	-0.1155	-0.1117	5.4722	453	0.7088	1.2861***	4.3711
+1	470	-0.13	-0.2417	6.1431	453	0.1814	1.4675***	5.2070
+2	470	-0.0391	-0.2808	6.2750	453	0.0324	1.4999***	5.4956
+3	470	-0.2487	-0.5295**	6.7777	453	0.0323	1.5321***	5.7056
+4	470	-0.0825	-0.6120**	7.2191	453	0.0104	1.5425***	5.8520
+5	470	-0.0519	-0.6639**	7.4531	453	-0.0226	1.5199***	5.9688
+6	470	0.0394	-0.6245**	7.6999	453	-0.0276	1.4923***	6.2416
+7	470	0.0521	-0.5724*	8.0301	453	0.0943	1.5866***	6.4515

Table 4: Abnormal trading: Pre-legislative change

This table reports abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period January 1998 - 1 December 2002 (i.e. before the Securities Markets Amendment Act 2002 came into force). The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the market model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event	Bad news				Good news			
day	Obs.	AR_t(%)	CAR_t(%)	S.D.(%)	Obs.	AR_t(%)	CAR_t(%)	S.D.(%)
-7	83	-0.2193	-0.2193	2.1161	80	0.0229	0.0229	2.4682
-6	85	-0.3106	-0.5299*	3.3434	84	-0.2589	-0.2360	2.7707
-5	87	-0.1226	-0.6525*	4.3285	84	-0.0410	-0.2770	3.2442
-4	88	0.3178	-0.3347	4.7635	84	0.2499	-0.0271	3.291
-3	88	0.0296	-0.3051	4.6490	84	0.0670	0.0429	3.2580
-2	88	-0.0645	-0.3700	5.0273	84	0.0540	0.0969	3.3903
-1	88	-0.0397	-0.4096	5.9619	84	0.5136	0.6105**	3.0732
0	88	0.2597	-0.1450	6.2605	84	0.3563	0.9668**	3.8704
+1	88	-0.1773	-0.3273	6.7176	84	0.6058	1.5726***	4.6701
+2	88	-0.2347	-0.5620	6.9966	84	-0.3329	1.2396**	5.3155
+3	88	-0.5646	-1.1265*	7.5406	84	0.1343	1.3739**	5.7884
+4	88	0.09625	-1.0303	8.0967	84	-0.1130	1.2609**	5.8418
+5	88	0.3393	-0.6910	7.7668	84	-0.0635	1.1974**	5.8682
+6	88	0.3857	-0.3053	7.6484	84	0.1072	1.3045**	6.2223
+7	88	0.2446	-0.0606	7.6851	84	0.2471	1.5516**	6.7354

Table 5: Abnormal trading: Post-first and pre-second legislave change

This table reports abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period 2 December 2002 - 29 February 2008 (i.e. after the Securities Markets Amendment Act 2002 came into force, but before the Securities Markets Amendment Act 2006 came into force). The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the Market Model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event	Bad news				Good news			
day	Obs.	AR_t(%)	CAR_t(%)	S.D.(%)	Obs.	AR_t(%)	CAR_t(%)	S.D.(%)
-7	151	-0.2076	-0.2076	2.045	148	-0.0148	-0.0148	1.518
-6	152	0.1793	-0.0284	2.3262	150	0.0690	0.0542	2.0952
-5	154	-0.1680	-0.1963	2.2790	151	0.0655	0.1197	2.2182
-4	154	-0.0716	-0.2679	2.8005	152	0.0951	0.2148	2.5873
-3	154	0.1926	-0.0753	3.4181	152	-0.0561	0.1587	2.7404
-2	154	-0.11552	-0.1908	4.0875	152	-0.0379	0.1207	2.9369
-1	154	0.0854	-0.1054	4.6480	152	0.0498	0.1706	2.9828
0	154	0.1625	0.0571	5.9286	153	0.9626	1.1331***	3.9407
+1	154	-0.0919	-0.0345	6.5093	153	0.0625	1.1956***	4.8878
+2	154	-0.0393	-0.0742	6.4556	153	0.2868	1.4824***	5.1392
+3	154	-0.1734	-0.2475	7.0164	153	-0.0025	1.4799***	5.1596
+4	154	-0.1802	-0.4278	7.5005	153	0.0883	1.5682***	5.1418
+5	154	-0.1465	-0.5743	8.0891	153	0.0519	1.6201***	5.1851
+6	154	-0.2104	-0.7847	8.5883	153	0.0107	1.6308***	5.2001
+7	154	-0.0714	-0.8561	9.1569	153	0.0037	1.6344***	5.3885

