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**The Efficacy and Microstructure  
Effects of Insider Trading Regulations**

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## **Abstract**

The competition for external capital amongst small and developing financial markets has resulted in a growing awareness of the importance of investor protection laws if markets are to be competitive. One particularly important aspect of such laws is the need to control the behaviour of insiders. Insider trading, widely perceived as trading by investors who have an unfair advantage by virtue of access to confidential information, represents a significant threat to market confidence and investors' willingness to invest in the market. For small markets therefore, not controlling such behaviour represents a significant cost in terms of the development of the market and the economy as a whole. However, while insider trading can do significant harm to the market, it also has the potential to be beneficial to the market as a signal of incorrectly priced information. The question becomes therefore how best to balance the advantages and disadvantages of insider trading. Most markets have relied on regulations to control insiders, however, little research has been done to establish if this is effective.

This thesis seeks to provide additional evidence with respect to the role of regulation in controlling insider trading. The issue is explored within the context of the New Zealand market where recent legislation, the Securities Market Amendment Act 2002, offers a prime opportunity to seek further understanding on the issue. In particular, four studies focussed on the role of regulation with respect to insider trading are undertaken within this thesis. In the first the impact of the law change on the profitability and informational base of insiders is examined. A significant decline in profitability is observed in addition to evidence of a change in the informational basis of insiders' trades from knowledge of upcoming announcements to short-term market mispricing. The impact of the new law on four aspects of the market is then examined. A significant increase in liquidity is found following the introduction of the new law, as well as significant reductions in the cost of equity, bid-ask spread and return volatility. The law therefore appears to have improved these aspects of the market. The bid-ask spreads were then examined in more depth by observing the impact of the laws on the cost of informed trading. Strong evidence of a decline in the cost of informed trading was observed, along with significant decreases in the proportion of the spread composed of information asymmetry costs. The declines were largest for those firms most prone to insider trading.



Lastly, the elements of an effective insider trading regime were investigated by examining the impact of various legal variables on the cost of informed trading and the total spread. The results indicated that stronger laws have resulted in lower spreads and less informed trading costs, and that effective regimes should prevent insiders passing on their information, should rely on financial penalties over criminal sanctions, and should be both enforceable and policed by a strong public regulator. Overall this thesis finds strong evidence that insider trading laws can be effective in controlling the behaviour of insiders, and that well drafted statutory regulations can be of significant benefit to the market.

# Chapter 1

## Introduction

Capital markets are of vital importance to the development of a country's economy. Financial markets open up access to external funds, allowing firms to invest in more projects, increasing their wealth and increasing the growth of a country's economy as a whole. The markets are also an important and effective way of allocating scarce resources (Wurgler, 2000). However, these functions are only possible where the markets are able to operate efficiently. In this respect a growing body of literature has attempted to look at ways in which the development of financial markets can be improved or hindered (La Porta et al., 1997, 1998, 2002, 2005; Chen et al., 2005; Hail and Leuz, 2006; Daouk et al., 2006). For regulators and legislators, the increased focus on the institutional, regulatory and governance setting within a country needs to be both acknowledged and addressed. As investors have increasing access to a multitude of investment opportunities in a variety of markets, it is vital that countries make investing in their markets as appealing to local and international investors as possible. This means providing markets where investors can feel assured that they are not at a risk of expropriation by unsavoury practices.

Insider trading is a prime example of behaviour that potentially hinders the development of capital markets. Insiders have an informational advantage over other investors, gained as a result of a fiduciary relationship with the issuing company<sup>1</sup>. Access to unpublished information allows insiders to earn excess returns when they trade their companies' shares. Unfortunately, while insiders win, it is outside investors who are perceived, accurately or inaccurately, to lose. Regardless of whether the loss is unavoidable, the perception of playing in a 'rigged' game contributes to a loss of confidence in the market as a whole resulting in investors either limiting their investment in the market or withdrawing completely (Ausbel, 1990), and seeking investments with a low risk of expropriation (Bernhardt et al., 1995). Therefore,

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<sup>1</sup> A great deal of literature examining insider profitability has established that insiders earn significant abnormal returns regardless of sample period and country. For example, US (Jaffe, 1974a; Finnerty 1976; Seyhun, 1986, 1998; Rozeff and Zaman, 1988; Lakonishok and Lee, 2001), Canada (Baesel and Stein, 1979), Spain (Del Brio et al., 2002), New Zealand (Etebari, et al., 2004) and the U.K. (Pope et al., 1990, Friederich et al., 2002). Counter-evidence is largely restricted to Eckbo and Smith (1998) for the Norwegian market, although this is likely a result of methodological differences.

markets which allow or do not effectively regulate insider trading will find themselves at a distinct disadvantage compared to better regulated markets.

While the evidence regarding insiders' impact on the market has generally reinforced the need to prevent or at least limit insider trading (reduced investor confidence and liquidity (Ausbel, 1990) and increased costs of capital (Bhattacharya and Dauok, 2002) and bid-ask spreads (Chung and Chareonwong 1998)), little work has been done examining the impact of the primary method used to accomplish this, regulations. What evidence does exist presents a mixed picture. Jaffe (1974) and Seyhun (1992) both found that changes, they argued, strengthened the laws resulted in no significant decline in profitability and even increased both the volume and profits in the case of Seyhun (1992). Further, Bris (2005) found that enforcement of insider trading laws actually increased the incidence and profitability of insider trading. Banerjee and Eckard (2001) argue that even illegal insider trading has been largely unaffected, despite decades of regulation and numerous 'improvements' to insider trading laws. They found that contemporary pre-takeover announcement price run-up patterns are similar to those at the turn of the 20<sup>th</sup> century, suggesting that the profits from insider dealing have not been altered. Durnev and Nain (2004) even found that insider trading regulations actually increased earnings opacity, suggesting controlling shareholders simply find other ways to expropriate wealth.

In contrast, Garfinkel (1997) found a change in insiders' trading behaviour after regulation change in the US made insider trading more costly, specifically insiders stopped trading before corporate announcements. Beny (2005) showed that stronger laws are associated with greater liquidity, less ownership concentration and greater price accuracy, while Bushman et al. (2005) found analyst following increased after the first enforcement of insider trading laws. They argued that the enforcement has reduced insider trading, and therefore encouraged greater private information collection. Bhattacharya and Daouk (2002) also showed that the first enforcement is associated with a reduction in the country cost of capital, although in a follow up paper (Bhattacharya and Daouk, 2005) they also demonstrated that unless the laws are enforced the cost of capital in countries with laws is higher than those without. This is likely to be of concern to many developing markets that have enacted laws against insider trading but for various reasons have not enforced them, and therefore are likely to have been harmed as a result.

Given the mixed evidence about regulating insider trading, it is vital that further examination of the role and impact of these laws is conducted. Countries have based the

decision to regulate on the best available information to date, but without a full understanding of the potential ramifications of regulating insider trading it is all too easy to contemplate situations where misguided or poorly structured laws do more harm than good. New Zealand offers a prime opportunity to examine the role of regulation due to a recent change in the laws that occurred in 2002. Commentators have noted that the previous regime in New Zealand was widely regarded as weak and ineffective (Fitzsimons, 1994,1995; O'Sullivan, 2000), however, changes proposed in the Securities Amendment Act 2002 have gone a long way to raising the New Zealand law to a standard commensurate with other developed markets. The change in rules therefore offers a good opportunity to contrast the impact on the market of weak, bordering on non-existent, legislation with what is perceived to be far more effective rules.

This thesis strives to make four major contributions to the literature as it stands. First, the experiences of another market are added to the literature. Most single market studies have focussed on the US markets, which are very different from most markets likely to be affected by insider trading. New Zealand by contrast is a small and illiquid market, these being characteristics it shares with many of the developing and emerging markets. Evidence from a similar market will therefore be of value for policy makers in the markets for whom insider trading is the greatest threat. Second, the impact of regulations on aspects of the market not previously covered is examined, namely bid-ask spreads, return volatility, the cost of informed trading and the informational basis of insider trading. Third, the effect of the enforceability of the rules on the market is investigated. Bhattacharya and Daouk (2005) highlight how the cost of capital can increase if laws are not enforced. Thus, New Zealand offers a good opportunity to look at the effect of strengthening laws on a number of aspects. This should be of particular interest to a number of other markets where the laws have not been enforced due to either structural weaknesses (as in New Zealand) or lack of political will. Finally, evidence is provided on the structure of insider trading laws that are most effective in limiting the harm from insiders, as proxied by the cost of informed trading. To date enacting laws to control insiders has been somewhat haphazard with little guidance from the literature as to what is and is not important for an effective regime. This has led to several disastrous situations around the world including New Zealand's private enforcement and the Netherlands' criminal only regime, both of which failed to effectively address the problem. This thesis sought to address the issue of what constitutes good insider trading rules.

## 1.1 Outline

The thesis consists of seven chapters. Chapter 2 provides a summary of the debate on regulating insider trading and details on the basis and development of the laws in New Zealand. The question of why the previous regime failed and the effect of recent changes is also examined.

Chapter 3 explored the impact of the new rules on the profitability and informational basis of insider trades. While the rules state that insiders may not use material information, and under an effective regime insiders would be forced to hide the details of trades using such information, it appears that little or no effort was made in the past to check and enforce the information that insiders used to make trading decisions once the details were disclosed. Further, as the regulations are designed to encourage insiders to trade only in situations when it is least harmful to the market, effective laws should prevent insiders trading on material information and encourage insiders to trade when the market price has deviated from the fundamental value. This is examined by matching disclosed trades with the first announcement within 80 days of the trade. The Fama and French (1992) three factor model was employed to calculate abnormal returns. The results showed that the law change had reduced the profitability of insider trading and altered the informational basis of the trades. Under the old regime insiders were more likely to trade prior to news in the right direction, that is buy before good news and sell before bad news, and insiders profitability was driven by these trades. After the change, however, a reduction in the percentage of trades before news in the right direction was observed. Instead insiders earn their profits by trading on knowledge of market mispricing. The laws therefore appear to have been successful in restraining illegal behaviour by insiders.

Chapter 4 examined the effect that regulatory change had on the level of various aspects of the market including bid-ask spreads, cost of equity, liquidity and volatility. One of the key and increasingly important reasons for regulating insider trading is the harm it does to numerous aspects of the market which has the effect of making the market less efficient. Four factors that have been theoretically linked to insider trading were examined to see if the improved enforcement and disclosure regimes of the new laws had improved the efficiency of the market. In particular, the impact of the rule change on closing daily bid-ask spread, dividend yield (as a proxy for cost of equity), liquidity and return volatility was explored. Significant decreases in bid-ask spreads,

dividend yield and return volatility and significant increases in liquidity were observed. These changes all occurred almost immediately following the introduction of the new legislation.

Chapter 5 analyses in more detail the impact on bid-ask spreads to see whether the law changes resulted in a reduction in the cost of information asymmetry, a proxy for the level of informed (and by extension insider) trading in the market. One of the key cost components of the spread is the cost of information asymmetry or the cost of trading against a better informed trader, a group that includes insiders. If the laws are effective then the increased cost of insider trading should reduce the incidence, and the cost of informed trading. This question was addressed by employing the Madhavan, Richardson and Roomans (1997) bid-ask spread decomposition model. Evidence consistent with the hypothesis that the new laws reduced the cost of informed trading was observed. The cost of information asymmetry was significantly lower following the introduction of the new laws, in addition to a significant reduction in the average proportion of information asymmetry costs in the total spread. Further, consistent with the view that the new rules should affect those companies with greater information asymmetry most, the reductions were largest in illiquid companies and those with the highest level of information asymmetry. Finally, the results also indicated that the proportion of price volatility made up of information asymmetry had been reduced as well as the total volatility. In all, the evidence supports the belief that the incidence and/or harm from information asymmetry is reduced by the introduction of tighter insider trading laws.

Chapter 6 then conducts a cross-country examination of 18 markets to find aspects of the laws that appear to be most effective in reducing the cost of information asymmetry. It is of some concern that while the changes in the New Zealand regulatory system have been effective, that they were largely made without the benefit of empirical evidence on the features of an effective regime. This thesis attempted to provide some guidance of the most effective elements of an insider trading regime for reducing the cost of informed trading. This was achieved by looking at the cost of information asymmetry as a proportion of the spread along with two additional measures, the percentage spread and the percentage effective spread, for a sample of companies from 18 countries and comparing them to various quantifiable aspects of the insider trading regime in those respective countries. In particular the impact of the scope of the laws, the sanctions that may be imposed and the impact of past and potential enforcement was explored. The results showed that an effective regime should prevent insiders passing

confidential information to outsiders, rely primarily on financial damages and be enforced by a public watchdog rather than rely on private enforcement. Of particular interest was the finding that criminal sanctions were not effective in reducing the cost of informed trading or the total spread despite there prevalent use as the primary deterrent.

Chapter 7 provides a summary of the key findings and discusses the implications of the conclusions.

## **Chapter 2**

### **Literature Review**

Insider trading is a term used to cover a wide variety of trading activities, both legal and illegal, by those who have either an actual or a construed relationship with a publicly listed company. Trading by someone with access to non-public price sensitive information on an issuing company, either by working for the firm or by contact with someone who does is illegal in most countries. Provided an insiders' trading is disclosed to the market, and is not classed as inside information, an insider can trade freely. Most research focuses on so called corporate insiders – such as directors, executives and large block holders- who by virtue of their employment or monitoring role within the firm have in-depth knowledge of the company's prospects. Research on these individuals shows that access to information, both in relation to their specific knowledge of upcoming announcements (illegal information) and their generally superior pricing ability (legal basis for trading), gives them the ability to obtain abnormal returns from those against whom they trade (as evidenced by the literature on insider profitability mentioned earlier). However, while some trading by insiders is legal, insider dealing or illegal insider trading is what most associate with the term. As a result insider trading is widely viewed with distaste and has been argued as doing much to undermine the development of financial markets. However, while it is widely viewed as dishonest and unfair, the merits of completely prohibiting insider trading have been hotly contested for the past half century. Despite numerous contributions from both law and finance academics, the literature reflects a standoff with reasonable arguments both for and against insider trading.

#### **2.1 Debate on Insider Trading**

##### *2.1.1 The Case for Insider Trading*

Manne (1966) is largely responsible for sparking off the debate on insider trading. He argues that insider trading is not only beneficial, but vital, for the development of financial markets based on two arguments. First, insider trading



improves price accuracy, and second, insider trading is the best way to compensate managers. These assertions have been challenged and counter-arguments for prohibiting insiders from trading have been developed as a result.

### *Price Accuracy*

Price accuracy is widely accepted as being an important component in developing effective capital markets. More accurate pricing of securities allows the market to more effectively evaluate the prospects of companies and so improves allocation decisions by the economy (Fishman and Hagerty, 1992; Khanna and Slezak, 1994). Bainbridge (2000) also points out that price accuracy decreases share price volatility, which reduces individual windfall gains making the capital markets more attractive for risk-averse investors. Price accuracy is also important in monitoring managers as it allows prices to more accurately measure firm performance.

The goal of promoting price accuracy is viewed as secondary when considering firms' need to withhold material information from the market to function effectively. Developing new products, evaluating new projects and acquisitions are all functions of a company that require the company to be able to delay informing the market until they are ready. However, it is also vital information for the market to possess to allow it to accurately price the firm. What Manne (1966) argued is that insider trading can provide a bridge between the need for corporate secrecy and the markets' thirst for information. When an insider enters the market their presence is detected, and while the specific details of the information the insider is trading on remains undisclosed, the price impact of the information can be inferred based on the insider's trades. This allows the market to incorporate the price impact of the undisclosed information into the price and maintain accurate prices. In this fashion insider trading effectively acts as a substitute for public disclosure.

The price accuracy argument made by Manne (1966) has been attacked on several points; one line of attacks has questioned whether insider trading does in fact provide an effective process by which material information can be presented to the market. A number of studies have examined the price effects of insider trading to see whether insider trades are conveying information to the market with mixed results. Meulbroek (1992) examined the impact on daily prices of illegal insider trades that were detected and prosecuted by the SEC in the US. She concluded that the presence of insiders in the market resulted in price movements consistent with the market correcting for the insider's information. Cornell and Sirri (1992) and Chakravarty and McConnell

(1997), using datasets of illegal insider transactions also found similar evidence of price movements consistent with price correction. However, Chakravarty and McConnell (1999) recanted their early positive evidence by comparing the market's price reaction to informed and uninformed trading, and found no significant difference. Further they showed that the earlier positive findings in Meulbroek and Cornell and Sirri are also dependent on the methodology employed.

More concerning is the finding of Chung and Charoenwong (1998) who argued that insider's trading cannot be observed accurately by the market based on the reactions of bid-ask spreads on days with insider trading. Chang and Suk (1998) show that, even after trades are disclosed to the market, secondary disclosures in the Wall Street Journal result in price adjustments. This adds further evidence to the argument that the process by which insider trading informs the market of the price effect of information is slow, sporadic and inefficient, calling into question the price accuracy basis for allowing insider trading (Bainbridge, 2000).

The other major critique of Manne's (1966) price accuracy argument came from those who question whether the net effect of insider trading would be positive. Brudney (1979) and Easterbrook (1981) both pointed out that allowing insider's to profit from private information may result in significant agency problems. In particular it may encourage insiders to delay disclosure of that information to the market via an announcement for as long as possible to preserve the possibility of trading profits. This argument gains support from evidence which suggests that insiders attempt to hide their presence by splitting up trades to preserve their informational advantage for as long as possible (Kraakman, 1991). Further, Fishman and Hagerty (1992) suggested that the presence of insiders may discourage private information gathering activities from outsiders, such as analysts. Bushman et al. (2005) examined the relationship between insiders and analysts by studying analyst following for companies in 103 markets following the introduction and first enforcement of insider trading laws. They found that actions that limit insider trading (enactment for developed markets and enforcement for developing and emerging markets) resulted in increased analyst following, suggesting, information production is negatively affected by insiders. Gilbert et al., (2006) show that this relationship also holds at the firm level based on actual levels of disclosed insider trading within the firm. Despite the criticisms for the basis of insider trading, it is widely accepted that insider trading does improve price accuracy.

### *Efficient Compensation*

Manne (1966) contended that the strongest argument in favour of allowing insider trading was the idea that it represented the most efficient way of compensating managers. Manne (1966) and Carlton and Fischel (1983) argued that innovators are encouraged to produce valuable information only when they have the ability to share in the rewards, namely the firm's increase in value. Rather than attempt to renegotiate after the creation of valuable information, which is both extremely costly and difficult, allowing innovators to trade on their information which hasn't been released offers an alternative, cheaper form of compensation. Manne (1966) argued that contractual and bonus compensation is inadequate largely because it fails to accurately reflect the added value of the innovation to the firm. This means that the innovator will likely be under-rewarded for his contribution, and therefore less likely to innovate.

This line of reasoning has run into criticism for a number of reasons. Firstly, while it is arguably right to compensate the innovator, due to the nature of such information and the fact that it is often necessary for the information to be shared, it is virtually impossible to limit its use simply to those who created it (Bainbridge, 2000). In essence those who have contributed little to the increase in firm value can also benefit equally. As Ausbel (1990) noted, much of the modern insider trading activity is not being conducted by traditional corporate insiders but instead by market professionals involved with the company such as investment bankers. Preventing information-based trading by those not directly involved with its creation, the majority of those defined as insiders, would have little effect on information creation. The other concern raised by Bainbridge (2000) is that it is also difficult to limit insiders to simply profiting when they have produced valuable information. The availability of trading mechanisms that allow insiders to benefit from price declines, such as short selling and put options, undermine the disincentive component of risky compensation as insiders can benefit regardless of the performance of the firm. Ausbel (1990) further suggested that as insiders can profit from either good or bad news, there may even be an incentive for managers to intentionally perform poorly as bad news is easier to create.

Another concern regarding insider trading as a source of compensation is the incentives that it gives to insiders. Carlton and Fischel (1983) argued that insider trading as a portion of compensation will encourage high quality management as risky compensation tends to attract competent and less risk adverse managers. They even go so far as to suggest that the possibility of trading on bad news is justified as it may induce insiders to take on risky projects while still being compensated. Easterbrook

(1981) and Bebchuk and Fershtman (1994) both noted that while insider trading may reduce the problem of risk-adverse managers who turn down risky projects, there was no guarantee that the projects selected by managers will earn sufficient returns to compensate for the extra risk. As the insider's compensation is based on price movement, and they can profit from movements in either direction, insiders have an incentive to increase stock price volatility as much as possible but can be ambivalent towards the expected rewards for the project (Beny, 1999; Manove, 1989).

Finally, it has also been noted that contracts involving insider trading are difficult to enforce. While an agreement may be worked out between the insider and the company, difficulties in assessing the trading returns in advance make selecting the most cost-effective compensation package problematic (Easterbrook, 1981). Further, even where the agreement allows for a level of insider trading, it is easy for the insider to overstep these boundaries. Only careful monitoring therefore will allow the company to maintain the contracted levels of compensation, and given the possibility of an insider hiding their trading, it is possible for an insider to circumvent and expropriate unearned compensation (Kraakman, 1991).

Given the development of a variety of new techniques for compensating managers and the identification of a number of serious issues surrounding the use of insider trading as a compensation mechanism, Manne's (1966) argument that insider trading is an efficient form of compensation has been largely dismissed. As a result the only reason still used to justify a stance allowing any insider trading is the idea of price accuracy.

### *2.1.2 The Case against Insider Trading*

A number of arguments have been put forward for prohibiting insider trading. Reasons offered for rejecting insider trading revolve around several concepts, including the property rights of information and the impact this has on the actions of insiders, and arguments around the inequity of insider trading and the effect it has on the markets. Both arguments appear to have found some favour, property rights for the legal justification it gives for prohibiting insider trading and unfairness arguments as an explanation for why it may not promote market efficiency.

#### *Property Rights*

The property rights argument has largely resulted from the rationale used in US cases to justify federal prosecution of insider trading (Bainbridge, 2000). This is based on the belief that the property right created to undisclosed information should be invested in the company. This opens up two causes of action against insiders, a breach of a fiduciary duty to the company itself and an argument for misappropriation. Bainbridge (2000) argued that the property rights argument had a great deal of appeal as the concept of creating and investing a property right to the company is both relatively straight forward and has precedents in other areas of law. Property rights in intangibles like information are a well established principle in areas of law such as patent and copyright. The creation of such a right is justified on the basis that property rights should be given where there is significant risk of the creator of valuable information being denied the opportunity to benefit from their efforts (Bainbridge, 2000). Bainbridge (2000) argued that there is a possibility that premature disclosure of information, or alerting of the market to valuable opportunities for a firm before the firm is in a position to exploit them, can reduce the value of any information created. The investment of the property right with insiders may even have an effect on firm plans such as the timing of revenues, depreciation or dividend payments in an attempt to offer profitable situations for insiders (Brudney, 1979), again affecting the value of information to the company. Bainbridge (2000) also argued that the mere possibility, however remote, of a reduction in value to the creating company is enough to warrant investing the property rights with them as opposed to outsiders.

The view that the company should possess any property rights to information created by the firm has found favour with the USA courts and opens up two legal justifications for prosecuting insiders. The first of these is the breach of a fiduciary duty owed by the insider to the company which the US Supreme Court in *Chiarella v United States* deemed to be necessary for rule 10b-5, the section of the law in the US that prohibits insider trading, to be breached. In particular the courts have ruled that the insider must have a duty to refrain from trading based on confidential information. It was stated by the court in *Chiarella* that three situations give rise to such a fiduciary duty; (1) where the insider is an employee of the company such as a director or executive, (2) where the insider is not an employee but works in a capacity which lends an obligation to the shareholders such as investment bankers or lawyers working for the firm, and (3) where the insider receives information from someone who breached a duty in giving them that information, that is a tippee of a corporate insider. These situations

effectively cover most occasions in which a person will receive material information, and therefore present little problem to establishing a fiduciary duty.

The concept of misappropriation offers an alternative in the situation where there is no direct fiduciary duty between the trader and the company producing the information. The US Supreme Court in *U.S v O'Hagan*, and earlier in the dissenting opinion in *Chiarella v U.S.*, ruled that an individual can breach the necessary duty when they misappropriate the source of the information. For instance, where an individual works in a firm with a duty to the issuing company and receives information as a result of that employment, they may be held to have breached their duty to their employers. That breach was deemed to be sufficient in *O'Hagan* to constitute the breach of fiduciary duty required for a prosecution.

### *Unfairness*

The other major argument against insider trading is the concept that insider trading is fundamentally unfair and the harm caused to the investor damages the market as a whole. The outside investor is principally harmed by the insider being able to sell or buy at the most advantageous times as a result of their superior knowledge, ensuring that the outsider is at a disadvantage. This is not without its detractors. Manne (1966) and Carlton and Fischel (1983) both disputed the basic assumption that outsiders are actually harmed by the actions of insiders. As they pointed out, the other party to the trade was a willing participant having come to the market to trade because they believed, based on their assessment of the company, that it was either under or over-valued. Had there not been a better informed party in the market, and it is mere bad luck that they traded against such a party, the trade would still have been conducted at the same price. Bainbridge (1995) went so far as to suggest that the perception that outsiders are harmed is merely envy on the part of those harmed rather than an actual economic harm. This argument does have some appeal but is flawed due to the nature of the information. It is information that is unavailable to anyone except someone associated with the firm, and therefore regardless of the efforts of the outsider is an information gap they cannot bridge, unlike other informed parties such as analysts.

Bainbridge (2000) and Macey (1991) both offered some anecdotal evidence to suggest that the predicted effects on the market have not occurred. Bainbridge (2000) noted that despite major scandals of the mid-1980's, the performance on the US markets since had been excellent. He argued that it is hard to accept that investor confidence had been diminished when, in spite of new evidence that insider trading is prevalent, the

market has performed so well. Likewise, Macey (1991) argued that the depth and health of the stock markets of Japan, Hong Kong and India where insider trading had either only just been regulated or insider trading regulations had been repealed implies investor confidence is not overly harmed by insider trading.

More robust evidence however, suggests that the market is harmed from reduced investor confidence. Ausbel (1990) modelled the effects of insider trading on outside investor's confidence in the market and concluded that when investors feel that they will be taken advantage of they reduce their investment in that market. This results in a decrease in the liquidity of the market. Bernhardt et al. (1995) likewise theorised that investors will be attracted to investments where there is a lower chance of being exploited. While measuring investor confidence directly has so far proven difficult, Beny (2005) concluded that liquidity is lower in markets with weaker insider trading laws, in line with the predictions of Ausbel (1990) and Bernhardt et al. (1995). Further, weaker regimes are also associated with reduced price accuracy and more concentrated share ownership (Beny, 2005), lower analyst following (Bushman et al., 2005) and higher costs of capital (Bhattacharya and Daouk, 2002). Copeland and Galai (1988), Glosten and Milgrom (1985) and Kyle (1985) also argued that insider trading adds to the transaction costs within a market, an outcome that inherently made the markets less efficient.

Regardless of the issue of whether the profits earned by insiders represent an actual harm to the other party to the trade, both theoretically and empirically there is a strong acceptance that insider trading undermines confidence in the market. At its most basic level insider trading does represent an inherently unfair advantage. Prior evidence also suggests that insider trading is related to a number of factors that affect the development and efficacy of the market as a whole, such as the liquidity and cost of capital of the market (Beny, 2005; Bhattacharya and Daouk, 2002). Whether this is an acknowledgement of the risk associated by trading in a market with more prevalent insider trading or a result of insiders' actions undermining the market is an open question. The net effect however remains the same, the market is made less efficient and its development is retarded. This suggests a strong reason for prohibiting the actions of insiders.

The debate appears to have stalled as both those advocating for and against insider trading have valid arguments backing their position. However, regulation covering insider trading has become far more frequent. Prior to the mid 1980's relatively few countries had regulations covering insiders, but since that time the

absence of such laws has become the exception. Bhattacharya and Daouk (2002) noted that by 1998 87 countries had laws including all the world's developed markets, in contrast to just 34 before 1990. Whether these laws are correctly aligned and, indeed, whether the various arguments for and against insider trading are valid are empirical questions (Carlton and Fischel, 1983). However, empirical answers have been slow in coming. Only with further empirical study of the various impacts of insider trading, both positive and negative will the debate regarding the deregulation or total prohibition of insider trading be concluded.

## **2.2 New Zealand Insider Trading Laws**

### *2.2.1 Securities Market Act 1988*

Legislation to specifically cover insider trading was introduced in the late 1980's at a time when globally insider trading started to become considered a serious concern. In particular the New Zealand government of the day was concerned about the conduct of traders on the securities market following market deregulation in the mid-1980's (Fitzsimons, 1995). The prohibition on insider trading was however only one part of the reforms proposed, which also included regulation covering takeovers (only implemented in 2001), disclosure rules and dealings on the futures market. Insider trading was addressed in Part 1 of the then Securities Amendment Act 1988 (later renamed and referred hereafter as the Securities Market Act 1988 ("SMA")). The law itself and the report of the Securities Commission (a market supervisory body which is also responsible for law reform proposals) in 1987 both showed that the regime in New Zealand was very heavily influenced by the state of the debate on insider trading. Cox (1990) for instance argued that the fact that the pecuniary penalties are only available to the issuer demonstrated that the property rights argument was the most heavily persuasive. Although the unfairness arguments were recognised in the other party's right to sue. This can be seen in both the priorities and exceptions contained within the Act itself.

The coverage and definitions of insiders and insider dealing (illegal insider trading as opposed to legal and disclosed insider trades) are similar to those implemented in the US (Cox, 1990). The elements determining whether an insiders transaction constitutes insider dealing are provided in s7(1) of the SMA as:



An insider of a public issuer who has inside information about the public issuer and who—

- (a) Buys securities of the public issuer from any person; or
- (b) Sells securities of the public issuer to any person—

An insider is defined as a principle officer (director), employee of the company, or substantial shareholder (shareholder who holds at least 5% of the voting stock of the company), or any person who receives information from them (s3 SMA). The passing of confidential information to an outsider confers upon them the same status as an insider with the same liabilities and prohibitions (s3).

The definition of inside information is contained in s2 of the SMA and requires that (a) the information not be publicly available and (b) information that is likely to materially affect the price of the share. The law therefore does not prohibit all insider trading. The report by the Securities Commission (1987) argues that managerial share ownership is “unquestionably positive” but that insiders must be considered to have inside information and therefore be prohibited from trading for “short term considerations”. In essence this provision supports both the arguments for and against insider trading by prohibiting the most unfair aspects of insider trading, trading on information unavailable to the market as a whole, while allowing them to trade when they believe, based on information that falls outside the definition of inside information, that the share price has deviated from the fundamental value. Given the acknowledged superiority of insiders in profiting even when they do not use knowledge of specific upcoming announcements (Givoly and Palman, 1985), insider trading does still offer a feasible method of signalling market mispricing. The law in New Zealand, and in many countries, does seem to recognise the role of insiders in improving price accuracy and also the merits of encouraging managerial share ownership, in spite of the arguments that insiders do the opposite, while limiting the worst excesses and most unfair aspects of insider trading.

The law in New Zealand also recognises the relative strengths of the various arguments against insider trading in determining who insiders shall be liable to. S7(2) makes insiders liable to two parties for their trading, the issuing company (c) and the other party to the trade (a and b). While both groups can prosecute insiders, only the issuing company is permitted to seek pecuniary penalties, defined as three times the value of the gain or loss avoided or the total value of the securities, whichever is greater. This suggests that the primary justification for the laws in New Zealand is in fact the property rights arguments, with the unfairness of insider trading acknowledged

in the right to prosecute of the other party to the trade although they can only pursue compensation for the value of their personal loss.

What is noticeable about the situation in New Zealand is that unlike most other markets insider trading enforcement is the sole providence of private individuals, the firm or the other party to the trade, rather than a public enforcement agency. The justification given for this oddity at the time was the lack of a suitable body within which to invest the powers to prosecute and the cost of establishing such an organisation (Securities Commission, 1987; Cox, 1990). Given the relatively small size of the market it was felt that it was not justified to incur the large expense associated with setting up a supervisory body. The Securities Commission, the most likely candidate, had also indicated that it felt that its role was law reform and therefore would have a conflict of interest if also given the enforcement role (Fitzsimons, 1994). The result was a private enforcement system, although attempts were made to mitigate the most glaring weaknesses of such a system.

The primary problem of private enforcement for insider trading is the difficulty in first establishing that an insider has traded and second, that they have done so based on inside information. In the USA, establishing that an insider has traded is the providence of the Securities Exchange Commission and requires a significant input of both time and resources to detect (Securities Commission, 1987). Even where it was feasible for the allowed groups to establish that a case does exist without significant input from a public regulator, only the issuing company was really in a position to pursue such an action. The other party to the trade had an additional hurdle to surmount in prosecuting an insider, namely the requirement to prove they had traded against the insider (the difficulties of which are discussed in Gaynor, 1995).

There are other aspects of the New Zealand judicial system that work against the other party to the trade, the lack of contingency fees and the lack of class actions (Cox, 1990). Class actions allow a number of parties to pursue one case jointly, an obvious advantage in the case of insider trading where the insider is only liable for the amount of loss avoided or gain made. A class action would make the case economically viable by amalgamating enough causes of action to outweigh the high costs of lawyers and any potential award for costs. Contingency fees allow clients to only pay if a lawyer is successful. If the lawyer wins they take a fixed percentage of any award if they win. Without these features the other party to the trade can often face very significant legal fees regardless of an outcome and only seek the value of their specific loss.

The Securities Commission recognised the fact that the burden would have to be borne predominantly by the issuing company. However, both the Commission and commentators have pointed out that the issuing company has good reasons not to prosecute their own insiders including protecting their reputation and the fact that there exists a connection between the insider and the company which may sap their will (Fitzsimons, 1995). To combat this, and to recognise the relative inability of the other party to the trade to effectively enforce insider trading laws, the Commission proposed establishing a statutory derivative right. This right would allow a shareholder in the company or a former shareholder who held shares at the time of the trade to effectively force a company to prosecute an insider. The shareholder would be able to take over the company's right to sue and conduct the case at the company's expense. By the time the law was passed however the derivative process had been altered and arguably weakened due to the extra steps added that investors were required to go through (Fitzsimons, 1995).

The procedure implemented in the 1988 Act was a four stage process contained in s17 and s18 of the Act. S17 allows for a shareholder or former shareholder to petition the Securities Commission to appoint a barrister or solicitor to examine whether there was an arguable insider trading case present. The cost of the opinion is incurred by the company. Once the opinion has been obtained the company can then choose whether or not to initiate an action against an insider. In the case of a refusal the shareholders can petition the court for permission to take over the company's cause of action against the insider and prosecute them in the name and at the expense of the company. S18 also requires the court to approve such requests unless there is "no arguable case" or there is "a good reason" not to. The fact that the opinion of the lawyer was non-binding on the company and the requirement to request the permission of the Securities Commission for the appointment of a lawyer were both added during the Bill's hearing stages. This adds time and, in the case of the need to petition the court for permission to take over the case, significant cost.

The statutory derivative action procedure on paper appears to be a viable solution to ensuring that the company does prosecute insiders, therefore the private enforcement regime should have worked effectively. However, legal interpretations have since undermined the viability of the system. In particular, the Court of Appeal in *Colonial Mutual Life Assurance Society Ltd v Wilson Neill Ltd* ("Wilson Neill") took a very broad interpretation of the second exception contained in s18. It held that where a good reason existed the court could refuse permission for the shareholders to take over a

company's case. The Court concluded that giving a small number of shareholders the right to undertake extensive and complicated litigation at the company's expense with few checks or balances was concerning. The court ruled that the poor health of the company and the fact that the proceedings could damage the other shareholders, the majority in this case, were both good grounds to deny the s18 application. Such a broad interpretation of "a good reason" significantly reduced the chance of a successful application. This is compounded by a key problem with the s18 process which was highlighted in the only other notable attempt to use the statutory derivative process, in *Kincaid v Capital Markets Equities Ltd.* O'Sullivan (1995) reported the cost to Kincaid of pursuing a successful s18 application to the High Court, was in excess of \$200,000 in legal fees. Further, prior to the case being settled, Kincaid faced possible costs of in excess of \$500,000 had the case been appealed as far as the Privy Council. Had he lost his application and been subject to an order for costs, then the costs could have been significantly higher still. With the broad definition in *Wilson Neill*, the risk of costs would be a significant disincentive in addition to the already steep cost of pursuing a s18 order. In essence, while the process is intended to allow small investors to force the issuing company to prosecute an insider due to their larger financial resources, it is a process that was so expensive as to make it impossible for those it was intended to help (Mulholland, 1994).

In the Securities Commission's (1996) review of the insider trading laws in New Zealand, the Commission attempted to address some of the weaknesses exposed in the system. However, much of these efforts were undermined by the continued refusal of the Securities Commission to accept a regulatory role. The main outcome of the 1996 review was to exclude a s18 applicant from being liable for damages when applying to the courts for permission to take over the case. As shown by Kincaid however, the financial cost of pursuing such an application, even without costs, was too prohibitively expensive for it to be an effective measure.

### *2.2.2 The Securities Market Amendment Act 2002*

The Labour Government in 1999 argued that much of the weakness in the New Zealand Stock Exchange over the previous decade was the result of poor regulation and a lack of confidence in the market (Labour Party of New Zealand, 1999). As a result several changes were proposed including the introduction of the Takeovers Code, a piece of legislation that was drafted in the late 1980's but never enacted, and

improvements to the insider trading laws. These changes were to take place in two phases; the first was introduced in the Securities Market Amendment Act 2002 (“SMAA”) which looked to amend the SMA to fix the most glaring weaknesses in the system. The second is still working through the legislative system at present and is designed as a more fundamental review of the insider trading laws including the coverage of the laws and the possible introduction of criminal sanctions.

The Ministry of Economic Development’s (2002) discussion document, published prior to the enactment of the new law, stated that one symptom of the weakness of the previous system was the lack of enforcement over the regime’s 14 year period. The solution proposed was to allow the Securities Commission to take over the cause of action of an issuing company where they choose not to prosecute or where there are good grounds for the Commission to take over a case. This effectively introduces a public enforcement regime into New Zealand after the failed experiment with only private enforcement. The failure of private enforcement is of little surprise given that most private enforcements in the USA, where insider trading can be prosecuted by both the other party to the trade and the SEC, have piggy-backed on public prosecutions (Bainbridge, 2000). The result should be a system that is far more likely to result in insiders being prosecuted, which is supported anecdotally by the speed with which the Securities Commission has involved itself in such enforcement activities<sup>2</sup>.

The law reform also corrected another anomaly in the previous regime. Under the previous laws the timing of the disclosure of legal insider trades varied considerably depending on the class of corporate insider. However, rather than run a system that requires the fastest disclosure by those with the best information, the system only required timely disclosure by those with the least access to information, substantial shareholders (Etebari et al., 2004). Directors were only required to disclose the details of their trades in the printed copy of the annual report, resulting in a delay of nine to ten months on average (Etebari et al., 2004). Executives, who Seyhun (1998) argued have the best information, were not required to disclose at all. Given the finding by Chung and Charoenwong (1998) that the market is unable to detect insider trading without disclosure, the long delays reduce the informational benefits to the market from insider trading considerably. According to the model of Huddart, Hughes and Levine (2001)

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<sup>2</sup> The Securities Commission filed proceedings against several insiders in October 2004 in relation to trading in Tranz Rail Holdings. Although the case has yet to be decided and numerous questions remain, the willingness of the Securities Commission to use its new powers within a year of gaining them suggests the political will to enforce the laws now exists.

the lack of timely disclosure also makes insider trades more profitable both over time and on a per round basis. The findings of Etebari et al. (2004) supported this showing that the delay in disclosure in New Zealand between directors and large blockholders allowed directors to earn significantly larger abnormal returns. It also supports the perception that the laws were ineffective in minimising the harm from insider trading. Under the SMAA all corporate insiders, directors, executives and substantial shareholders, are required to disclose the details of their trades within five working days.

The result of the new laws should be a much improved enforcement regime with a significant increase in the cost of insider trading, while the disclosure regime improvements should improve the flow of information to the market. It should also make insiders more accountable for the information they trade on. Under the previous regime there is little evidence that companies policed the information being used for disclosed trades or that the timing of those trades was examined once they were disclosed for indications of trading on material information. In fact, the previous regime offered few disincentives to insiders at all. It is therefore likely that the rule changes will reduce illegal trading and force insiders to be more careful with regards to disclosed trades.