Table 6: Abnormal trading: Post-second legislative change

This table reports abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period March 2008 - March 2014 (i.e. after the Securities Markets Amendment Act 2006 came into force). The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the Market Model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event	Bad news				Good news			
day	Obs.	AR_t(%)	CAR_t(%)	S.D.(%)	Obs.	AR_t(%)	CAR_t(%)	S.D.(%)
-7	209	-0.0286	-0.0286	2.2548	202	0.0740	0.0740	2.0281
-6	214	-0.3439	-0.37241**	3.3107	208	0.20504**	0.27902	2.2567
-5	217	0.1380	-0.2344	3.5182	209	0.0766	0.3556**	2.8556
-4	221	0.1140	-0.1203	3.7361	212	0.1420	0.4977***	3.1011
-3	222	0.0370	-0.0833	4.1294	214	0.0104	0.5080**	3.3420
-2	224	-0.0657	-0.1491	4.4087	214	0.1330	0.6410***	3.5088
-1	225	0.3850	0.2359	4.0963	215	0.2394	0.8804***	3.9498
0	225	-0.4208	-0.1849	4.7962	215	0.6384	1.5188***	4.8377
+1	228	-0.1635	-0.3484	5.6632	215	0.0957	1.6145***	5.635
+2	228	0.0365	-0.3119	5.8687	215	-0.0070	1.6074***	5.8331
+3	228	-0.1777	-0.4896	6.3041	215	0.0135	1.6210***	6.0674
+4	228	-0.0855	-0.5751*	6.6738	215	0.0015	1.6225***	6.3443
+5	228	-0.1390	-0.7140*	6.8947	215	-0.0598	1.5627***	6.5357
+6	228	0.07447	-0.6396*	7.0924	215	-0.1077	1.4550***	6.9283
+7	228	0.0613	-0.5783	7.3430	215	0.0980	1.5530***	7.0464

Table 7: VPIN results

This table reports the volume-synchronized probability of informed trading measure (VPIN) for the period beginning 7 days before the announcement and ending 1 day before. The mean and standard deviation of daily VPIN during the two time window [-7, -5] and [-4, -1] are reported. Obs. is the number of observations. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Difference is the difference of mean VPIN between time window [-7, -5] and [-4, -1]. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

	Bood news			Good news		
Time window	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Full sample						
$[-7,-5]$	701	0.2224	0.2277	748	0.2168	0.2287
$[-4,-1]$	919	0.2429	0.2404	858	0.2533	0.2384
Difference		0.0204*	0.2350		0.0365***	0.2339
Period 1: Before the first legislative change						
$[-7,-5]$	68	0.2393	0.2566	82	0.2317	0.2279
$[-4,-1]$	102	0.2309	0.2696	92	0.2745	0.2679
Difference		-0.0085	0.2579		0.0429	0.2296
Period 2: Between the first and second legislative change						
$[-7,-5]$	260	0.2151	0.2313	298	0.2077	0.2421
$[-4,-1]$	375	0.2460	0.2368	339	0.2442	0.2287
Difference		0.0309	0.2316		0.0365*	0.2424
Period 3: After the second legislative change						
$[-7,-5]$	373	0.2245	0.2199	368	0.2208	0.2178
$[-4,-1]$	442	0.2430	0.2368	427	0.2560	0.2395
Difference		0.0185	0.2201		0.0351**	0.2181