Whether this is the case or not however is an empirical question, the answer to which has the potential to be of assistance in determining public policy in a number of small and developing markets. To date however, the answers have been slow in coming. While greater focus has been given to the role of regulation recently, much work remains to be done with regard to the effects that regulations have on aspects of insiders' behaviour, insiders' impact on the market and the most effective ways of controlling insider trading. Perhaps most notable from the experience of New Zealand is the lack of available guidance in establishing insider trading laws. While the experiences of other countries were considered, little mention was made of the success or failure of those regimes. Clear guidance from the academic literature appears necessary, especially in light of the significant penalties for either inaction or ineffective actions as revealed by Bhattacharya and Daouk (2005).

The examination of the New Zealand system is started by investigating the impact that the SMAA has had on the profitability and informational basis of disclosed insider trading in New Zealand. As regulations distinguish between beneficial and harmful insider trading based on the information used by insiders, the next chapter

seeks to find out whether regulations can provide the necessary incentives to trade purely on good information, and what impact, if any, that has on their profitability.

## Chapter 3

# The Impact of Regulations on the Informational Basis of Insider Trading<sup>3</sup>

### 3.1 Introduction

Insider trading regulation in most countries appears to be designed around the principle of balancing the positives (improved informational efficiency, as in Manne, 1966; Kyle, 1985; Leland, 1992) against the negatives (reduced investor confidence and liquidity, as in Ausbel, 1990 and increased costs of capital, as in Bhattacharya and Dauok, 2002 and bid-ask spreads, as in Chung and Chareonwong 1998). The purpose being to limit trading in situations that appear unfair while retaining the usefulness of insider trading as a credible signalling mechanism of unpriced information. In effect the definition of prohibited information in the US, New Zealand, Australia and other countries, which requires the information to have a likely price impact, separates information into that which the market will react to, which insiders are prohibited from trading on, and that which requires a further signal to prompt a market reaction, such as an insiders trade.

The underlying basis of insider trading regulations in many countries also appears consistent with the two main sources of profits for insiders identified in the academic literature. These sources of profits for insiders are specific knowledge of undisclosed information and knowledge of market mispricing. Specific knowledge usually refers to access to information on events such as earnings announcements, dividend events and corporate control actions. These events will, when released to the market, result in a significant and relatively predictable price adjustment, allowing insiders to earn significant abnormal returns. Given the inefficiencies of insider trading as a signalling mechanism<sup>4</sup>, this is information that is deemed best released via a company announcement (Ausbel, 1990). However, despite the obvious illegality of trading on private price sensitive information in most markets, it has been observed in a number of studies of disclosed insider trades in the United States (Karpoff and Lee,

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<sup>3</sup> This chapter is based on Gilbert, A. and Tourani-Rad, A. (2006). The Impact of Regulations on the Informational Basis of Insider Trading. Enterprise and Innovation Research Paper Series Faculty of Business, Auckland University of Technology.

<sup>4</sup> Bainbridge (2000) refers to the process as slow, sporadic and inefficient due to questions about the ability of the market to observe insider signals and further evidence indicates that when the market does react it tends to under-react to the signals sent (Lakonishok and Lee, 2001).



1991; Lee et al., 1992; Lamba and Khan, 1999; Elliot et al., 1984; Seyhun and Bradley, 1997). The observation of questionable trades being disclosed publicly raises questions regarding the effectiveness of regulations in controlling informational basis of insider trades.

Trading on the basis of market mispricing by contrast appears to have been implicitly encouraged by regulators. The literature on signalling theory tells that under- or overvaluation of a company's shares cannot be simply disclosed, but rather requires a credible signal to reinforce the information. Insider trading is one such mechanism as details of such transactions are well followed by the market (Lakonishok and Lee, 2001). The ability to identify and profit from even transitory mispricing has been identified in studies such as Seyhun (1992), Lakonishok and Lee (2001) and Freiderich et al. (2001). Piotroski and Roulstone (2004) show that trading on misvaluation outweighs trading on specific knowledge, in their study they were examining trading on knowledge of long-run future earnings performance. Therefore, while it is an inefficient system of signalling, insider trading offers the market the insiders' evaluation of the firm's (true) value and allows mispriced but available information to be priced into the market value. In this case insiders act in a very similar fashion to analysts who also attempt to find and exploit inaccurately priced information (Fishman and Hagerty, 1992; Khanna and Slezak, 1994) albeit specialising on firm specific factors.

The question becomes whether regulations can be effective in limiting the information that insiders use to trade upon. As argued by Ausbel (1990), and appears to be supported by regulators, specific information is better disclosed by the company. The implication being that temporary mispricing due to prices not reflecting all unreleased information is of less concern than insiders exploiting this information. In many respects this is understandable given that the use of material information is what most outsiders are concerned about in relation to insider trading with all the connotations of inequity and unfairness that go with that view. Intuitively, this information should also be the most valuable and certain basis for an insider's trade, and therefore would be the most damaging for outside investors. Mispricing by contrast affords insiders less certain returns as it requires the mispricing to be recognised. Lakonishok and Lee (2001) find that the market under-reacts to the disclosure of insider trading, which confirms the finding of Chang and Suk (1998) who show that secondary dissemination of already disclosed trades result in price reactions. It is therefore of little surprise that, where insiders are able, they would prefer to trade on specific knowledge despite its illegality, particularly where the disincentives are insufficient to act as a credible deterrent.

The literature provides a mixed picture on the effect of insider trading regulations on the actions of insiders. Jaffe (1974) found that significant court rulings which broadened the reach of insider trading laws resulted in no change in insider trading profits, despite arguably increasing the cost of insider trading. In the same vein Seyhun (1992) found that a significant increase in the enforcement activities of the SEC coupled with sweeping changes to insider trading laws in the 1980's resulted in a doubling of insider's profits and a quadrupling of their volume. The findings of Jaffe (1974) and Seyhun (1992) are therefore inconsistent with the view that improvements in the regulatory regime hinder the activity of insiders. By contrast, Garfinkel (1997) observed a change in the timing of insider trades following the introduction of a strict new law in the US. Specifically, he found insiders switched from trading before and in the direction of an upcoming announcement to trading after and away from the direction of news. He argued insiders went from trading on knowledge of the upcoming announcement to trading on long-run information and waiting for the most profitable time to exploit their informational advantage.

This study will explore the regulatory experiences of New Zealand to help address the issue of whether regulations can be effective in limiting the profitability of insiders and controlling the information they trade on. Specifically, the enactment of the Securities Market Amendment Act 2002 (SMAA) in New Zealand, which was introduced to tighten a previously ineffective regime, is explored. The experience of New Zealand in going from a lax to tight legislative regime may be of interest to policy makers in developing and emerging markets many of whom, while having enacted laws against insider trading, have not enforced them due to weaknesses in their systems or a lack of political will (Stamp and Walsh, 1996).

This study was conducted by first exploring the profitability of insiders for a sample of 1121 director transactions before (755) and after (366) the regulatory changes. The results indicate that insiders earn significant abnormal returns for both purchases and sales prior to the law changes but not after. Further, the change in profitability appears to be due to a change in the informational basis for the trades. In addition, significant decreases post-change in the number of trades followed within 80 days by corporate announcements in the right direction were observed. Further, pre-change profitability was predominantly driven by those trades preceding news in the expected direction. Post-change abnormal returns, on the other hand, are limited to situations where market prices have deviated in the short-run from the fundamental price. The results suggest that the recent changes have been effective in discouraging

insiders from trading or giving the appearance of trading on the basis of upcoming announcements.

The rest of the chapter is structured as follows. Section 3.2 will provide a summary of the literature and more detail on the New Zealand insider trading laws. Section 3.3 will provide a discussion of the sample employed and the methodology for determining the profitability of insiders and the source of information they rely on. Section 3.4 presents the empirical results, while the final section concludes the chapter.

### **3.2 Background Literature and New Zealand**

The literature on insider trading is in many respects as confused as that relating to the role of regulation on insiders behaviour. Studies examining insider trading around announcements in the US, while not explicitly examining the role of regulation, show support for the findings of Garfinkel (1997). Studies on samples drawn predominantly from prior to the 1988 law changes examined by Garfinkel tend to show insiders trading prior to an upcoming announcement (Karpoff and Lee, 1991; Lee et al., 1992; Lamba and Khan, 1999; Elliot et al., 1984). Studies based on sample periods after the law change show that insiders wait till after an announcement to trade and do so away from the direction of the market reaction (Sivakumar and Waymire, 1994; Noe, 1999; Piotroski and Roulstone, 2004). This change was argued as indicating a switch from short term information, such as the contents of an upcoming earnings announcement, to long term knowledge, including expectations about next years cash flow realisations or predicted future growth rates. Such a finding suggests the increased cost of insider trading from the law changes have forced a change in the informational basis of insider trades to avoid the appearance of trading on material information. Bettis et al. (2000) also find that in the period following the law change in Garfinkel (1997) firms themselves acted to restrict insiders trading around earnings announcements. This provides further evidence that the new legislation had a significant impact on the attitudes to the information insiders could use.

Evidence also exists to show regulations have had a positive impact in other areas affected by insiders. Beny (2005) examined an index rating the strength of insider trading laws and found that countries with stricter regimes had higher liquidity, more widely held share ownership and more accurate prices. Bhattacharya and Daouk (2002), while finding that the enactment of laws had little effect, concluded that the first enforcement of insider trading laws resulted in a significant reduction in the cost of

capital. In a follow up paper, Bhattacharya and Daouk (2006), found that countries that enacted new laws but failed to enforce them wound up with higher costs of capital than countries that failed to enact laws. This reinforces their earlier finding that any laws enacted must be effective and enforceable. Bushman et al., (2005) using the same sample also found that enforcement resulted in a marked increase in the analyst following of emerging and developing markets. Developed markets by contrast saw a significant increase in analyst following after enactment of the laws (Bushman et al., 2005). The evidence therefore does suggest that regulations have had an impact on insider trading, although the evidence is not unanimous.

Banerjee and Eckard (2001), in contrast to the above studies, found that insider trading laws have been largely ineffective in the US. By examining mergers that occurred in the period 1897-1903 and comparing them with modern mergers the authors conclude that insider trading restrictions have not fulfilled their objectives. Run-ups are of a similar level but outsiders participate less in mergers when the market is regulated. Bris (2005) finds that enforcement of insider trading laws actually increases the profitability and incidence of illegal insider trading prior to firm acquisitions. As a result Bris (2005) concludes that regulations have failed to prevent insider trading. Although he does note that the strength of the laws appears to have an effect in that greater potential penalties appear to work better. Durnev and Nain (2004) even show that the opacity of earnings is harmed by insider trading laws, suggesting that if insiders are prevented from expropriating abnormal returns from outsiders via insider trading they will switch to an alternative method. Therefore while the laws may reduce insider trading, they will not protect outsiders from expropriation.

### *3.2.1 The New Zealand Situation*

The regime prior to the introduction of the Securities Market Amendment Act 2002 (“SMAA”) has been widely regarded as weak and ineffective by market commentators, particularly in light of its inability to secure a conviction after being in effect for over a decade. Two weaknesses of the previous system were of particular importance; the lack of a public regulator and the lack of timely disclosure by directors and executives. Previously, the other party to the trade or the issuing company were required to prosecute insiders. However, due to the cost and evidential burdens, traders affected by insiders have proven largely unprepared to pursue an action against an

insider, while the issuing companies have proven to be reluctant to prosecute their own insiders. The result has been very few cases taken with no successes<sup>5</sup>.

Further, the lack of timely disclosure has severely limited the benefit to the market of insider's trading. Chung and Charoenwong (1998) concluded that the market is unable to detect insider trades unless they are disclosed. No disclosure, or delayed disclosure, means the market is unable to infer the insider's information. It also means that insiders are able to continue trading on inside information for much longer as the market is unable to adjust prices for their information resulting in significantly higher returns to insiders (Huddart et al., 2001). It also appears to have given insiders little reason not to trade on the most profitable information, knowledge of upcoming announcements, as the insiders had little reason to suspect their trades would be examined in depth once they were disclosed (on average 9-10 months later as shown by Etebari et al., 2004).

Both these weaknesses were addressed in the SMAA. The Securities Commission<sup>6</sup> was given the ability to prosecute where the issuing company refused and all corporate insiders (directors, executives and large blockholders) were required to disclose within 5 days. Given the lack of disincentives not to use knowledge of upcoming announcements under the previous regime, and the significant tightening under the recent amendments, if regulations can influence the information that insiders use, and by extension their profitability, then it should be apparent in the New Zealand experiences.

### **3.3 Sample and Methodology**

#### *3.3.1 Sample*

To explore whether insider trading regulations can be effective in controlling the information that insiders trade on, director trades around the time of the introduction of the SMAA were examined. Directors were focussed on exclusively as the old legislation

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<sup>5</sup> Several cases did result in out of court settlements repaying the profits earned by the insider including the case of Kerry Hoggard with respects to Fletcher Forests and Eric Watson's trading in Blue Star Group. However, other more severe non-financial penalties were avoided by these actions making the punishment significantly smaller than it could have been.

<sup>6</sup> The Securities Commission is a publicly funded watchdog which already had oversight of the primary markets.

did not require executives to disclose details of their trades. Substantial shareholders<sup>7</sup> were also excluded as prior evidence suggests that large block holders either have little informational advantage over outside investors or are unable to exploit superior information due to constraints on their actions (Lakonishok and Lee, 2001; Seyhun, 1998). Director's transactions were collected from all companies listed on the New Zealand Exchange over the period January 1996 – October 2005. Transactions for 2002, the year the amendment was enacted, were excluded from the study to prevent any bias from the preceding legislative events that occurred throughout 2002 leading up to the enactment. Where multiple trades occurred on the same day, the trades were combined into one event where the direction and volume was determined by adding the numbers of shares purchases and subtracting the number of shares sold. If more shares were sold than bought then it was deemed that the stronger signal was the sale and therefore the trade was recorded as a sale and vice versa for purchases. After removing transactions where there were insufficient price histories to estimate the models or where there were gaps in the available data, the sample consisted of 1121 transactions from 120 companies. The sample was separated into two time periods, pre-change running from 1996-2001 (755 trades) and post-change from 2003-Oct 2005 (366 trades).

### 3.3.2 Methodology

The first step was to examine the ability of insiders to outperform the rest of the market. This is accomplished by calculating the cumulative abnormal returns earned by insiders over the 80 days following the trade. As was observed in Lakonishok and Lee (2001) insiders tend to be contrarian investors whose profits are largely driven by the returns they earn from small stocks. It is therefore necessary to account for these trading strategies in calculating the abnormal returns of insiders so as not to assign returns available to the wider investing communities as profits from information driven trading. In this respect the Fama and French three factor model should perform better than a simple CAPM model as it accounts for both the size of the company and its book-to-market (a measure used in Lakonishok and Lee, 2001 to account for contrarian investing). The abnormal returns are calculated using the Fama and French 3 factor model such that

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it} \quad (3.1)$$

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<sup>7</sup> Substantial shareholders are defined as those investors who hold 5% or more of the voting stock of a company. These investors are the equivalent of large block holders.

where  $r_{it}$  is the return on company  $i$ ,  $r_{ft}$  is the risk free rate,  $r_{mt}$  is the return on the NZSE All index,  $SMB$  is the return from a portfolio of small stocks minus a portfolio of large stocks, and  $HML$  is the return from a portfolio of high book-to-market firms minus a portfolio of low book-to-market firms. Daily portfolio returns were calculated for the top and bottom 30% of the universe of stocks, in this case non-financial firms listed on the NZX between 1993 and 2006 including delisted firms. Portfolio formation occurred on the 30<sup>th</sup> of June with returns measured from 1 July. Sorts for the  $SMB$  and  $HML$  portfolios were based on the prior end of calendar year values. Parameter estimates for the regression coefficients were estimated over the period -375,-125 days prior to the date of the trade. Those estimates were then applied to calculate the abnormal returns in the testing period, -124,80.

The issue of whether insiders are using knowledge of upcoming announcements was explored in a similar fashion to that employed in Givoly and Palman (1985). The period following an insider's trade was examined and searched for the first news announcement within 80 days, which seems a reasonable estimate of the time before an announcement that an insider would be aware of the information. News was classified as either good, bad or neutral (see Appendix 3.A) based on the combined criteria developed in Palmon and Schneller (1980) and Fama (1998). Both papers develop criteria for classifying news based on the expected markets view. Fama (1998) determines this based on the findings of a variety of papers examining a number of different announcement types. Palmon and Schneller's (1980) criteria were developed based on the determination of analysts as to whether a certain type of news was good or bad. An objective classifying method was preferred as it arguably represents a better measure of the insiders expectation of the market reaction prior to trading. The announcements were also categorised by the type of announcements into one of seven categories based on the classifications of Pritamani and Singal (2001). If insiders are predominantly trading on the basis of the information contained in forthcoming announcements it would be expected that the majority of purchases occurred before good news, and sales before bad news.

In addition, the issue of whether insiders are trading based on market mispricing, or when the market price deviates from the fundamental price, is also examined. As demonstrated by Seyhun (1992), if insiders are trading based on expected price reversals you should see purchases following price declines, and sales after a price appreciation. Rozeff and Zaman (1998) and Piotroski and Roulstone (2004) went further and noted that this should be most apparent in situations where the price suffers

the most deviation. They argued that this occurs in value and growth firms where value firms tended to be undervalued and growth firms overvalued (Fama and French, 1992; Lakonishok et al., 1994). The book-to-market ratio, as a proxy for value versus growth stocks, was employed to test whether insiders are trading in the under or over-valued firms.

### *3.3.3 Summary Statistics*

Table 3.1 gives sample descriptive statistics separating the sample into pre and post-change purchases and sales. Transactions per month have stayed largely the same between the purchases and sales samples with the only major deviation being a 7% increase in the number of transactions taking place in March 2003 following the introduction of the new laws. Sales also see a small spike in transactions in March, however, there were few other notable deviations between the two pre and post-changes samples. The purchases per year show a large jump between the pre-change and post-change periods, largely driven by the 2003-2004 period. 2005 however was back to pre-change levels. Sales on the other hand are at low end of the pre-change levels with 2004 being significantly lower. The high purchases and low sales, however, may be the result of strong performance on the New Zealand market over this time period. One point of interest though is the very small number of transactions in 2001 for both purchases and sales. This may be a result of insiders attempting to avoid regulation by masking the size of the problem by delaying trades prior to the final decision on the enactment of new law. The final value given is the average shares per transaction. While there was a small increase in purchases post-change, the numbers are largely similar suggesting little difference between the two time periods. On the whole the descriptive statistics do not show a significant change following the introduction of the new legislation.

## **3.4 Results**

### *3.4.1 Insiders Performance*

If the legislative changes have been effective it would be expected that there would be a noticeable reduction in the profitability of insider's transactions following their enactment. Table 3.2 gives details of the cumulative abnormal returns (CARs) earned by insiders both prior to the change in the law and following their introduction. The results



**Table 3.1: Transaction Summary Statistics**

	Purchases				Sales			
	Pre-Change		Post-Change		Pre-Change		Post-Change	
	Number	%	Number	%	Number	%	Number	%
<i>Transactions Per Month</i>								
January	24	6%	6	3%	9	3%	5	4%
February	21	5%	10	4%	24	8%	10	8%
March	43	10%	40	17%	32	10%	16	13%
April	47	11%	24	10%	25	8%	12	9%
May	42	10%	22	9%	24	8%	14	11%
June	33	8%	25	10%	29	9%	11	9%
July	22	5%	10	4%	17	5%	6	5%
August	33	8%	23	10%	32	10%	18	14%
September	45	10%	26	11%	26	8%	10	8%
October	45	10%	9	4%	32	10%	8	6%
November	51	12%	30	13%	38	12%	10	8%
December	29	7%	14	6%	32	10%	7	6%
<i>Transactions Per Year</i>								
1995	76		-		60		-	
1996	59		-		63		-	
1997	65		-		52		-	
1998	78		-		49		-	
1999	66		-		44		-	
2000	74		-		42		-	
2001	17		-		10		-	
2003	-		90		-		48	
2004	-		82		-		34	
2005	-		67		-		45	
<i>Average Shares/Transaction</i>								
	180,886		237,794		311,851		301,711	

Note: Pre-change includes the 755 transactions (435 purchases and 340 sales) that occurred between Jan 1996 and Dec 2001. Post-change includes the 366 transactions (239 purchases and 127 sales) that occurred between Jan 2003 and Oct 2005. Transactions per month were measured as the total number of trades in a given month over the relevant time period. Transactions per year were measured as the total number of trades in a given year. Average shares per transaction were measured as the average shares traded over the relevant time period.

showed a marked reduction in the profitability of insiders driven by both the purchase and sales sub-samples. The pre-change sub-samples results indicate that insiders significantly outperformed the market starting days following the transaction for sales (0,20) and 40 days after for purchases (0,40). Over the entire 80 day period following a purchase (0,80), insiders outperformed the market by on average 3.9% while sales netted insiders abnormal returns of 6%. By contrast in the post-change period insiders did not earn significant abnormal returns over any event period. Post-change purchase CARs were down nearly 50% and sales close to 80% after the new law were introduced. These changes in profitability suggest the new law had a significant impact on the trading of insiders. These results also contrast somewhat with the evidence of other

studies that have shown that changes in regulations had little or no impact on the profitability of insiders (Jaffe, 1974; Seyhun, 1992).

**Table 3.2: Insiders Cumulative Abnormal Returns by Transaction Type**

Panel A: Insider Purchase Cumulative Abnormal Returns					
	Pre-Change		Post-Change		
	CAR		CAR	Difference	
0-10	0.0064		0.0082	-0.0018	
0-20	0.0112		0.0110	0.0002	
0-40	0.0216	*	0.0163	0.0054	
0-80	0.0390	***	0.0219	0.0172	***

Panel B: Insider Sales Cumulative Abnormal Returns					
	Pre-Change		Post-Change		
	CAR		CAR	Difference	
0-10	0.0082		0.0120	0.0038	
0-20	0.0205	*	0.0217	0.0012	
0-40	0.0352	**	0.0240	-0.0112	***
0-80	0.0597	***	0.0130	-0.0467	***

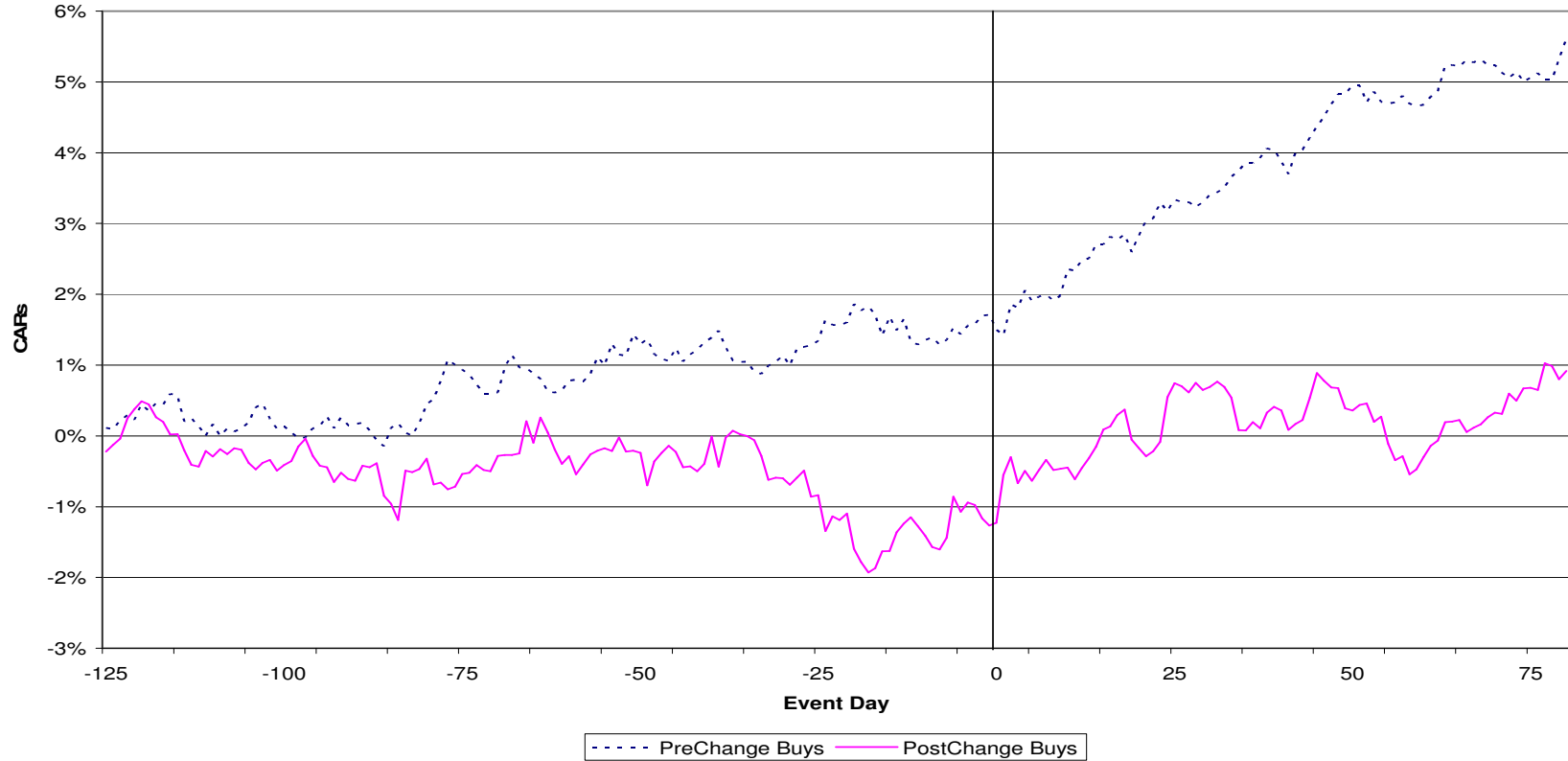
Note: Pre-change includes the 755 transactions (435 purchases and 340 sales) that occurred between Jan 1996 and Dec 2001. Post-change includes the 366 transactions (239 purchases and 127 sales) that occurred between Jan 2003 and Oct 2005. Sales CARs were multiplied by -1. Abnormal returns were calculated using the Fama and French 3 Factor model such that  $r_{it} - r_{ft} = \alpha_{it} + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$  where  $SMB$  is a portfolio of small company returns less a portfolio of large companies.  $HML$  is a portfolio of high book-to-market companies less a portfolio of low book-to-market firms. Portfolios were formed based on the top and bottom 30% of a universe of New Zealand companies listed between 1993 and 2006 including delisted companies. Parameters were estimated over the period -375,-126. The significance of the difference between the pre and post-change samples was calculated using two-sample t-tests.

\*\*\* = Significant at 1%.

\*\* = Significant at 5%

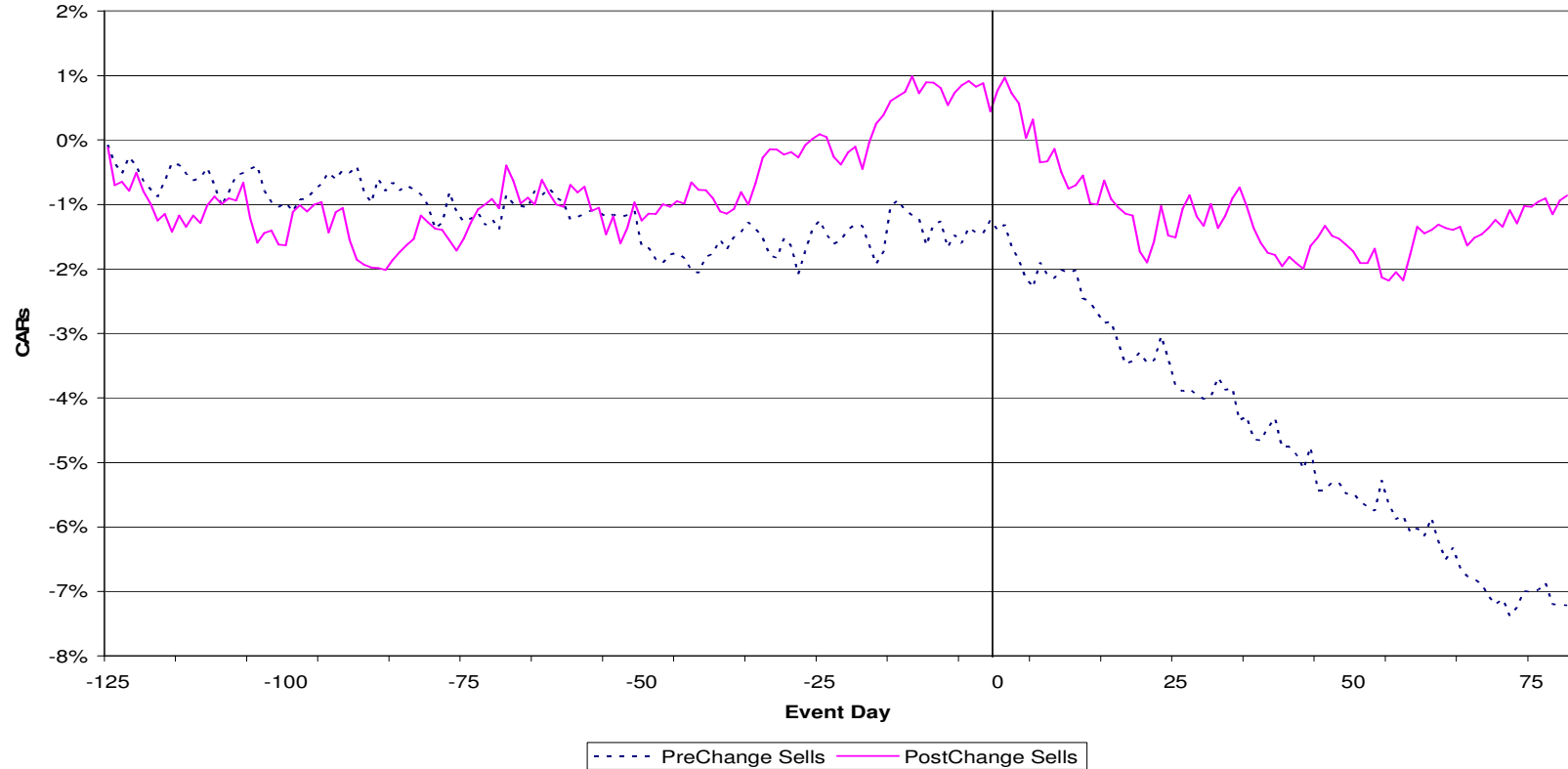
\* = Significant at 10%

Figures 3.1 and 3.2 indicate some differences in the patterns of the cumulative abnormal returns between the pre and post-change periods. Figure 3.1 shows the CAR's over the period -125,80 for the pre and post-change purchases respectively. Pre-change purchases occur after a long and gradual increase in the CAR's dating from about 80 days before the change. After the trade the CAR's appeared to increase more quickly and continue for nearly the full 80 days following the transaction. This pattern is inconsistent with the overseas evidence of attempts to time the market by insiders,



**Figure 3.1: -125,80 Day Cumulative Abnormal Returns for Insider Purchases**

Note: Pre-change includes 435 purchases that occurred between Jan 1996 and Dec 2001. Post-change includes 239 purchases that occurred between Jan 2003 and Oct 2005. Abnormal returns were calculated using the Fama and French 3 Factor model, such that  $r_{it} - r_{ft} = \alpha_{it} + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$  where SMB is a portfolio of small company returns less a portfolio of large companies. HML is a portfolio of high book-to-market companies less a portfolio of low book-to-market firms. Portfolios were formed based on the top and bottom 30% of a universe of New Zealand companies listed between 1993 and 2006 including delisted companies. Parameters were estimated over the period -375,-126. Low BM includes the lowest 30% of trades based on the previous end of calendar year book-to-market ratio. High BM includes the highest 30% of trades based on the previous end of calendar year book-to-market ratio.



**Figure 3.2: -125,80 Day Cumulative Abnormal Returns for Insider Sales**

Note: Pre-change includes 340 sales that occurred between Jan 1996 and Dec 2001. Post-change includes 127 sales that occurred between Jan 2003 and Oct 2005. Abnormal returns were calculated using the Fama and French 3 Factor model, such that  $r_{it} - r_{ft} = \alpha_{it} + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$  where SMB is a portfolio of small company returns less a portfolio of large companies. HML is a portfolio of high book-to-market companies less a portfolio of low book-to-market firms. Portfolios were formed based on the top and bottom 30% of a universe of New Zealand companies listed between 1993 and 2006 including delisted companies. Parameters were estimated over the period -375,-126. Low BM includes the lowest 30% of trades based on the previous end of calendar year book-to-market ratio. High BM includes the highest 30% of trades based on the previous end of calendar year book-to-market ratio.

where insiders will buy after a prolonged period of poor performance. Following the trade the stock then experiences strong positive abnormal returns. There is some evidence of this pattern for the post-change sample. Insiders do buy after a period of negative returns which reverse. However, the period of negative returns is shorter than is observed in most overseas studies that have looked at the ability of insiders to time the market at approximately Day -35 (Seyhun, 1992; Lakonishok and Lee, 2001). Also the market reverses itself prior to the trade. The results are however in line with the short-term timing found in Freiderich et al. (2002) who showed insiders traded on market downturns of about 3% over the 20 days prior to the trade, and earned 1.9% in 20 days following the trade. The evidence therefore shows limited support for the hypothesis that insiders post-change utilise market mispricing, although the results for pre-change show little attempt if any to time the market.

A similar pattern is observed in Figure 3.2 for the sales samples. Pre-change sales occur during a period of downward prices that intensifies following the trade. Both the pre and post-trade downward trends occur over virtually the entire observed period. Post-change sales however, occurred at the peak of a price increase of nearly 2% starting at around Day -35. After the trade the abnormal returns reverse themselves with a steep decline over the following 25 days. The trade in this case appears to occur at the peak of the increase, unlike purchases which occurred once the change in abnormal returns had already occurred. As with the purchases therefore there is some limited support for insiders timing their trades following the regulation change, although again the positive returns pre-trade are not as prolonged as observed in other studies. Pre-change, however, there appears little evidence of an attempt to time trades for market mispricing.

#### *3.4.2 The Source of Insider's Performance*

The literature offers two possible explanations for insiders' profitability, market mispricing and private information (Piotroski and Roulstone, 2004). The change in patterns observed in Figures 3.1 and 3.2 suggest that the new insider trading amendments may have forced insiders to switch between these two possible sources of profits. The two sources will be examined separately to see if the legislative changes have resulted in a fundamental change in how insiders make their profits.

### *3.4.2.1 Knowledge of Upcoming Announcements*

The first source of profitability explored is knowledge of upcoming announcements. Insiders, by virtue of their positions, are privy to confidential information about the company that once released will have a price impact. Prior studies provide evidence to suggest that insiders both possess this information and trade in advance of its release where regulations do not provide a sufficient disincentive (Karpoff and Lee, 1991; Lee et al., 1992; Lamba and Khan, 1999; Elliot et al., 1984; Sivakumar, 1994; Noe, 1999; Piotroski and Roulstone, 2004). There have been suggestions by a variety of commentators that prior to the recent law changes the insider trading regime in New Zealand was weak (Fitzsimons, 1995; O'Sullivan, 2000; Gaynor, 2000). The lack of a public watch dog to police insider trading rules, the lack of timely disclosure with regard to directors' transactions, and the use of private enforcement all contribute to an environment where insiders had little reason not to use their information advantage. Insider's use of this information is investigated by exploring the pattern of announcements following insider trades.

To determine if insiders did predominantly base trading decisions on material information, their trades were examined to see if a trade preceded an announcement in the 'right' direction, that is, a purchase followed by good news or a sale followed by bad news. The inference drawn from observing such a pattern was that the insider has traded based on knowledge of the likely price impact the information will have. Rather than limit this study to examining insider trades around one type of announcement, the first announcement within 80 days of an insider's trade was examined. This allowed a fuller investigation of the relationship between insiders' buying and selling and the flow of publicly disclosed information to the market, and whether the introduction of new laws to strengthen the regime has altered this relationship.

Panel A of Table 3.3 gives the breakdown of the purchase and sale trades both pre and post-change and the direction of the subsequent announcements. The pre-change samples both have markedly higher percentages of trades in the right direction than their post-change counterparts. Pre-change purchases are followed by good news nearly 60% of the time, not as high as observed by Calvo and Lasfer (2002), who examined the UK, but much higher than the number followed by news in the wrong direction at just 16%. Post-change purchases by contrast are only followed by good news in 44% of cases while news in the wrong direction nearly doubles to 32%.

A similar pattern is apparent in the sales sample with pre-change sales being followed by news in the right direction in 45% of trades as opposed to just 19% of

transactions for the post-change sample. The smaller percentage in the right direction for sales is likely to be due to these trades being less informationally driven in light of a number of other reasons to sell, such as liquidity needs and diversification that do not exist for purchases. The results also indicated a doubling of the number of trades followed by news in the wrong direction from 27% pre-change to 52% post-trade. What is apparent between the pre and post-change samples is that there are fewer trades being conducted ahead of announcements in the same direction for both purchases and sales with concurrent increases in trades in the wrong direction.

Panel B shows the cumulative abnormal returns for each sample. Notably, the profitability of the pre-change samples is largely dependent on the trades in the right direction. Pre-change purchases, for instance, rely on trades in the right direction which earn on average nearly 6% to make up for the insignificant but positive returns on the neutral and no news categories and the slight losses on the trades followed by announcements in the wrong direction. Likewise, sales saw very strongly significant returns of 14.17% when the news is in the right direction and insignificant returns otherwise. The post-change samples by contrast have no category with significant returns and all categories earn similar levels of cumulative abnormal returns. This suggests that the pre-change profitability is largely driven by upcoming announcements while post-change is largely independent of the news.

In Table 3.4 the sample is further separated by the type of announcement to see if there are particular categories of news that insiders trade in advance of. Announcements were separated into one of seven categories, Earnings Announcements, Earnings and Profit Forecasts, Board and Management Changes, Capital Structure Information, Restructuring Information, General Business Information and Miscellaneous Information. The results for the Earnings and Profit Forecasts are not reported due to the very small numbers for all sub-samples for this category. For most of the categories there was little change in the percentage of transactions followed by an announcement of that type between the pre and post-change periods. However, there is a significant decrease in the percentage of trades followed by earnings announcements for both purchases (decreased by 12%) and sales (decreased by 21%). This is possibly a result of greater visibility as a result of continuous disclosure making breaches of black-out periods more obvious combined with the increased risk of prosecution.

**Table 3.3: Trade Direction and Cumulative Abnormal Returns**

Panel A: Raw Numbers and Percentages								
<i>Announcement Direction</i>	Pre Change Purchases		Post Change Purchases		Pre Change Sales		Post Change Sales	
	Number	%	Number	%	Number	%	Number	%
Right Direction	254	58.39%	106	44.35%	143	44.69%	24	18.90%
Wrong Direction	73	16.78%	77	32.22%	87	27.19%	67	52.76%
Neutral	50	11.49%	24	10.04%	30	9.38%	12	9.45%
No Announcement	58	13.33%	32	13.39%	60	18.75%	24	18.90%
Total Trades	435		239		320		127	

Panel B: Cumulative Abnormal Returns by Announcement Direction								
<i>Announcement Direction</i>	Pre Change Purchases		Post Change Purchases		Pre Change Sales		Post Change Sales	
	CAR		CAR		CAR		CAR	
Right Direction	0.0597	**	0.0174		0.1417	***	0.0067	
Wrong Direction	0.0096		0.0225		-0.0246		0.0173	
Neutral	0.0321		0.0279		0.0127		0.0076	
No Announcement	0.0110		0.0312		0.0125		0.0314	

Note: Pre-change includes the 755 transactions (435 purchases and 340 sales) that occurred between Jan 1996 and Dec 2001. Post-change includes the 366 transactions (239 purchases and 127 sales) that occurred between Jan 2003 and Oct 2005. Sales CARs were multiplied by -1. Right Direction represents purchases (sales) followed by good (bad) news. Wrong Direction represents purchases (sales) followed by bad (good) news. Neutral represents trades followed by neutral news and No Announcement represents trades without an announcement within the following 80 days. Classifications of announcements as good, bad or neutral was based on the criteria in Appendix 1. Abnormal returns were calculated using the Fama and French 3 Factor model, such that  $r_{it} - r_{ft} = \alpha_{it} + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$  where SMB is a portfolio of small company returns less a portfolio of large companies. HML is a portfolio of high book-to-market companies less a portfolio of low book-to-market firms. Portfolios were formed based on the top and bottom 30% of a universe of New Zealand companies listed between 1993 and 2006 including delisted companies. Parameters were estimated over the period -375,-126.