Table 8: Abnormal trading of subsamples: Extended test

This table reports cumulative abnormal returns (CAR) of different subsamples for the period beginning 7 days before the announcement and ending 1 day before during the period January 1998 - March 2014. Bid-ask spread, market capitalization and industry classifications are used to construct the subsamples. The announcements are categorised into "good news" and "bad news" based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. CAR_{-1} is the sample average cumulative abnormal return from event day -7 to day -1. S.D. is the standard deviation of the CAR_{-1}. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Variable		Bad news			Good news		
		Obs.	CAR_{-1}(%)	S.D.(%)	Obs.	CAR_{-1}(%)	S.D.(%)
Bid-ask	Low	46	-0.1441	2.4184	51	0.6291**	2.5136
spread	High	91	-0.1375	7.2008	77	0.8413*	4.8823
Market	Small	87	-0.2833	7.4641	75	0.7561*	4.913
capitalization	Large	88	0.1553	2.6011	117	0.5533**	2.8848
Industry	Finance	66	-0.4981	7.5556	75	0.8416**	3.5306
	Consumer	91	0.7141*	4.1299	77	0.9369**	4.5327
	Ports & Transport	36	-1.5196*	5.4145	37	0.2725	3.1675
	Investment	50	0.0596	3.6702	43	0.9997*	3.3776
	Property	45	0.3905	2.4845	40	-0.4493*	2.1508
	Goods	41	-0.2378	3.9648	45	1.2187***	3.2154
	Energy	36	0.5466	2.8424	35	0.4625	3.8842
	Media & Telecomms	31	0.3304	3.0132	28	-0.0432	2.8441
	Primary	71	-0.2441	4.8244	72	0.3547	3.1847

Figure 1: Cumulative abnormal returns: Full sample

This graph plots the cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period January 1998 - March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change.

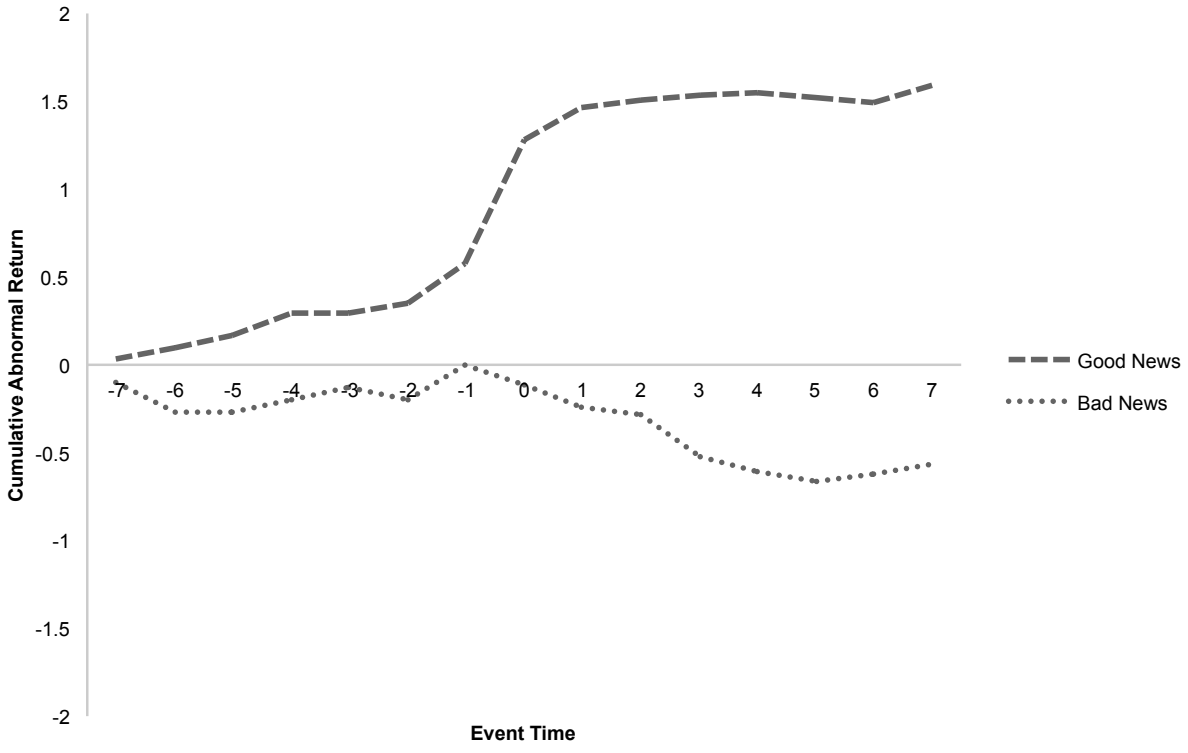


Figure 2: Cumulative abnormal returns: Pre-legislative change

This graph plots the cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period January 1998 - 1 December 2002. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change.

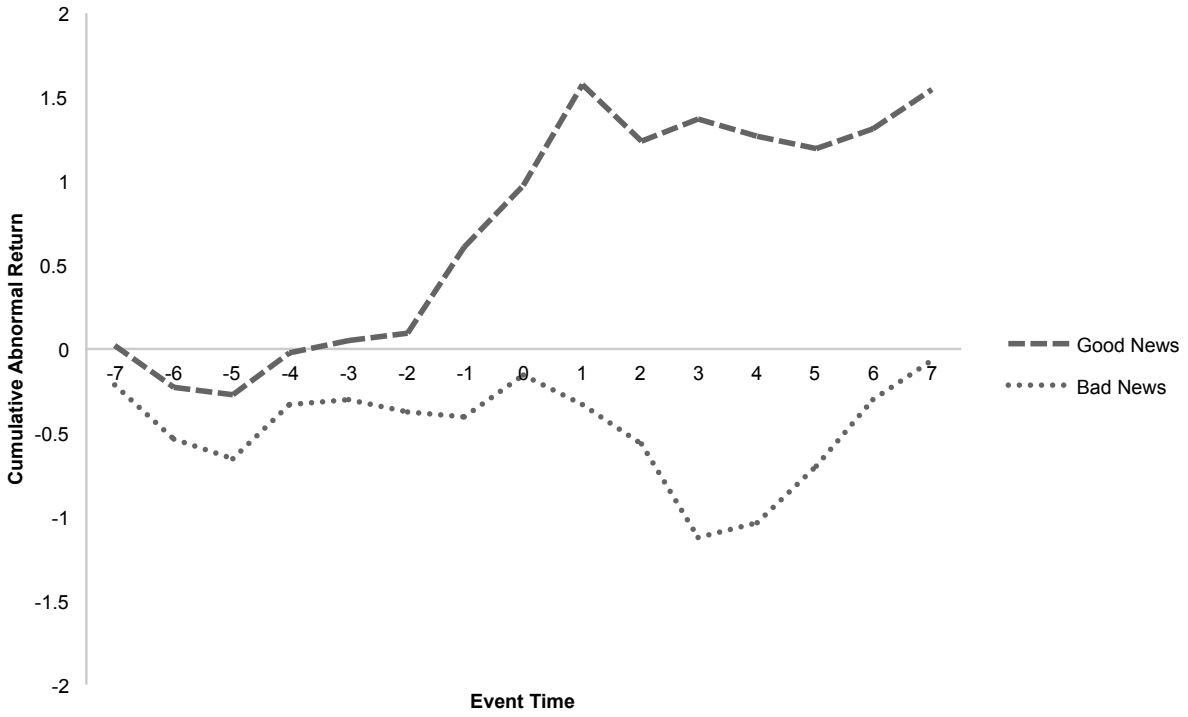


Figure 3: Cumulative abnormal returns: Post-first and pre-second legislative change
This graph plots the cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period 2 December 2002- 29 February 2008. The announcements are categorised into "good news" and "bad news', based on the change in their announced earnings per share from their last announcement, adjusted for the market average change.