\*\*\* = Significant at 1%

\*\* = Significant at 5%



Table 3.4 also shows a reduction in the number of categories that feature a greater than average percentage of trades followed by good news following the enactment of the new laws. As seen in Panel A, pre-change purchases featured four types of announcement that were more frequently preceded by trades in the expected direction, Earnings Announcements, Capital Structure, Restructuring and General Business Information. Panel E, which details the CAR's earned by trades preceding each announcement category, shows that the four above average categories all earn significant abnormal returns while the other two categories, Miscellaneous and Board/Management Changes are very close to zero. The same pattern appeared in the pre-change sales results presented in Panel C. Here there are five categories above the average, the same four as purchases plus Board/Management Changes. Of these four, Earnings Announcements, Board/Management Changes, Capital Structure and General Business Information, earn significant abnormal returns. The fifth, Restructuring Information, had similar levels of news in the right direction, 52%, as in the wrong direction, 45%. The smaller difference between right and wrong direction trades especially in relation to the other announcement categories, offers one possible reason for why this category earns insignificant abnormal returns. Even with the high number of trades in the wrong direction, this category still earns returns of 5.28%, although these are insignificant.

The pattern for the post-change sample was vastly different. Post-change purchases (Panel B) have three categories with high percentages of trades followed by news in the right direction; Earnings announcements, Restructuring and General Business news. Of these however, all have reduced percentages from the pre-change sample, 17%, 15% and 7% respectively, and none earn significant cumulative abnormal returns. The only category to earn significant abnormal returns was Capital Structure Information which had more trades followed by news in the wrong direction than the right direction. Post-change sales demonstrated an even bigger change with no categories featuring more than 36% in the right direction (except Board/Management Changes, which had only one trade) and no categories that earn significant cumulative abnormal returns.

The results suggest that prior to the enactment of the new legislation insiders significantly outperformed the market when they entered into trades. When these trades were examined in relation to upcoming news announcements, it was found that insider purchases and sales occurred most frequently before announcements in the expected direction. Further, the abnormal returns earned by insiders were driven by trades

**Table 3.4: Trade Direction and Insider Cumulative Abnormal Returns by News Classification**

Panel A: Pre Change Purchases								
	Right Direction		Wrong Direction		Neutral		Total	
	Number	%	Number	%	Number	%	Number	
Earnings Announcements	75	67%	36	32%	1	1%	112	30%
Board/Mngt Changes	21	44%	0	0%	27	56%	48	13%
Capital Structure Info	36	88%	1	2%	4	10%	41	11%
Restructuring Info	57	74%	19	25%	1	1%	77	20%
General Business Info	38	90%	3	7%	1	2%	42	11%
Misc Info	24	50%	9	19%	15	31%	48	13%
Panel B: Post Change Purchases								
	Right Direction		Wrong Direction		Neutral		Total	
	Number	%	Number	%	Number	%	Number	
Earnings Announcements	19	50%	17	45%	2	5%	38	18%
Board/Mngt Changes	0		0		0		0	0%
Capital Structure Info	10	36%	11	39%	7	25%	28	14%
Restructuring Info	24	59%	17	41%	0	0%	41	20%
General Business Info	35	83%	7	17%	0	0%	42	20%
Misc Info	8	22%	13	36%	15	42%	36	17%
Panel C: Pre Change Sales								
	Right Direction		Wrong Direction		Neutral		Total	
	Number	%	Number	%	Number	%	Number	
Earnings Announcements	55	65%	27	32%	2	2%	84	32%
Board/Mngt Changes	19	59%	1	3%	12	38%	32	12%
Capital Structure Info	12	60%	7	35%	1	5%	20	8%
Restructuring Info	23	52%	20	45%	1	2%	44	17%
General Business Info	13	30%	30	68%	1	2%	44	17%
Misc Info	18	56%	1	3%	13	41%	32	12%
Panel D: Post Change Sales								
	Right Direction		Wrong Direction		Neutral		Total	
	Number	%	Number	%	Number	%	Number	
Earnings Announcements	4	36%	7	64%	0	0%	11	11%
Board/Mngt Changes	1	100%	0	0%	0	0%	1	1%
Capital Structure Info	5	28%	10	56%	3	17%	18	17%
Restructuring Info	7	28%	18	72%	0	0%	25	24%
General Business Info	2	6%	30	94%	0	0%	32	31%
Misc Info	3	23%	1	8%	9	69%	13	13%
Panel E: Cumulative Abnormal Returns by Announcement Type								
	Purchases				Sales			
	Pre Change		Post Change		Pre Change		Post Change	
Earnings Announcements	0.0778	**	0.0398		0.0782	*	0.0013	
Board/Mngt Changes	-0.001		NA		0.0977	**	0.0122	
Capital Structure Info	0.0576	*	0.0511	*	0.1106	***	0.0032	
Restructuring Info	0.0386	*	0.0035		0.0528		0.0239	
General Business Info	0.0752	**	0.0136		0.0219		0.0214	
Misc Info	0.0028		0.0447		0.0767	**	0.0147	

Note: Pre-change includes the 755 transactions (435 purchases and 340 sales) that occurred between Jan 1996 and Dec 2001. Post-change includes the 366 transactions (239 purchases and 127 sales) that occurred between Jan 2003 and Oct 2005. Sales CARs were multiplied by -1. Right Direction represents purchases (sales) followed by good (bad) news. Wrong Direction represents purchases (sales) followed by bad (good) news. Neutral represents trades followed by neutral news

and No Announcement represents trades without an announcement within the following 80 days. Classifications of announcements as good, bad or neutral was based the criteria in Appendix 1. Classification by type was undertaken as per the criteria in Appendix 1. Abnormal returns were calculated using the Fama and French 3 Factor model, such that  $r_{it} - r_{ft} = \alpha_{it} + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$  where  $SMB_t$  is a portfolio of small company returns less a portfolio of large companies.  $HML_t$  is a portfolio of high book-to-market companies less a portfolio of low book-to-market firms. Portfolios were formed based on the top and bottom 30% of a universe of New Zealand companies listed between 1993 and 2006 including delisted companies. Parameters were estimated over the period -375,-126.

\*\*\* = Significant at 1%

\*\*= Significant at 5%

\* = Significant at 10%

followed by news in the expected direction. When this was examined based on the type of announcement, it was again found that there was a direct relationship between the announcement categories with the highest percentage of trades in the expected direction and excess returns by insiders. These findings suggest that insiders prior to the law changes were basing their investment decisions on specific knowledge of the likely market reaction to upcoming announcements. This basis seems to have altered post-change with marked decreases in the number of trades made prior to announcements in the right direction for both sales and purchases, and the lack of a relationship between these trades and the returns earned by insiders.

#### 3.4.2.2 Market Mispricing

The second widely suggested basis for insider's profits is so called market mispricing. This relies on the belief that insiders, by virtue of their intimate knowledge of the company have a much better ability to accurately price the fundamental value of the company, and exploit deviations from the fundamental price (Lakonishok and Lee, 2001). This gives them the ability to time their trades such that they purchase or sell shares in the company when the market value is sufficiently different from the fundamental value to enable them to significantly outperform the market (Seyhun, 1992; Rozeff and Zamen, 1998; Piotroski and Roulstone, 2004; Freiderich et al., 2002). Insiders use of such information provides a valuable signal to the market about the true price of the company and leads to more accurate pricing of shares (Fishman and Hagerty, 1992; Khanna and Slezak, 1994). This greatly benefits the market, which is why insider trading based on this superior pricing ability is encouraged by legislators, in contrast to knowledge of specific price-sensitive announcements. However, market mispricing is also likely to earn smaller and less certain abnormal returns as it requires the market to fully recognise the deviation from the fundamental value and correct the prices before insiders are rewarded (Lakonishok and Lee, 2001). Use of specific

knowledge on the other hand, relies on the market to react to the information content of the announcement, which is more predictable.

If insiders are predominantly relying on mispricing rather than specific knowledge of upcoming announcements, then a particular pattern in the abnormal returns should be observed. Specifically, a decline in CAR's prior to a purchase followed by an increase in the abnormal returns and the opposite for sales should be seen, increasing CAR's before the transaction and a decline following. To a limited degree this pattern is observed in Figures 3.1 and 3.2 for the post-change sample. The results in Panel A of Table 3.5, which shows the CARs for the total test period, -125,80, and various event windows within that period, also indicate returns in the right directions, however, the results are insignificant for the full sample. In overseas studies that have observed insiders timing their trades the CAR's both pre and post-trade have been significant. Further, the negative (positive) abnormal returns for the purchases (sales) appear largely confined to the 60 day window immediately prior to the trade.

As can be seen both the pre-change samples show CARs in the same direction through-out the entire test period, positive for purchases and negative for sales. If insiders were predominantly exploiting deviations from the fundamental value you would expect the opposite signs prior to the trade. The post-change samples do exhibit these patterns, although the CARs earned are insignificant. Prior to the trade date purchase companies see CARs of -1.27%, while sales firms gain .4%.

Calvo and Lasfer (2003) point out that it should be more obvious when insiders are using mispricing if you look at those companies that are most prone to deviations from the fundamental price. In particular growth firms, or firms with low book to market ratios, tend to be overvalued while value firms, those with high book to market ratios, tend to be undervalued (Fama and French, 1992; Lakonishok et al., 1994). Insiders trading in these particular types of firms should be more profitable as the deviation from the true value is much greater providing more opportunity to profit. The results showed little evidence of a difference in the pre-change abnormal returns earned by insiders when the sample was separated based on book to market ratios. In both cases the only significant CARs occur after the trade and when the pre-trade abnormal returns are positive (negative) for purchases (sales). In contrast the post-change results are more supportive of insiders trading based on mispricing when the sample was separated based on book-to-market ratio. For the purchases (sales) the results show

**Table 3.5: Market Mispricing**

Panel A: All Trades									
	Pre-Change				Post-Change				
	Purchases		Sales		Purchases		Sales		
-125,80	0.0561	***	0.0722	**	0.0092		0.0086		
-125,-60	0.0078		0.0124		-0.0029		0.0070		
-59,-1	0.0093		0.0001		-0.0098		-0.0114		
0,80	0.0390	***	0.0597	***	0.0219		0.0130		
Panel B: Insider Purchases Separated by BM									
	Pre-Change				Post-Change				
	Low BM		High BM		Difference	Low BM		High BM	Difference
-125,80	0.0973	***	0.0644	***	0.0328	0.0067	0.0452	***	-0.0385
-125,-60	0.0211		0.0093		0.0118	0.0115	-0.0103		0.0218
-59,-1	0.0230		0.0227		0.0003	-0.0065	-0.0139	*	0.0074
0,80	0.0532	***	0.0324	*	0.0207	0.0017	0.0694	***	-0.0677
Panel C: Insider Sales Separated by BM									
	Pre-Change				Post-Change				
	Low BM		High BM		Difference	Low BM		High BM	Difference
-125,80	0.0765	**	0.0856	*	0.0090	0.0779	**	-0.0223	-0.1002
-125,-60	0.0274		0.0193		-0.0081	0.0019		-0.0100	-0.0119
-59,-1	-0.0188		-0.0215		-0.0027	-0.0406	*	-0.0219	0.0186
0,80	0.0679	**	0.0878	**	0.0199	0.1167	***	0.0097	-0.1070

Note: Pre-change includes the 755 transactions (435 purchases and 340 sales) that occurred between Jan 1996 and Dec 2001. Post-change includes the 366 transactions (239 purchases and 127 sales) that occurred between Jan 2003 and Oct 2005. Sales CARs were multiplied by -1. Abnormal returns were calculated using the Fama and French 3 Factor model such that  $r_{it} - r_{ft} = \alpha_{it} + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$  where SMB is a portfolio of small company returns less a portfolio of large companies. HML is a portfolio of high book-to-market companies less a portfolio of low book-to-market firms. Portfolios were formed based on the top and bottom 30% of a universe of New Zealand companies listed between 1993 and 2006 including delisted companies. Parameters were estimated over the period -375,-126. Low BM includes the lowest 30% of trades based on the previous end of calendar year book-to-market ratio. High BM includes the highest 30% of trades based on the previous end of calendar year book-to-market ratio.

\*\*\* = Significant at 1%

\*\* = Significant at 5%

\* = Significant at 10%

significant cumulative abnormal returns for the high (low) book to market firms after the trade as expected. Significant decreases (increases) in the CARs in the event window immediately prior to the trade were also observed, suggesting that insiders are timing their trades to maximise their abnormal returns. As expected, there were also significant differences between the high and low book to market CARs.

The results overall suggest that the differences observed in the cumulative abnormal returns earned by insiders between the pre and post-change samples are driven by a difference in the informational basis of the trades. Pre-change, in an environment of very lax enforcement and no continuous disclosure the results indicated that insiders predominantly trade prior to, and in the same direction as, the upcoming announcement, that is purchases before good news and sales before bad news. It is also apparent that

the insiders' ability to outperform the market is driven by trades that occur prior to news in the expected direction suggesting a reliance on the market reaction to the information to earn abnormal returns. After the introduction of the stringent new law, that increases the possibility of enforcement and requires all insiders to disclose in a timely fashion, the evidence appears supportive of the hypothesis that insiders trade predominantly based on their superior ability to price the company. The results show patterns that are for the most part consistent with insiders timing their trades such that they purchase when prices are low and sell when they are high. Insiders also do significantly better in situations with the greatest perceived mispricing. Overall it appears that the new laws have had a significant impact on the harm from insider trading, and have done much to encourage insiders to engage in the more beneficial types of trades.

### **3.5 Conclusion**

The role of regulation and its efficacy in controlling the actions of insiders have not been examined in great detail in the literature. Yet this lack of scholarly attention has not prevented over 80% of countries with financial markets from regulating insider trading (Bhattacharya and Daouk, 2002). The research conducted has demonstrated inconsistent findings on the question of whether insider trading laws can be effective in controlling insider trading. Much of the dissent centres on the issue of the profitability of insider transactions and the information they use to gain their profits. In particular, two sources are open to insiders, their superior ability to price the firm, which allows them to detect and exploit inaccurate or unpriced information, and their knowledge of specific upcoming announcements and the likely effect this will have on the price. However, whether regulations can force insiders to trade only on the less harmful information, knowledge of mispricing, rather than the more profitable knowledge of material information has yet to be comprehensively established. This paper has addressed these issues within the context of a non-US market to add the experiences of this market to help understand the effect of regulation. The New Zealand experience also offers the advantage of jointly allowing an examination of the effect of the structure and strictness of the laws in affecting insider trading, as the law change being examined involved a marked increase in the cost of insider trading as well as a reduction in its benefit.

This study employed a sample of 1121 director's transactions for the period January 1996 to October 2005, separated into two samples pre-change (Jan 1996 to Dec

2001, 755 trades) and post-change (Jan 2003 to Oct 2005, 366 trades). Employing the Fama and French three factor model, significant out-performance of the market pre-change was observed by directors but not in the post-change period. This change appears to be related to the informational base of the trades which also changes following the introduction of the SMAA. Pre-change insiders traded prior to news announcements in the right direction (that is, purchases before good news and sales before bad news) far more frequently than before news in the wrong direction. The trades followed by news in the right direction also drove the profitability of insiders' trades. These patterns were also reinforced when announcements were separated by announcement type. Post-change transactions by contrast showed little evidence of these patterns. In fact post-change transactions were only shown to outperform in situations which arguably indicate the company is most prone to deviations between the market price and fundamental price (that is, sales for growth firms and purchases for value firms). Overall the results show that the new law has been effective in both reducing the profitability of insiders and forcing insiders away from the most profitable information.

Having determined that regulations can be effective in controlling the informational basis of insider trades and thereby reducing their profitability, the question of whether this reduction in harmful trading has been beneficial for the market is examined.

## Chapter 4

### Insiders and the Law: The Impact of Regulatory Change on Insider Trading<sup>8</sup>

#### 4.1 Introduction

The literature on corporate governance has shown that the structure of laws within a country has a profound effect on the business environment. In particular, poor investor protection can lead to more concentrated share ownership and generate problems for businesses that seek external financing for worthy projects (La Porta et al., 1998). Given the importance of catering to the financing needs of companies and the huge benefits of a strong stock market to an economy in general, countries have had to examine all factors that reduce their appeal to savvy international investors. This has been especially important for areas that are not easily addressed by private contracting and/or enforcement between the company and its stakeholders (La Porta et al., 2000). One area in particular that has come under intense scrutiny over the previous decade and a half is insider trading regulation.

Insider trading profits come at the expense of other traders, resulting in investors either purchasing shares only at a discount or avoiding investing altogether (Manove, 1989; Ausbel, 1990). This lack of confidence in the integrity of the market may not only reduce its liquidity, but also slow down the pace of IPOs, affect the efficiency of resource allocation, and raise the cost of capital for companies, thereby reducing their value (La Porta et al., 2000; Bhattacharya and Daouk, 2002). Consequently, businesses may find themselves at a disadvantage to competitors in better regulated markets. In an effort to improve investors' protection a significant number of countries have enacted insider trading restrictions in recent years. Prior to 1990 only 34 countries had insider trading laws, whereas by 1998 these laws were present in 87 of the 103 countries with capital markets (Bhattacharya and Daouk, 2002).

While some research has been done to explore the effects of regulation on controlling insider trading and the harm it causes to the markets, the literature is far from complete, especially for markets outside of the US. In this chapter the impact that efficient regulation can have on several aspects of the market is explored within the

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<sup>8</sup> This chapter is based on Gilbert, A., Tourani-Rad, A. & Wisniewski, T.P. (2006). Insiders and the Law: The Impact of Regulatory Change on Insider Trading. Forthcoming in *Management International Review*.



context of New Zealand. New Zealand makes for an interesting case study for a number of reasons. Firstly, it has similarities to many emerging and developing markets in terms of its size and turnover (Bhattacharya and Daouk, 2002). The recent change in regulations also marks a major change both in the structure of the laws and the political will to enforce insider trading sanctions. These two factors are the most likely causes for the poor enforcement record in developing markets. Only 25% of emerging markets, compared to 82% of developed ones, had prosecuted an insider by 1998 (Bhattacharya and Daouk, 2002). Given this fact, it is clear that further efforts to combat insider trading are needed and the experience of New Zealand can provide valuable guidelines for other markets that are poorly regulated at present.

There are a number of areas where the existence of insider trading laws has an impact on the market. It has been found that the first enforcement of insider trading laws resulted in a significant decrease in the cost of capital within a country and an increase in the number of analysts that follow local companies (Bhattacharya and Daouk, 2002, Bushman et al., 2005). The results presented in Beny (2005) indicated that more prohibitive laws lead to widespread share ownership, more accurate share prices and improved liquidity. Garfinkel (1997) found that the information insiders traded on in the USA changed after the introduction of the Insider Trading and Securities Fraud Enforcement Act (ITSFEA) of 1988. Insiders switched from exploiting earnings information prior to its disclosure to a more passive trading mode. They also started using more long-term information to spot market mispricing and appeared more restrained in their short-term speculation (Piotroski and Roulstone, 2004). The effect of regulations on insider trading profitability, however, is uncertain with several USA studies finding either no impact or an increase in profitability following events likely to increase the costs of insider trading (Jaffe, 1974; Seyhun, 1992).

The recent legislative changes to insider trading in New Zealand provided a good opportunity to examine the effect of regulation on the market structure. Prior to 2002 insider trading was governed by the Securities Market Act 1988 which was almost universally regarded to be ineffective. This perception was largely based on several early cases which undermined the Act's ability to prosecute insiders<sup>9</sup>. This was vividly highlighted by the subsequent lack of successful enforcement over the lifespan of the

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<sup>9</sup> These were the cases of *Colonial Mutual Life Assurance Society Ltd v Wilson Neill Ltd* [1994] MCLR 134 and *Kincaid v Capital Markets Equities Ltd* (1995) 1 ACSR 53. Both were cases attempting to force the respective companies to take an action against insiders under s18 Securities Market Act 1988. In both cases the courts ruled the companies had good reason not to take the case and declined leave to force the companies to act.

Act. The criticism appears to be justified in two major areas, the disclosure requirements set out in the Act and the enforcement regime it established.

The disclosure requirements set out in the Act differed by the class of corporate insider. The problem was that the stringency of reporting requirements was inversely related to the information hierarchy within a firm, as established by Seyhun (1998). Substantial shareholders, those holding more than 5% of the voting rights, were required to disclose their trades within five working days. Directors, on the other hand, were required to publish details of their transactions only in annual reports. This represented an average delay of 9-10 months (Etebari et al., 2004). Executives, who have the best access to information, were not required to disclose at all. Since the law was most lenient for those with the biggest informational advantage, the profits for insiders were significantly greater, compounding the harm to the markets (Etebari et al., 2004).

The second major area of concern was the enforcement mechanisms set out in the law as discussed in more detail in Chapter 2. Rather than relying on a public enforcement regime such as is employed in the US and the UK, the Securities Market Act (1988) relied on private enforcement. The company in whom the trading took place, and the other party to the trade were permitted to take a suit against an insider. This placed the burden of proof on those with the least access to the information and expertise required to establish if illegal insider trading occurred (Beny, 2005). Compounding this was the fact that only a company was able to sue for punitive damages while private individuals were only able to recover the value of loss that they personally incurred, making it uneconomical to pursue a case. Companies have also proven reluctant to prosecute their own insiders, even in high profile cases.

In response to the ineffectiveness of the previous regime, the Securities Market Amendment Act (2002) was enacted and came into force on the 1 December 2002. This Act sought to address weaknesses in the old act with the most profound changes addressing the disclosure and enforcement regimes. The new law requires all corporate insiders; blockholders, directors and executives to disclose information about their share dealings within five working days. The new Act also gives the Securities Commission, the local securities watchdog, the ability to take over a company's right of action where it chooses not to sue. The combined effect of these changes should be a marked increase in the expected cost of insider trading as blatant breaches are more likely to be prosecuted and to reduce the profits to insiders.

The impact of the new regulations was examined on four market structure variables, namely bid-ask spreads, liquidity, price volatility and cost of equity. If the new Act has been effective it would be expected that there would be a decrease in the spreads. The bid-ask spreads represents a way for the providers of liquidity in a market to insulate themselves from the losses they would incur from trading against an insider (Kyle 1985, Glosten and Milgrom, 1985; Copeland and Galai, 1988). If the risk of trading against an insider decreases, the spreads can be reduced to account for the lower expected losses. While the impact of regulations on spreads has not been looked at directly, Chung and Charoenwong (1998) did find a positive relationship between the size of the spread and the intensity of insider trading in a share. It was also expected that there would be an increase in liquidity due to an increase in investor confidence in the market (Ausbel, 1990; Bernhardt et al., 1995; Fishman and Hagerty, 1995). The increase in market depth should lead to reduced price volatility, as trades can be cleared without large price impact (Kyle, 1985; Leland, 1992). Lastly, as was shown by Bhattacharya and Daouk (2002), less insider trading should result in a lower cost of equity.

The average level of the four variables (cost of equity, bid ask spreads, liquidity and volatility) in the pre and post change periods was examined to determine if the law changes minimised the influence of the negative aspects of insider trading on the market. Using a sample of 85 companies listed on the New Zealand Stock Exchange (NZX) over the period 1996-2004 the level of each variable in the two sub-periods was explored. A variety of testing methods were used including the matched pair t-test, the Wilcoxon signed rank test, rolling regressions and fixed effect panel regressions to determine if the variables experienced statistically significant changes in the expected directions. The results showed marked decreases over all the tests employed for the dividend yield (a proxy for cost of equity), bid ask spreads and volatility. Further, significant increases in the total value of traded shares was observed in the post change period. The results give support to the hypothesis that the recent changes have had a beneficial impact on the market as a whole.

The next section of this chapter contains information on the sample and variable construction along with the methodology employed. Section 4.3 presents the results of the testing described above while Section 4.4 presents the paper's conclusions regarding the impact of the law changes on the market.

## **4.2 Sample, Variables and Methodology**

### *4.2.1 Sample*

The sample employed in this study was drawn from companies that were listed on the New Zealand Exchange between January 1996 and March 2004. Only companies that were listed over the entire period were considered in order to eliminate the potential for variations in the composition of the sample. This resulted in a sample of 85 companies with 8415 firm-months worth of observations. Data on volume, bid prices, ask prices, dividend yield and market capitalisation were obtained from Thompson Financials DataStream. Information on cross-listing dates was obtained from the Datex market announcements database.

To establish whether the change in regulation impacted on the market, a number of aspects of the market were examined that should be affected by insider trading. The impact was studied by exploring these variables in two time periods, the pre-change period from January 1996 to December 2001 and the post-change period from December 2002 to March 2004. The period January 2002 to November 2002 was examined separately to see if there was any evidence of the market reacting before the Act came into power. The SMAA spent much of 2002 going through the legislative process, which raises the possibility that the market may have reacted early as its main provisions were well known to investors prior to enactment. By examining this period separately, any abnormalities as a result of the legislative process can be observed.

### *4.2.2 Variables*

The first variable examined was the dividend yield which was used as a proxy for the firm level cost of equity. As noted in a number of studies, the cost of equity is difficult to determine directly (Bhattacharya and Daouk, 2002, Bekaert and Harvey, 2000; Henry, 2000). For this reason proxies were employed to examine the impact of differing events on the cost of equity. One of the proxies suitable for a firm-level examination of the cost of equity are dividend yields<sup>10</sup> as they are easily observed and do not exhibit excess volatility. This makes them an excellent proxy for estimating the effect of a discrete change in the laws. Bekaert and Harvey (2000) concluded that for

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<sup>10</sup> Bekaert and Harvey (2000) provide a detailed examination of the link between the cost of capital in general pricing models and dividends.

small samples, dividend yields are superior to other possible proxies. Dividend yield was measured as the annualised dividend yield.

The second variable examined is the daily closing bid-ask spread (*BA*) defined as

$$BA = \ln \left( \frac{(Ask - Bid)}{(Ask + Bid)/2} \right) \quad (4.1)$$

The definition employed here is similar to that Chung and Charoenwong (1998). Interday prices have been used in a number of papers examining the bid-ask spreads and have been shown to be a reasonable estimator of the actual spread (Jain, 2002; Acker et al., 2002).

Liquidity has been asserted as having a negative relationship with insider trading (Kyle, 1985; Glosten and Milgrom, 1985; Copeland and Galai, 1988; Ausbel, 1990; Leland, 1992). Had the new laws been effective, liquidity would have improved. Liquidity was measured as the dollar value of daily trading divided by the market capitalisation. This measure was used by Jain (2002) and produces similar results to the average volume traded measure employed in Acker et al. (2002) and Chung and Charoenwong (1998).

The final variable inspected was the variance of a firm's return. Kyle (1985) argued that the presence of insider trading reduces the depth of a market, making it less liquid and prone to greater price movements. Less insider trading should therefore increase market depth resulting in less volatility over time. Volatility was defined as the natural log of the return variance over the last 30 days. As variances are expected to follow a chi-square distribution and exhibit skewness, a log transformation was employed to allow reliable t-statistics to be obtained.

#### 4.2.3 Methodology

To examine the effect of the regulatory change, the level of each of the variables before and after the introduction of the new law was observed. The significance of the yearly difference in the means was tested by employing the matched pairs t-test and Wilcoxon signed rank test. As the Wilcoxon signed rank test considers both the direction of the change as well as its relative magnitude it has superior power compared to other nonparametric tests. The null hypothesis tested is that the means of the four variables of interest in the post-change period are equal to the means in the pre-change years.

Rolling regressions were also conducted by computing an equally weighted cross-sectional average for the variables at each point in time. A moving-window estimation was then employed whereby, the previous 100 observations were regressed against a constant. This allowed the regression intercept and its confidence bounds to be plotted over time, providing a graphical representation of structural shifts in the underlying variable. This approach is the equivalent of that employed by Driffill and Sola (1998).

Finally, fixed effect panel regressions were employed using the firm-month level data of each variable against a dummy variable that equals one in the months following the introduction of the new law. These regressions also included several control variables; *MV*, defined as the natural log of the firms market capitalisation, and *CROSS* which is a dummy variable that equals one for each month that a firm had a cross listing on another exchange. This was used to control for firms that are subjected to the laws of another exchange, and therefore may already comply with tighter regulations. As a robustness check, F-tests were used to verify the significance of group effects in each of the model specifications employed. Almost uniformly the fixed effect panel proved to be superior compared to the restricted, single intercept model. Further, the fixed model was preferred as it did not suffer from the omitted variable bias that can plague the random effect models (Hausman and Taylor, 1981; Chamerlain, 1978). The panel regressions were also re-estimated using an adjustment for serial correlation in the errors. First-order autocorrelation was controlled, which greatly improved the accuracy of the reported specifications, as measured by the Durbin-Watson statistic.

## 4.3 Results

### 4.3.1 Descriptive Statistics

Table 4.1 gives summary statistics based on firm-month data for the variables used. The BA spread has a geometric average of 2.93% of the price. This was larger than the average spreads reported in the USA (Chung and Charoenwong, 1998 report 1.83%) or the UK (Acker et al., 2002 report 2.3%). This is likely to be due to the small size of the market with its resulting low liquidity. Table 4.1 also shows that on average .08% of a firms market value is traded on a daily basis with an average of 143,000 shares changing hands. However, this variable has a large standard deviation indicating

that there is a large difference between the average shares traded of the most and least liquid companies on the New Zealand market. *VAR* had an average of .00033, while *DY* had an average of .0575. The latter value is higher compared to other markets due to the tendency of NZ companies to pay out larger dividends. The average firm market capitalisation over the sample period was just NZ\$91 million, indicating that companies in New Zealand are much smaller than their counterparts in other developed markets.

**Table 4.1: Cross-Sectional Descriptive Statistics**

Variable	Mean	Std. Dev.	Median	1st Quartile	3rd Quartile
BA	-3.5298	1.1757	-3.6877	-4.4040	-2.8406
VOL	0.0008	0.0015	0.0004	0.0001	0.0009
VAR	-8.0120	1.6738	-8.0588	-8.8899	-7.0770
DY	0.0575	0.1188	0.0348	0.0000	0.0600
MV	4.5150	2.0434	4.4581	3.0474	5.8491

Note:

*BA* defined as the natural log of the monthly average of the daily ask price minus the bid price divided by the midpoint of the spreads. *VOL* represents the firm's liquidity defined as the monthly average of the daily dollar value of trading divided by the market value of the company. *MV* is the natural log of the firms market capitalisation averaged for the calendar month. *VAR* represents the return volatility of the firm defined as the natural log of the variance of returns over the period - 30,0, averaged over each calendar month. *DY* is defined as the monthly average of the annualised dividend yield. *MV* is the log of the firms market capitalisation averaged for the calendar month.

The sample cross correlations are presented in Table 4.2. Bid-ask spreads (*BA*) had significant negative relationships with *VOL*, *MV*, *CROSS*, and *DY*, implying that lower spreads are associated with larger more liquid companies, as well as companies that are cross-listed on other markets. The results also indicated that lower spreads are associated with companies with higher dividend yields, likely a result of the higher rate of dividends that larger companies pay out. The relationship with *VAR* suggests that lower variance is associated with lower spreads. *VAR* had negative associations with *MV* and *DY* implying that larger companies and companies with higher dividend yields have lower volatility of returns. Finally, as can be observed there is strong relationships in the predicted directions between *POST* and all key variables, *BA* (-) *DY* (-) *VAR* (-) and *VOL* (+). This lends some preliminary support to the hypothesis that the changes in law have had a positive impact on the market.

**Table 4.2: Correlation Coefficients between Variables**

	VOL	VAR	MV	CROSS	POST	DY
<i>BA</i>	-0.0572 (0.0344)	0.2211 (0.0023)	-0.6949 (0.0001)	-0.0312 (0.1035)	-0.0731 (0.0214)	-0.0421 (0.0609)
<i>VOL</i>		-0.0116 (0.3974)	0.0585 (0.0329)	-0.0177 (0.2462)	0.0605 (0.0309)	-0.0146 (0.3121)
<i>VAR</i>			-0.3710 (0.0007)	0.0390 (0.0699)	-0.0653 (0.0267)	-0.2874 (0.0013)
<i>MV</i>				0.2030 (0.0028)	0.0174 (0.2512)	-0.1759 (0.0037)
<i>CROSS</i>					-0.1723 (0.0039)	0.0124 (0.0637)
<i>POST</i>						-0.0798 (0.0180)

Note: *p*-values are in parentheses. *BA* defined as the natural log of the monthly average of the daily ask price minus the bid price divided by the midpoint of the spreads. *VOL* represents the firms liquidity defined as the monthly average of the daily dollar value of trading divided by the market value of the company. *VAR* represents the return volatility of the firm and is defined as the natural log of the variance of returns over the period -30,0, averaged over each calendar month. *MV* is the natural log of the firms market capitalisation averaged for the calendar month. *CROSS* is a dummy variable that equals 1 for those months in which a firm is cross-listed on another exchange. *POST* is a dummy variable that equals 1 for all firm-months from December 2002 onwards. *DY* is defined as the monthly average of the annualised dividend yield.

#### 4.3.2 Dividend Yield

Dividend yield has been used in a number of studies to examine the impact of market changes on the cost of equity. While the cost of equity is difficult to estimate, papers have shown that dividend yield and cost of equity are closely related. Bekaert and Harvey (2000) discussed the theory behind this relationship and conclude that dividend yield is an easily observable and stationary variable. It, therefore, is an excellent proxy for viewing the effect of dramatic structural changes on the market. Bhattacharya and Daouk (2002), in applying this model, noted that it is possibly better suited to examining the effect of insider trading laws introduction than market liberalisation, the purpose of the Bekaert and Harvey (2000) study. They concluded that the major weakness of the dividend yield measure is that the dividend growth rate must be constant. This is more likely to be true for changes in insider trading laws as it has no real impact on the company's growth rate.

The results in Table 4.3 provide strong support for the hypothesis that the law change resulted in a substantial decrease in dividend yields. Panel A reports the test



results of the mean level of *DY* before the change with the average after the change. As can be seen the average has decreased from between .0557 to .0753 before the change period to just .0323 afterwards. This decrease is significant at the 1% level based on

**Table 4.3: Impact of Regulatory Change on Dividend Yield**

Panel A: Difference in Mean Dividend Yield								
	Mean	T-Stat	p-values	Wilcoxon	p-values			
Pre Regulation Change								
1996	0.0557	-2.2333	0.0286	-2.0230	0.0215			
1997	0.0626	-2.7362	0.0078	-3.1026	0.0010			
1998	0.0753	-3.8812	0.0002	-5.4245	0.0000			
1999	0.0654	-2.9147	0.0047	-3.7278	0.0001			
2000	0.0609	-2.9536	0.0042	-3.8554	0.0001			
2001	0.0588	-2.6656	0.0094	-3.1682	0.0008			
Change Period								
2002	0.0527	-1.6933	0.0946	-1.9385	0.0263			
Post Change								
Post	0.0323							
Panel B: Panel Regression Results								
	Model 1		Model 2		Model 3		Model 4	
Constant	0.1509	***	0.0776	***	0.1316	***	0.0814	***
	(0.0188)		(0.0299)		(0.0225)		(0.0305)	
Post	-0.0276	***	-0.0071	***	-0.0203	***	-0.0024	***
	(0.0015)		(0.0012)		(0.0013)		(0.0019)	
MV					-0.0070	***	-0.0089	***
					(0.0009)		(0.0015)	
CROSS					0.0112	***	0.0003	
					(0.0026)		(0.0035)	
AR(1)			0.9367	***			0.9372	***
			(0.0045)				(0.0043)	
R-Squared	0.8521		0.9778		0.8565		0.9783	
Durbin-Watson Statistic	0.1616		1.9370		2.2945		1.9428	

Note: Standard errors are shown in parentheses. The sample consists of 8330 firm months observations. All yearly means were calculated as calendar years with the exception of the post change period where the sample ran from April 2003 to March 2004. T-Stats were calculated using the matched pairs t-test. The dependent variable in all models is *DY* defined as the monthly average of the annualised dividend yield. *Post* is a dummy variable that equals 1 for firm months after December 2002, the time of the regulatory change. *MV* is the natural log of the firms market capitalisation averaged for the calendar month. *CROSS* is a dummy variable that equals 1 for those months in which a firm is cross-listed on another exchange. *AR(1)* is an autoregressive term where the coefficient is fixed across cross-sectional units.

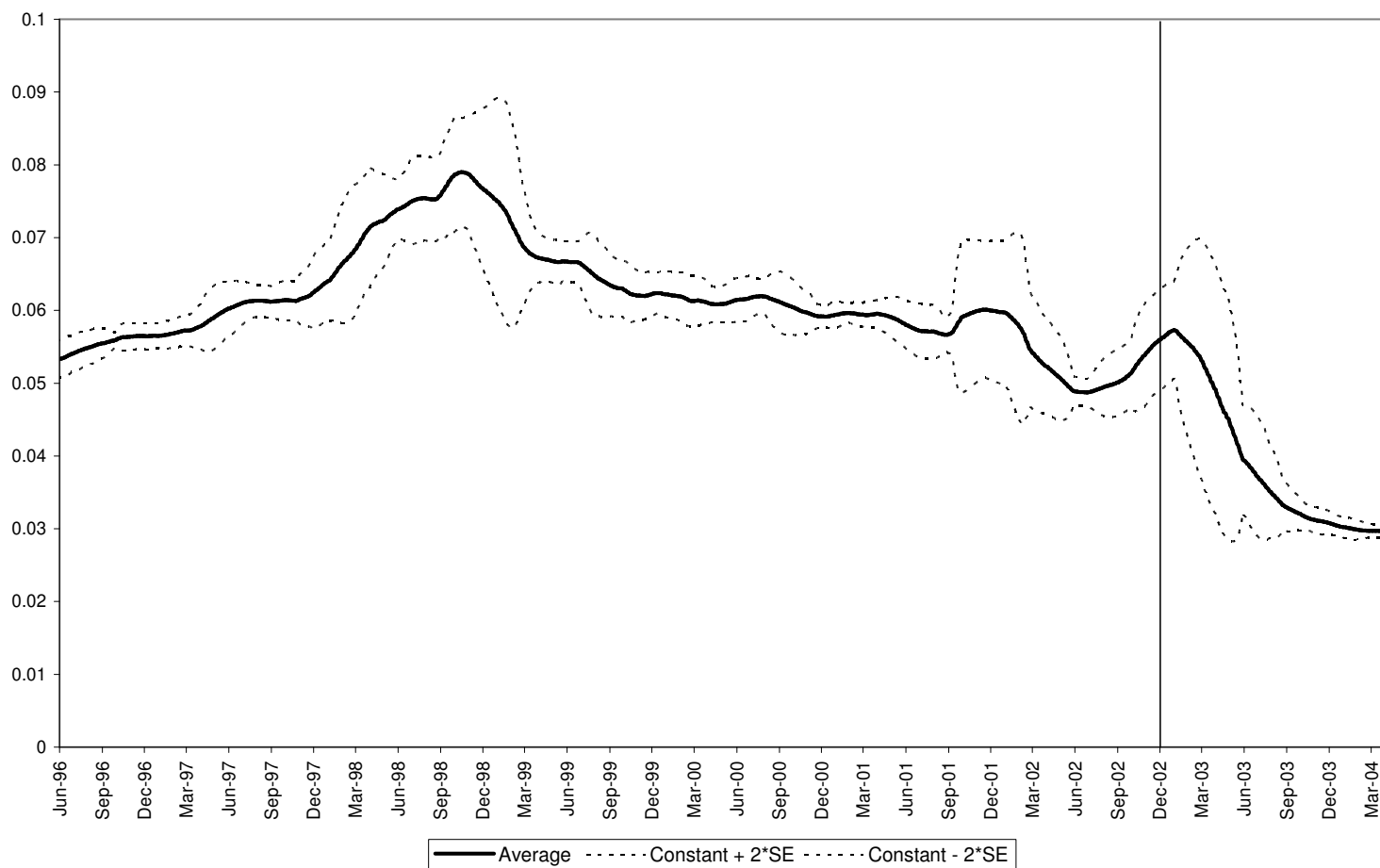
\*\*\* Significant at 1%,

both the matched pairs t-test and the Wilcoxon signed rank tests in all periods except for 1996 where it is significant at the 5% level. It was also interesting to note that based on

both the mean and the t-statistic there appears to be some pre-emption of the change. For the 2002 period there appeared to be a decrease in the mean dividend yield with a resulting decrease in the significance of the differences between the 2002 period and the post period.