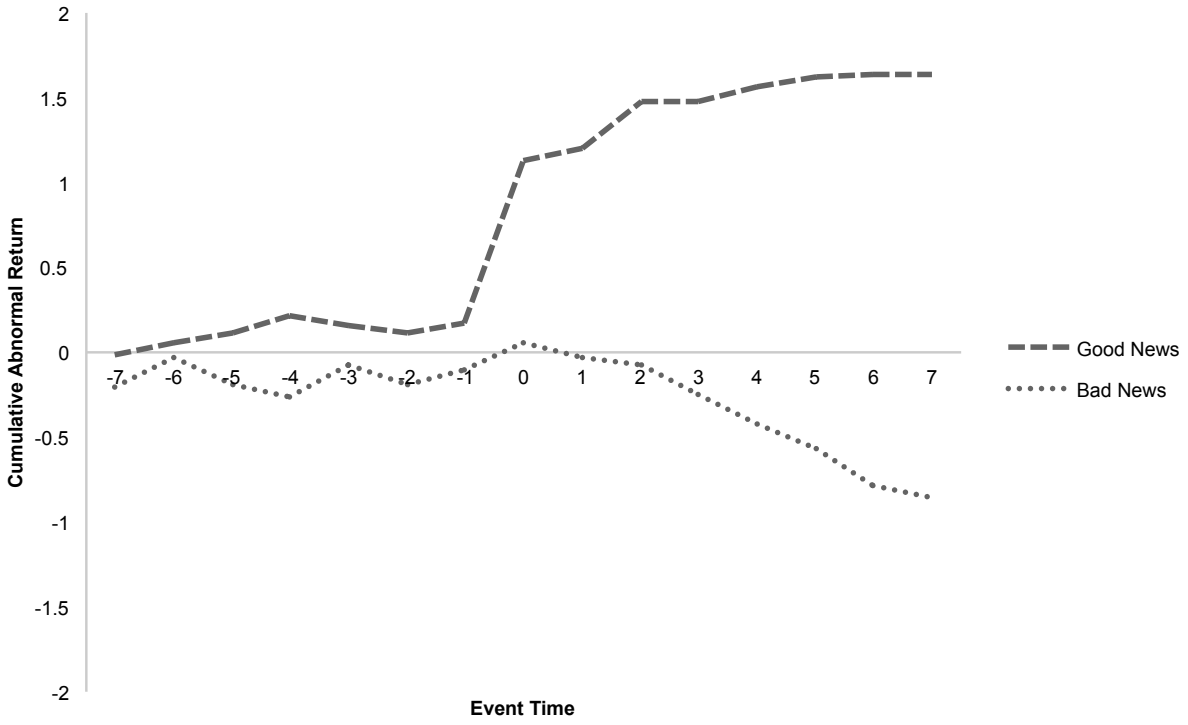
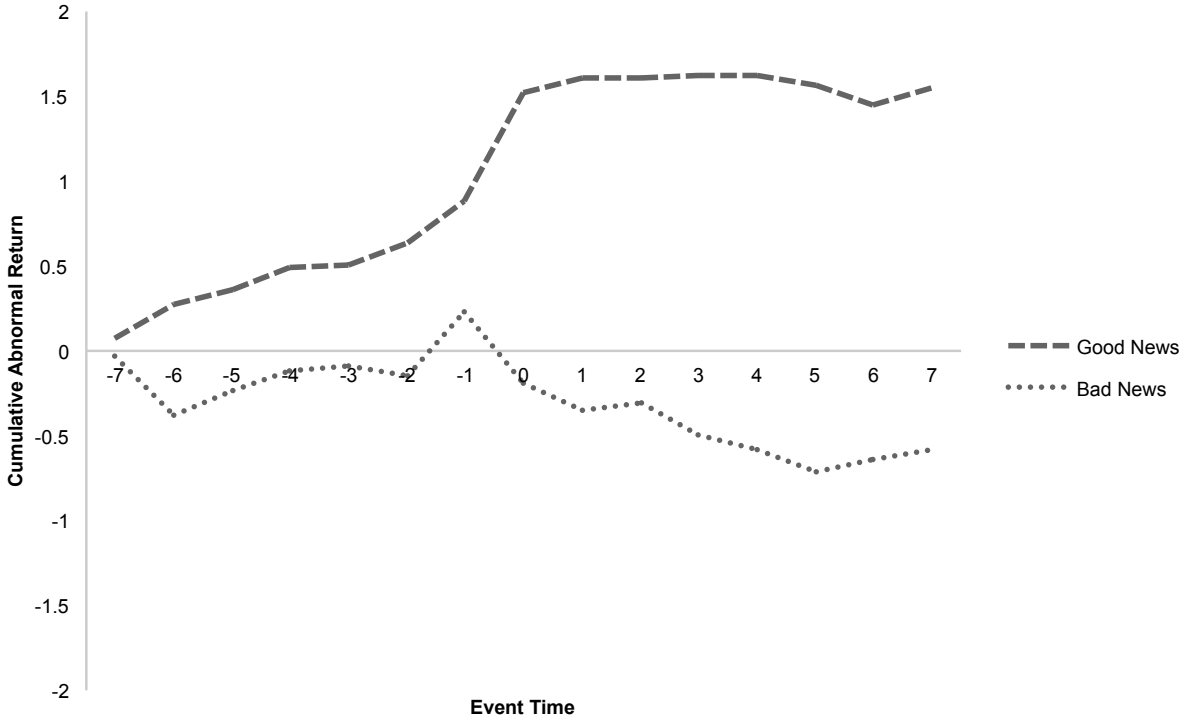