This pre-emption is to a certain extent supported by the rolling regressions presented in Figure 4.1. There is a decrease in the average dividend yield starting at approximately December 2001, however it reverses and starts to increase about the middle of 2002. The graph shows more vividly the significant impact on dividend yield once the new law came into force on the 1<sup>st</sup> December 2002 (represented by the vertical line). After that date the results showed a very sharp and rapid decrease before *DY* settles at a new stable level after October 2003. This suggests that there was a sharp adjustment in the cost of equity brought about by the increase in the expected cost of insider trading. The graph also shows an increase in the *DY* between 1997-1998, declining in 1999. Similar patterns were observed in the *BAS* and *VOL* plots. This is likely caused by the Asian and Russian financial crises. These financial shocks caused a subsequent flight to safety in world capital markets. Given the dependence of NZ on Asia, one can observe the evidence of a loss of market confidence in this period which lead to higher costs of capital, more volatility and wider spreads.

The panel regression results presented in Table 4.3 Panel B also rejects the hypothesis of no impact on the dividend yield from the regulatory change. The results show that the dummy variable for all months following the change period, *POST*, is significant at the 1% level in the four regression models employed. After controlling for autocorrelation by introducing an autoregressive term the relationship between *POST* and *DY* still remains strong. The regressions in Models 3 and 4 also included several control variables that may have impacted on the relationship. As can be seen the *MV* variable also captured a significant proportion of the variation in *DY* while the *CROSS* variable is only relevant when the AR(1) is omitted from the regression. Controlling for both firm size and cross listings has little impact on the significance of the *POST* variable. The model also captures a significant proportion of the variation in dividend yield with an adjusted  $R^2$  of nearly .98 in Models 2 and 4.



**Figure 4.1: Rolling Regressions of Dividend Yield against a Constant**

Note: The vertical axis represents the estimate from a regression run on the previous 100 daily dividend yield averaged over 85 companies against a constant. The dividend yield is defined as the annualised dividend yield. The vertical line represents the date the new legislation came into force.

#### 4.3.3 Bid Ask Spreads

Several papers have developed theoretical models that make predictions about the effect insider trading has on the bid ask spread. Copeland and Galai (1988), Glosten and Milgrom (1985) and Kyle (1985) have all predicted a positive relationship between the prevalence of insider trading and the spreads that market makers set. This has also been supported by Chung and Charoenwong (1998) empirically who found that market makers, although not able to spot exactly when an insider trades, set greater spreads on firms with a greater incidence of insider trading to compensate for their losses to informed traders in the long run. The recent law changes in New Zealand should have raised the cost of insider trading and resulted in a reduction of the incidence as insiders trade less. As such, and in line with both the theoretical and empirical evidence, it is predicted that there should be a significant decrease in the spreads on companies in the New Zealand market.

Table 4.4 presents the results for the tests on the bid ask spreads. As can be observed in Panel A there is strong evidence of a significant decrease in the level of the log spreads in the post change periods. The mean bid ask spreads declined from an average of 3.95% (-3.23) in 1998 to a post change mean of 2.23% (-3.79). The difference in means is significant at the 1% level from 1998 onwards. These significance levels are also repeated for the Wilcoxon test values with only 1996 and 1997 having *p*-values not above the 1% level. The results of the panel regressions lend further support to the belief that there has been a decrease in the spreads following the introduction of the new laws. The *POST* variable is significant in all specifications at the 1% level. Figure 4.2 also confirms the impact of the regulatory change. The rolling regressions show a decrease soon after the new regime's commencement.

#### 4.3.4 Liquidity

Ausbel (1990) built on the earlier models of insider trading by attempting to quantify the impact of insider trading on investor confidence. One of the conclusions she made, in line with the models of Kyle (1985), Glosten and Milgrom (1985) and Copeland and Galai (1988), is that loss of investor confidence impacts negatively on the liquidity in a market. Investors, feeling uncertain about their prospects of getting a fair deal, are put off the market and reduce their investments. This finding was also

**Table 4.4: Impact of Regulatory Change on Bid-Ask Spreads**

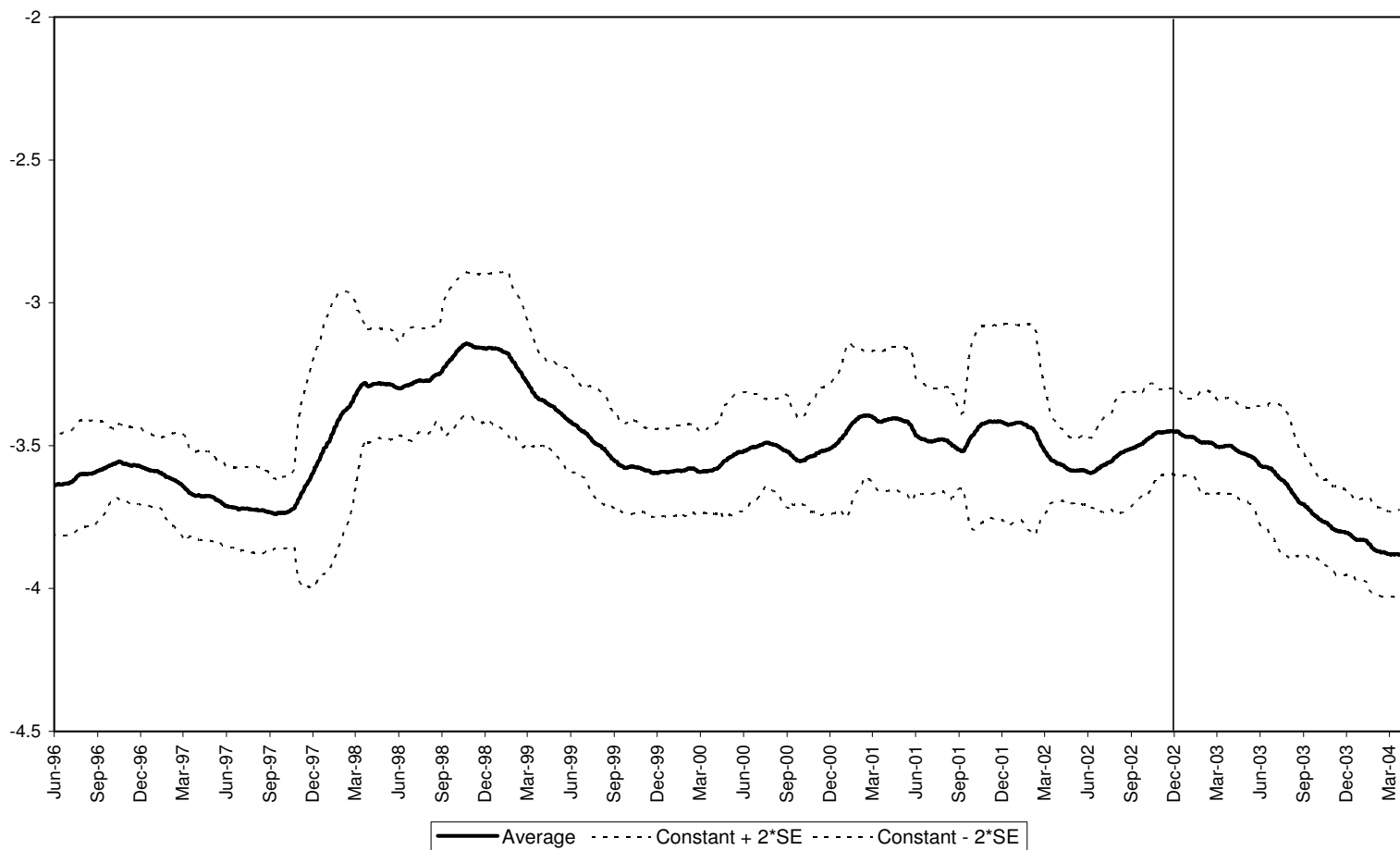
Panel A: Differences in Mean Bid Ask Spreads													
		Mean	T-Stat		<i>p</i> -values		Wilcoxon		<i>p</i> -values				
Pre Regulation Change													
	1996	-3.6027		-2.2546		0.0268		-2.0529		0.0200			
	1997	-3.6315		-1.9456		0.0551		-1.4920		0.0679			
	1998	-3.2308		-7.9399		0.0000		-6.3061		0.0000			
	1999	-3.5099		-4.3871		0.0000		-4.5713		0.0000			
	2000	-3.4984		-3.9294		0.0002		-4.3081		0.0000			
	2001	-3.4544		-5.7297		0.0000		-5.4855		0.0000			
Change Period													
	2002	-3.5180		-5.2523		0.0000		-5.5881		0.0000			
Post Change													
	Post	-3.7943											
Panel B: Panel Regression Results													
		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Constant		0.3650		0.4903		0.3689		0.4877		0.3686		0.4616	
		(0.2298)		(0.8121)		(0.4646)		(0.8032)		(0.5115)		(0.7191)	
Post		-0.2334 ***		-0.1742 **		-0.2156 ***		-0.1688 ***		-0.2158 ***		-0.1691 ***	
		(0.0153)		(0.0284)		(0.0150)		(0.0283)		(0.0151)		(0.0283)	
MV						-0.3627 ***		-0.4315 ***		-0.3605 ***		-0.4316 ***	
						(0.0104)		(0.0211)		(0.0105)		(0.0211)	
CROSS						-0.1082 ***		-0.0572		-0.1101 ***		-0.0573	
						(0.0289)		(0.0541)		(0.0289)		(0.0541)	
VAR										0.0092 **		0.0026	
										(0.0043)		(0.0037)	
VOL										-11.9573 ***		0.4289	
										(3.8161)		(2.4351)	
AR(1)				0.7658 ***				0.7412 ***				0.7412 ***	
				(0.0071)				(0.0074)				(0.0074)	
R-Squared		0.8081		0.9201		0.8327		0.9238		0.8330		0.9238	
Durbin-Watson Statistic		0.4715		2.2872		0.5237		2.2936		0.5269		2.2945	

Note: Standard errors are shown in parentheses. The sample consists of 8330 firm months observations. All yearly means were calculated as calendar years with the exception of the post change period where the sample ran from April 2003 to March 2004. T-Stats were calculated using the matched pairs t-test. The dependent variable in all models is *BA* defined as the natural log of the monthly average of the daily ask price minus the bid price divided by the midpoint of the spreads. *Post* is a dummy variable that equals 1 for firm months after December 2002, the time of the regulatory change. *MV* is the natural log of the firms market capitalisation averaged for the calendar month. *CROSS* is a dummy variable that equals 1 for those months in which a firm is cross-listed on another exchange. *VAR* represents the return volatility of the firm and is defined as the natural log of the variance of returns over the period -30,0, averaged over each calendar month. *VOL* represents the firms liquidity and is defined as the monthly average of the daily dollar value of trading divided by the market value of the company. *AR(1)* is an autoregressive term where the coefficient is fixed across cross-sectional units.

\*\*\* Significant at 1%

\*\* Significant at 5%

\* Significant at 10%



**Figure 4.3: Rolling Regressions of the Bid Ask Spread against a Constant**

Note: The vertical axis represents the estimate from a regression run on the previous 100 daily bid ask spreads averaged over 85 companies against a constant. The daily bid ask spread is defined as the natural logarithm of the bid price minus the ask price divided by the midpoint of the spreads. The vertical line represents the date the new legislation came into force.

supported by Fishman and Hagerty's (1995) model. The new law should result in less insider trading, as insiders trade only when their information will compensate for the increased costs. As a result, the liquidity of the sample firms should increase following the new laws introduction.

Panel A of Table 4.5 presents the results for liquidity. The results strongly support an increase in liquidity following the introduction of the Securities Market Amendment Act 2002. The average of the sample has increased from around .08% of the firms value traded per day, to .12%, a marked increase and nearly double the change period. The increase in liquidity was also significant across the board at the 5% level or better in all years. The only exception to this is the Wilcoxon signed rank test value for 1996, which has a  $p$ -value of .11. The rolling regressions in Figure 4.3 again strongly support this finding with an almost immediate increase following the introduction of the new law to a higher level than was observed at any point in the pre change period. The increase is relatively sharp with the new level being reached by June 2003.

Panel B of Table 4.5 also provides evidence to support the notion that the legislative changes have had an impact on insider trading. In all four model specifications the *POST* variable is positive and significant at the 1% level. Due to the use of market capitalisation as a denominator in the construction of the liquidity variable, *MV* was excluded from the regressions to avoid spurious relationships induced by the way the variable was constructed. *BA* was included instead due to the impact that spreads have on liquidity. The results showed that *CROSS* somewhat surprisingly has no impact on the volume traded, although *BA* is significant in both Models 3 and 4, although only at the 10% level in Model 4. The adjusted  $R^2$  showed that while the models are not as strong as those for dividend yield and bid ask spread, they still appeared to explain a reasonable amount of the variation in the liquidity. The results overall provided strong evidence that liquidity in the sample firms increased in the period following the introduction of the new insider trading laws.

#### 4.3.5 Log Volatility

The final measure examined is log volatility. Kyle (1985) argued that insider trading reduced the depth of a market making stocks more prone to price shocks and increased volatility. Therefore, another sign of an improvement in the market brought about by a reduction in insider trading would be a significant decrease in the volatility of the market.

**Table 4.5: Impact of Regulatory Change on Liquidity****Panel A: Difference in Mean Liquidity**

	Mean	T-Stat	p-values	Wilcoxon Signed Rank	p-values
Pre Regulation Change					
1996	0.0008	2.5412	0.0129	1.2028	0.1145
1997	0.0008	2.4695	0.0156	2.0485	0.0203
1998	0.0007	2.9096	0.0046	1.9311	0.0267
1999	0.0008	2.3514	0.0211	2.1050	0.0176
2000	0.0008	2.7762	0.0068	2.2923	0.0109
2001	0.0008	3.0935	0.0027	2.3369	0.0097
Change Period					
2002	0.0006	3.9622	0.0002	4.1253	0.0000
Post Change					
Post	0.0011663				

**Panel B: Panel Regression Results**

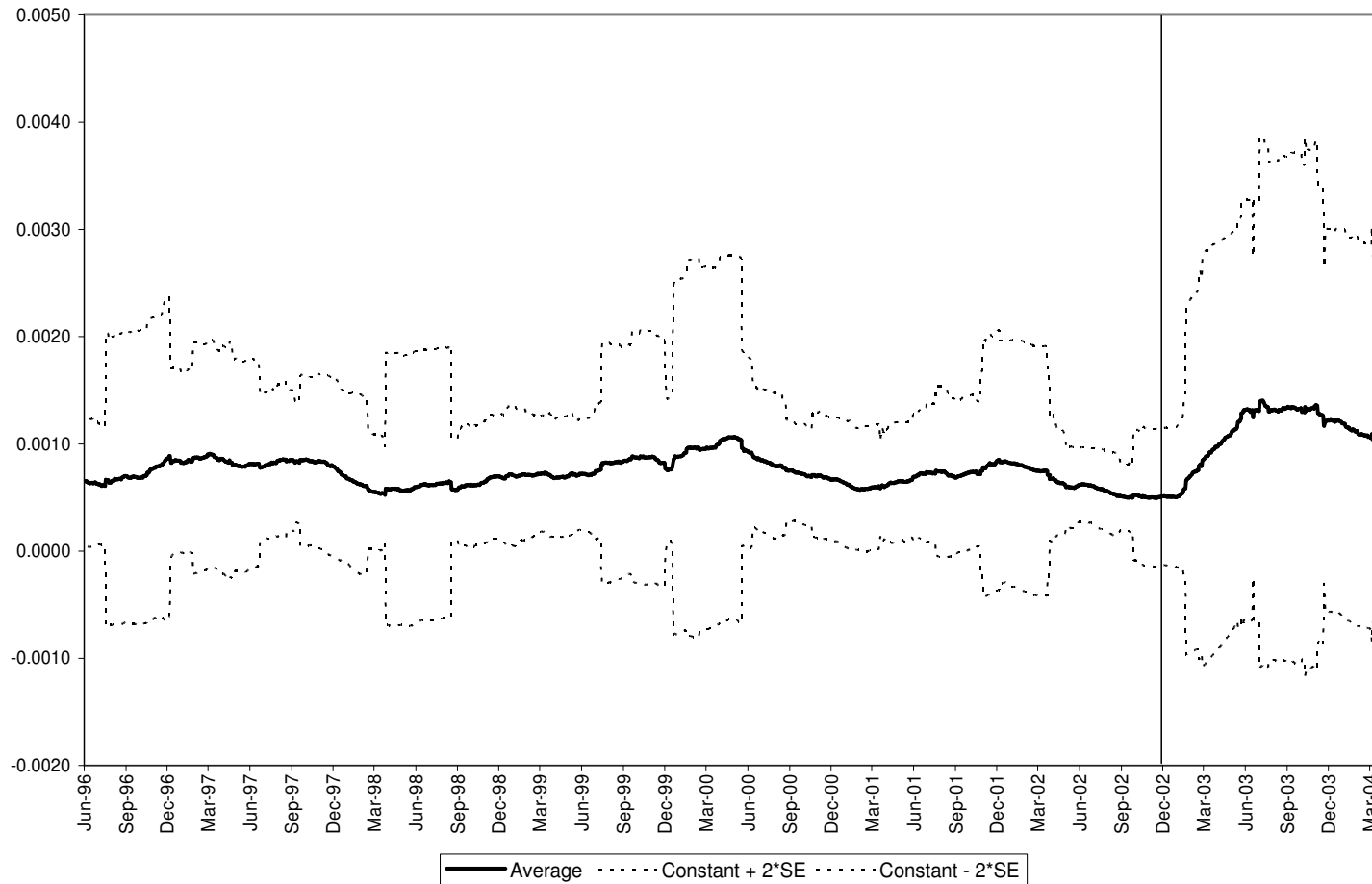
	Model 1		Model 2		Model 3		Model 4	
Constant	0.0005 ***	(0.0000)	0.0006 ***	(0.0000)	0.0005 ***	(0.0000)	0.0006 ***	(0.0000)
Post	0.0003 ***	(0.0000)	0.0002 ***	(0.0001)	0.0002 ***	(0.0000)	0.0002 ***	(0.0001)
CROSS					-0.0001	(0.0001)	-0.0001	(0.0001)
BA					-0.0001 ***	(0.0000)	-0.0001 *	(0.0000)
AR(1)			0.2776 ***	(0.0105)			0.2766 ***	(0.0105)
R-Squared	0.1881		0.2530		0.1890		0.2532	
Durbin-Watson Statistic	1.4378		2.0654		1.4405		2.0651	

Note: Standard errors are shown in parentheses. The sample consists of 8330 firm months observations. All yearly means were calculated as calendar years with the exception of the post change period where the sample ran from April 2003 to March 2004. T-Stats were calculated using the matched pairs t-test. The dependent variable in all models is *VOL* defined as the monthly average of the daily dollar value of trading divided by the market value of the company. *Post* is a dummy variable that equals 1 for firm months after December 2002, the time of the regulatory change. *CROSS* is a dummy variable that equals 1 for those months in which a firm is cross-listed on another exchange. *BA* defined as the natural log of the monthly average of the daily ask price minus the bid price divided by the midpoint of the spreads *AR(1)* is an autoregressive term where the coefficient is fixed across cross-sectional units.

\*\*\* Significant at 1%

\* Significant at 10%





**Figure 4.2: Rolling Regressions of the Bid Ask Spread against a Constant**

Note: The vertical axis represents the estimate from a regression run on the previous 100 daily liquidity averaged over 85 companies against a constant. The liquidity is defined as the dollar value of trading divided by the current market capitalisation. The vertical line represents the date the new legislation came into force.