Figure 4: Cumulative abnormal returns: Post-second legislative change

This graph plots the cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the 111 companies on the NZX All index during the period March 2008- March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change.



A Appendix

Table A1: Abnormal trading: Low bid-ask spread companies

This table reports average abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for companies in the bottom quintile of average bid-ask spread percentage during the period January 1998 - March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the market model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event day	Bad news				Good news			
	Obs.	AR_t	CAR_t	S.D.	Obs.	AR_t	CAR_t	S.D.
-7	41	0.1106	0.1106	1.1853	51	0.0157	0.0157	0.8939
-6	43	0.4940	0.6046**	2.1467	51	0.1488	0.1645	1.4035
-5	45	-0.2653	0.3393	1.7427	51	0.1205	0.2850*	1.5316
-4	46	-0.0875	0.2518	2.0001	51	-0.0633	0.2217	1.7242
-3	46	0.1268	0.3786	2.1222	51	0.0019	0.2236	1.8373
-2	46	-0.5056	-0.127	2.286	51	0.0308	0.2544	2.2706
-1	46	-0.0171	-0.1441	2.4184	51	0.3747	0.6291**	2.5136
0	46	-0.1596	-0.3037	3.3594	51	0.6082	1.2373***	2.8728
1	46	0.2684	-0.0353	3.7247	51	0.2307	1.468***	3.3416
2	46	0.0312	-0.0041	3.9454	51	0.0947	1.5627***	3.4466
3	46	-0.054	-0.0581	4.2258	51	0.2523	1.8150***	3.3801
4	46	0.0153	-0.0428	4.3857	51	-0.1262	1.6888***	3.2844
5	46	0.0856	0.0428	4.4446	51	0.0380	1.7268***	3.3042
6	46	0.1990	0.2418	4.9223	51	-0.2060	1.5208***	3.5357
7	46	-0.0692	0.1726	5.2809	51	0.3072	1.828***	3.9554

Table A2: Abnormal trading: High bid-ask spread companies

This table reports average abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for companies in the top quintile of average bid-ask spread percentage during the period January 1998 - March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the market model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event	Bad news				Good news			
day	Obs.	AR_t	CAR_t	S.D.	Obs.	AR_t	CAR_t	S.D.
-7	77	-0.0657	-0.0657	2.9823	73	0.2769	0.2769	3.1457
-6	81	-0.6305	-0.6962*	3.9651	74	0.1046	0.3815	3.7378
-5	83	0.0799	-0.6163	4.4217	75	0.1624	0.5439	4.1611
-4	87	0.4564	-0.1599	5.0039	75	0.0978	0.6417*	4.2947
-3	89	0.0788	-0.0811	5.7173	77	-0.1603	0.4814	4.7152
-2	90	-0.1318	-0.2129	6.2359	77	-0.0515	0.4299	4.5972
-1	91	0.0754	-0.1375	7.2008	77	0.4114	0.8413*	4.8823
0	91	-0.5099	-0.6474	8.0238	77	0.5582	1.3995**	5.6966
1	93	-0.4764	-1.1238	8.8459	77	0.1065	1.506**	6.4049
2	93	-0.0715	-1.1953	9.3456	77	0.0875	1.5935**	6.9445
3	93	-0.6694	-1.8647**	10.3088	77	-0.0303	1.5632**	7.8098
4	93	-0.1513	-2.016**	10.8369	77	-0.1984	1.3648*	8.0745
5	93	-0.1069	-2.1229**	11.3257	77	-0.016	1.3488*	8.2847
6	93	-0.2303	-2.3532**	11.9735	77	0.358	1.7068*	9.0442
7	93	0.0849	-2.2683**	12.9947	77	-0.2967	1.4101	9.7787

Table A3: Abnormal trading: Small market capitalization companies

This table reports abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the smallest 20% of companies on the NZX All index, based on market capitalisation, during the period January 1998 - March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the market model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event	Bad news				Good news			
day	Obs.	AR_t	CAR_t	S.D.	Obs.	AR_t	CAR_t	S.D.
-7	74	0.1063	0.1063	3.2683	69	0.2485	0.2485	3.2282
-6	77	-0.3246	-0.2184	4.3608	72	-0.1155	0.1330	3.5794
-5	78	0.2005	-0.0179	4.9080	73	0.0688	0.2018	4.2963
-4	82	0.2622	0.2443	5.4300	73	0.3261	0.5279	4.3460
-3	85	-0.0136	0.2307	6.2369	75	-0.0819	0.4460	4.6777
-2	86	-0.2052	0.0256	6.7289	75	0.0153	0.4613	4.6333
-1	87	-0.3088	-0.2833	7.4641	75	0.2948	0.7561*	4.9130
0	87	-0.1611	-0.4444	8.4566	75	0.5201	1.2762**	5.9701
+1	88	-0.2872	-0.7316	8.9124	75	0.3188	1.5950**	6.5600
+2	88	-0.0853	-0.8169	9.4244	75	0.0686	1.6636**	7.1179
+3	88	-1.0442	-1.8611*	10.4613	75	-0.0827	1.5809**	7.9043
+4	88	-0.2928	-2.1539**	11.1345	75	-0.1102	1.4707*	8.1225
+5	88	-0.0794	-2.2332**	11.5182	75	0.1506	1.6213**	8.4018
+6	88	-0.0578	-2.2910**	12.2636	75	0.4295	2.0507**	9.1888
+7	88	-0.1798	-2.4708**	13.1963	75	-0.1062	1.9445**	9.8229

Table A4: Abnormal trading: Large market capitalization companies

This table reports abnormal (AR) and cumulative abnormal returns (CAR) for the period beginning 7 days before the announcement and ending 7 days after for the largest 20% of companies on the NZX All index, based on market capitalisation, during the period January 1998 - March 2014. The announcements are categorised into "good news" and "bad news", based on the change in their announced earnings per share from their last announcement, adjusted for the market average change. Event day is days relative to the announcement. Obs. is the number of observations for each day. AR_t is the sample average abnormal return for day t calculated using the market model. CAR_t is the sample average cumulative abnormal return from event day -7 to t. S.D. is the standard deviation of the CAR_t. *, ** and *** denote significance at 10%, 5% and 1% level respectively.

Event day	Bad news				Good news			
	Obs.	AR_t	CAR_t	S.D.	Obs.	AR_t	CAR_t	S.D.
-7	81	0.0325	0.0325	1.3382	112	-0.0220	-0.0220	1.3833
-6	84	0.1741	0.2066	2.1760	115	0.0215	-0.0005	2.1077
-5	86	-0.0427	0.1639	2.0266	117	0.2183	0.2178	2.1643
-4	88	-0.0268	0.1371	2.2484	117	-0.0104	0.2074	2.2536
-3	88	0.1442	0.2813	2.4495	117	0.0636	0.2710	2.3516
-2	88	-0.1561	0.1252	2.5530	117	0.0418	0.3127*	2.5266
-1	88	0.0301	0.1553	2.6011	117	0.2405	0.5533**	2.8848
0	88	0.0188	0.1741	3.2088	117	0.3686	0.9219***	3.8780
+1	88	0.2828	0.4569	3.5248	117	0.0378	0.9597**	4.7226
+2	88	-0.0449	0.4120	3.7454	117	0.0400	0.9998**	4.8453
+3	88	-0.1062	0.3058	3.9021	117	0.1644	1.1641***	4.6912
+4	88	-0.0460	0.2598	3.9967	117	-0.0715	1.0927***	4.7258
+5	88	0.0343	0.2941	4.1718	117	-0.1158	0.9769**	4.7619
+6	88	0.0939	0.3880	4.3415	117	0.0536	1.0305**	4.7712
+7	88	-0.0891	0.2989	4.5444	117	0.1459	1.1765***	5.1627