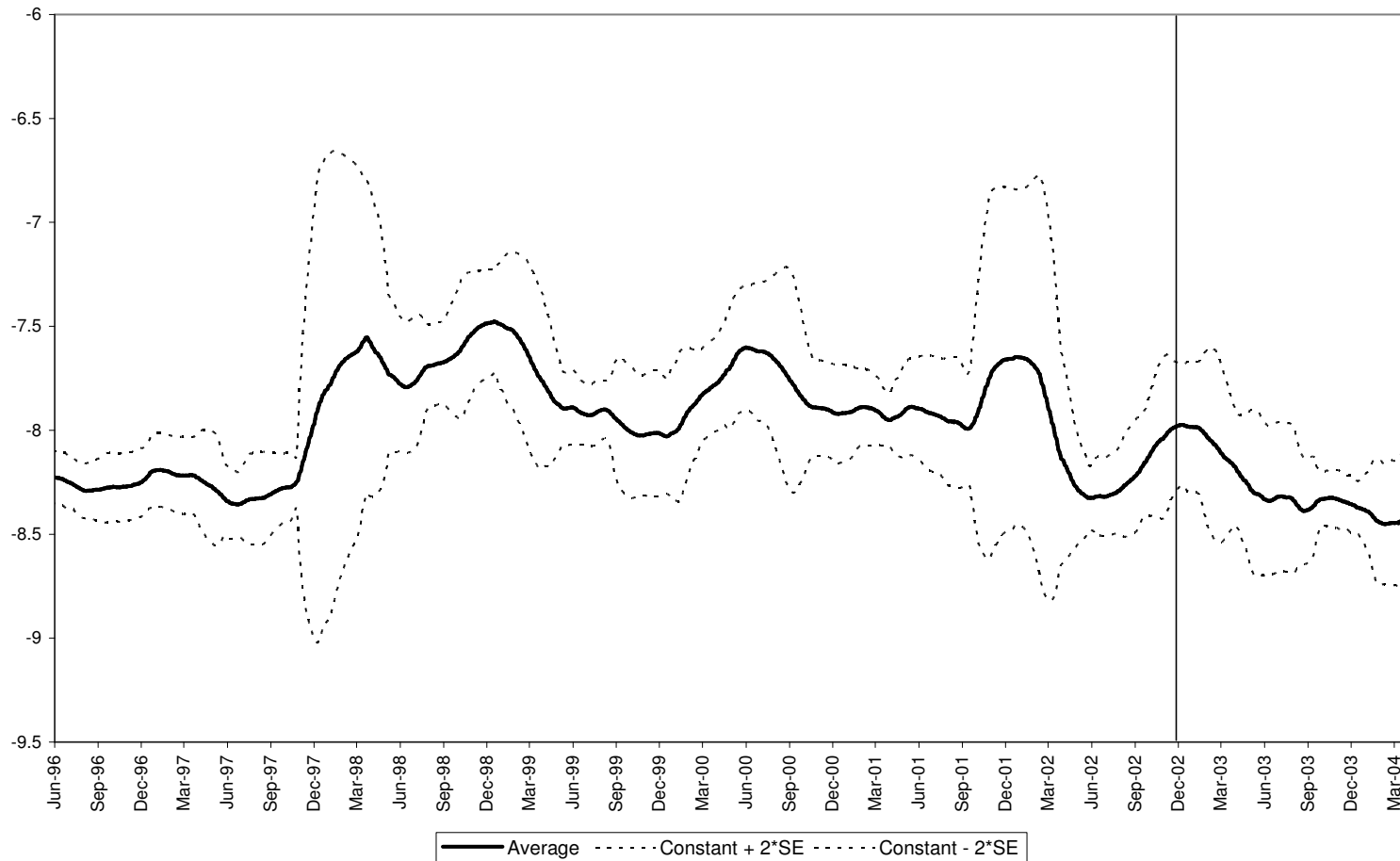
**Table 4.6: Impact of Regulatory Change on Log Volatility**

Panel A: Differences in the Return Volatility Means								
	Mean	T-Stat	p-values	Wilcoxon	p-values			
Pre Regulation Change								
1996	-8.2281	1.1959	0.2351	-0.2631	0.3962			
1997	-8.0981	2.3293	0.0222	1.7461	0.0404			
1998	-7.6468	6.9550	0.0000	5.6104	0.0000			
1999	-7.9400	3.6478	0.0005	4.2178	0.0000			
2000	-7.7784	6.2686	0.0000	5.1349	0.0000			
2001	-7.8299	5.0419	0.0000	4.5176	0.0000			
Change Period								
2002	-8.1669	1.7179	0.0895	1.9347	0.0265			
Post Change								
Post	-8.3935							
Panel B: Panel Regression Results								
	Model 1		Model 2		Model 3		Model 4	
Constant	-1.7246	***	-1.5909	***	-1.9149	***	-1.5748	***
	(0.0224)		(0.0919)		(0.0453)		(0.0959)	
Post	-0.2968	***	-0.1618	**	-0.3274	***	-0.1784	***
	(0.0363)		(0.0644)		(0.0381)		(0.0682)	
MV					-0.2156	***	-0.0726	
					(0.0265)		(0.0500)	
CROSS					0.0611		0.0569	
					(0.0733)		(0.1313)	
AR(1)			0.6383	***			0.6363	***
			(0.0085)				(0.0085)	
R-Squared	0.4640		0.6814		0.4682		0.6814	
Durbin-Watson Statistic	0.7269		1.8675		0.7350		1.8662	

Note: Standard errors are shown in parentheses. The sample consists of 8330 firm months observations. All yearly means were calculated as calendar years with the exception of the post change period where the sample ran from April 2003 to March 2004. T-Stats were calculated using the matched pairs t-test. The dependent variable in all models is *VAR* defined as the natural log of the variance of returns over the period -30,0, averaged over each calendar month. *Post* is a dummy variable that equals 1 for firm months after December 2002, the time of the regulatory change. *MV* is the natural log of the firms market capitalisation averaged for the calendar month. *CROSS* is a dummy variable that equals 1 for those months in which a firm is cross-listed on another exchange. *AR(1)* is an autoregressive term where the coefficient is fixed across cross-sectional units.

\*\*\* Significant at 1%

\*\* Significant at 5%



**Figure 4.4: Rolling Regressions of Share Volatility against a Constant**

Note: The vertical axis represents the estimate from a regression run on the previous 100 day's share volatility averaged over 85 companies against a constant. The share volatility was defined as the natural log of the variance in returns over the previous 30 days. The vertical line represents the date the new legislation came into force.

Panel A of Table 4.6 presents the mean log volatility before and after the law change. The results supported the hypothesis that the log volatility of shares had decreased compared with all years except 1996. While 1996 for both the t-test and the Wilcoxon signed rank test was insignificant, every other year is significant, with all but 1997 at the 1% level. There also appears to be a similar pre-emption to that observed in the dividend yield with the mean for 2002 being larger than those in the pre change period and the significance down to the 10% level for the t-test. The panel regressions in Panel B of Table 4.6 provided additional support for the impact of regulatory change. There was a strong negative association between *VOL* and *POST*, however the relationship seemed to weaken somewhat when serial correlation in the errors were controlled for. Likewise, the pattern depicted in Figure 4.4 was consistent with the decrease in log volatility occurring during a ‘U’ shape dip that climbs back up before the date the new regime came into effect. Once the new law was enacted there was a significant and sharp decrease in the volatility.

#### *4.3.6 Robustness Check*

To control for the possibility that our results have been biased by long-term trends in the four variables of interest we also utilise a portfolio approach. This methodology, as applied by Jaffe (1974), involves creating a portfolio of stocks and comparing the mean of the variable of interest to the time-series variation in the portfolio. The portfolio we employ is an equally-weighted average of the monthly values for each variable. This was then regressed against a constant and a regulation dummy that is one for months where the new regime was in effect and zero otherwise. The results displayed in Table 4.7 show support for the earlier findings based on the cross-sectional data. The dividend yield, volatility and bid-ask spreads all have a significantly negative relationship with the regulation dummy while liquidity has a positive and significant coefficient. These results support the earlier finding that the new law had resulted in marked improvements in the market.

The results for all four measures showed strong support for the contention that the introduction of the new law resulted in a marked change in the structure of the market. Dividend yields, bid ask spreads and volatility have all seen substantial decreases in the average level since the change in regulations, while the liquidity had significantly increased. For all measures the change can be shown to have occurred on, or very soon after, the change in the laws supporting the view that the structural change

**Table 4.7: Portfolio Approach Results**

	DY	BA	VOL	VAR
Constant	0.0631 <i>0.0000</i>	-3.4869 <i>0.0000</i>	0.0008 <i>0.0000</i>	-7.92 <i>0.0000</i>
Regulation Dummy	-0.0288 <i>0.0000</i>	-0.2562 <i>0.0000</i>	0.0003 <i>0.0000</i>	-0.4412 <i>0.0000</i>
R-Squared	0.7436	0.2553	0.1913	0.2551

Note: *p*-values are in parentheses. The sample consists of 8330 firm months observations. *BA* defined as the natural log of the monthly average of the daily ask price minus the bid price divided by the midpoint of the spreads. *VOL* represents the firms liquidity defined as the monthly average of the daily dollar value of trading divided by the market value of the company. *VAR* represents the return volatility of the firm and is defined as the natural log of the variance of returns over the period -30,0, averaged over each calendar month. *DY* is defined as the monthly average of the annualised dividend yield. *Regulation Dummy* is a dummy variable that equals 1 for months after December 2002 and 0 otherwise.

had occurred as a result of the change in the insider trading laws. The results also show that even controlling for other known determinants of the measures employed, the dummy variable for the post change period, *POST*, was significant in all cases, at the 1% level in most model specifications. The models used also showed high  $R^2$  values especially for the dividend yield and bid ask spreads suggesting a good fit. The new law appeared to have been effective in increasing the cost of insider trading and lowering its incidence, and therefore, the harm that it causes to the market microstructure.

#### 4.4 Conclusions

This chapter set out to examine the impact of tightening insider trading regulations on the structure of the New Zealand market. This was achieved by comparing four variables that have been shown to be impacted by insider trading. The variables examined were the dividend yield which was used to proxy for the cost of equity, the natural log of the bid-ask spread, liquidity measured as the daily percentage of the firm's market capitalisation traded, and finally the natural log of the volatility. If the new law had the expected effect one should see reductions in the cost of equity, spreads and return volatility accompanied by an increase in the liquidity. The results provided strong support for the notion that the improvements in the regulatory regime

had a positive impact on the market, as well as adding to the evidence that regulations do have a role in protecting the market from insiders. For all the variables, a significant change in the average level of the variables was observed after the introduction of the new law. Overall, the results provided strong evidence that the regulatory changes have resulted in a significant reduction in the microstructure effects of insider trading. Given the positive economic spin-offs a healthy financial market brings, countries lacking a strong enforcement record should explore and address the causes.

These results should be of interest to law makers in a number of countries around the world. Much of the improvements in the market appear to have come from increased investor confidence in the New Zealand Exchange, with a number of flow-on improvements in the market structure. This suggests that the laws and their general efficacy can have a significant impact on an investor's willingness to enter and participate in the market.

Having determined that regulations can be effective in controlling the harm of insider trading on the market, the next chapter will examine one aspect of the market in more depth, namely bid-ask spreads. Using a more sophisticated model, the question of whether the reduction in spreads was related to the regulations by examining the cost of information asymmetry in the market will be determined.

## Chapter 5

# Insider Trading, Regulation and the Components of the Bid-Ask Spread<sup>11</sup>

### 5.1 Introduction

Corporate insider trading (trading by directors, executives and large shareholders), if unregulated, may have an adverse effect on financial markets. In fact, 80% of countries with financial markets have regulations governing insider trading (Bhattacharya and Daouk, 2002). Such regulations are shown to increase liquidity, lead to wider share ownership and more accurate prices (Beny, 2005); reduce the cost of capital (Bhattacharya and Daouk, 2002); and increase analyst following (Bushman et al., 2005).

Market microstructure theory suggests that the presence of more informed traders increases the size of the bid-ask spread and hence the cost of trading for the uninformed (e.g. Copeland and Galai 1983; Kyle 1985; Glosten and Milgrom 1985). In poorly regulated markets, corporate insiders may represent a substantial proportion of more informed traders which can increase the cost of trading.<sup>12</sup> For such markets, effective regulation may reduce the degree of informational asymmetry and consequently reduce the spread. Effective regulation may be even more important for illiquid stocks or markets, because the probability of informed trading is shown to be higher in such cases (Easley et al., 1996).

In this chapter the issue of the impact of the introduction of a new, stricter set of regulations on the cost of trading for a relatively illiquid market is addressed. Changes in regulations are not observed frequently. However, in 2002 New Zealand changed its legislation with respect to insider trading (Securities Market Amendment Act 2002, henceforth SMAA). To determine whether the new legislation actually reduced the proportion of the spread attributable to information asymmetry, a standard decomposition model (Madhavan, Richardson and Roomans, 1997, hereafter the model

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<sup>11</sup> This chapter is based on Frijns, B., Gilbert, A. & Tourani-Rad, A. Insider Trading, Regulation and the Components of the Bid-Ask Spread. *Enterprise and Innovation Research Paper Series*, Faculty of Business, Auckland University of Technology.

<sup>12</sup> In a first endeavor to establish a relationship between the cost of trading and insider trading, Chung and Charoenwong (1998) found that firms with more prevalent insider trading have wider spreads.

will be referred to as MRR) is applied to a sample of 70 New Zealand Stock Exchange listed companies before and after the introduction of significantly stricter insider trading regulations.

The introduction of the new rules resulted in a significant decrease in the proportion of trading costs attributable to informational asymmetries. Conjointly, there was observed a decrease in total spread and a significant decline in the contribution of information asymmetry to price volatility. As our second contribution to the literature, the sample was split based on a measure for liquidity (number of trades) and pre-change information asymmetry. The decrease in information asymmetry is greatest and most significant for the least actively traded firms and those with the largest pre-change asymmetry. Finally, because it has been shown that estimated spread components are sensitive to model specification (De Jong et al., 1996), an alternative decomposition model (Glosten and Harris, 1988) was applied as a robustness check. This model reinforced the MRR results. Overall, our results are in line with La Porta et al. (2000), who stated that government intervention is vital in reducing the prevalence and problems associated with insider trading.

The purpose of the SMAA, enacted in December 2002, was to correct two major weaknesses in the previous legislation which resulted in a poor enforcement record. The first weakness was the lack of a public regulator. This had the consequence that enforcement was left to individual traders (who lack the resources to prosecute<sup>13</sup>) and the issuing company (who have strong incentives not to prosecute). Since the introduction of the SMAA, a public regulator, the Securities Commission, is able to prosecute corporate insider if the issuing company refuses to take action. The expectation of market commentators and legislators is that with the public regulator possessing both the ability and will to prosecute, enforcement should improve.

The second major concern was the disclosure regime of the previous legislation. Under the previous legislation, only large blockholders were required to disclose details of their trades in a timely fashion (five working days). More traditional corporate insiders, such as directors, were not required to disclose until the annual report was published, resulting in executives avoiding disclosure entirely. The SMAA now requires all insiders to disclose within five working days. The consequence of this should increase the timely flow of information and ultimately reduce the profitability of insider trades. Collectively, the changes to the legal regime in New Zealand should have

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<sup>13</sup> The laws of New Zealand do not allow for class action or contingency fee arrangements and plaintiffs potentially face significant counter claims for court costs if they lose.



resulted in both an increase in the cost of engaging in insider trading (a greater probability of being prosecuted) and a concurrent decrease in the profitability of insiders as a result of improved disclosure, which should result in an improvement in market quality.

The question of how regulatory changes affect the cost of trading is not new. The Regulation Fair Disclosure enacted in the USA in October 2000 required that any intentional disclosure of non-public information must be released to all parties (analysts, general public and other parties) simultaneously, and was therefore directly aimed at reducing the amount of informational asymmetry. Eleswarapu, Thompson and Venkatraman (2004) confirm this expectation and showed that informational asymmetry reflected in trading costs was lower after the introduction of the regulation. Using a spread decomposition model, Jiang and Kim (2005), confirmed the findings that informational asymmetry has decreased after the introduction of the new regulations.

## **5.2 The Model**

Determining the information asymmetry component of the spread was achieved by applying a decomposition model. These models split bid-ask spreads into three components identified by Demetz (1968) as determining the spread, information asymmetry, order processing and inventory-holding costs. There are two types of models that are frequently used for this purpose. The first type of model, which follows from the work of Roll (1984), relies on serial covariances of the time series of trades and quotes to decompose the spread (e.g. George, Kaul and Nimalendran, 1991; Stoll, 1989). The decomposition is accomplished by analysing how dealers update their quotes after a trade occurs. The second type of model, referred to as trade indicator models, rely on identifying whether a trade is buyer or seller initiated and examining the impact of buys and sells on prices. Of this type, there are three main models, Glosten and Harris (1988), MRR and Huang and Stoll (1997). Huang and Stoll (1997) proposed a model that explicitly decomposes prices into all three of the costs commonly associated with spreads, order-processing, inventory-holding and information asymmetry. The explicit decomposition of the inventory-holding costs however, makes the model of Huang and Stoll (1997) less appropriate for use in an electronic limit order book (LOB) market. In these markets inventory costs play little or no role in the setting of prices. (Ahn et al. 2002; Chung et al. 2004). The models of Glosten and Harris and MRR, which have been applied to LOB markets (e.g. Ahn et al. 2002; De Jong et al.

1996), are more suitable as they model only two components, permanent price impacts, which cover information asymmetry, and transitory price effects, which covers both order-processing and, if relevant, any inventory-holding costs. As a result of the difference in the treatment of the inventory holding costs, the Glosten and Harris and MRR models were preferred to that of Huang and Stoll. In addition, the Huang and Stoll model have also been shown to result in a high proportion of implausible estimates providing another reason to rely on MRR and Glosten and Harris (Van Ness et al. 2001).

Both Madhavan's et al. (1997) and Glosten and Harris' (1988) models rely on the assumption that the fundamental value of a risky security changes with the change in public beliefs. These changes in public beliefs arise from two sources of information: information that arrives due to new public announcements and information market participants can infer from order flow.

Firstly, when new information arrives through public news announcements, the fundamental value of the asset changes without a trade occurring. No trade occurs, because such events are observed by all market participants, who simultaneously update their information set, which leads to a change in the fundamental value. The amount by which the fundamental value changes due to the arrival of new public information is assumed to be measured by  $\varepsilon_t$ , which is an i.i.d. variable with mean zero.

Second, new information can arrive through order flow if traders with private information are present. When these privately informed traders are present, their trading activity reveals information to other market participants, which results in a change in the fundamental value. However, since not all traders are privately informed, order flow provides a noisy signal about future asset values. Further, as argued by Madhavan et al. (1997), it is the innovation or surprise in order flow that reveals new information about the fundamental value.<sup>14</sup> By relating the surprise in order flow to the change in the fundamental value of the asset, the amount of privately informed trading can be inferred.

To measure order flow, let  $x_t$  be a trade indicator at time  $t$  that equals one if a trade is buyer initiated and minus one if it is seller initiated (for trades that cross, i.e. trades initiated by both buyer and seller,  $x_t = 0$ ). The surprise in order flow can be defined as  $x_t - E[x_t|x_{t-1}]$ , where  $E[x_t|x_{t-1}]$  is the expected value of the trade direction at time  $t$  conditional on the previous trade direction. This expected value removes the

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<sup>14</sup> Glosten and Harris (1988) differ in this respect because they considered the total impact of the arrival of a new order and not the impact of the surprise in the new order.

predictability in the trade direction that comes from, for instance, order splitting. Practically, Madhavan et al. (1997) suggested use of the first order autocorrelation of the order flow ( $\rho$ ) to determine this expected value,  $E[x_t|x_{t-1}] = \rho x_{t-1}$ . The impact of the surprise in order flow on the change in beliefs, and therefore in the fundamental value, is measured by  $\theta(x_t - \rho x_{t-1})$ , where  $\theta$  captures the degree of informational asymmetry.

Given these two sources of information the process for the fundamental value of the asset can be defined. Let  $(\mu_t)$  be the post-trade expected value of the asset, which is driven by the two sources of information, then

$$\mu_t = \mu_{t-1} + \theta(x_t - \rho x_{t-1}) + \varepsilon_t. \quad (5.1)$$

Although it is impossible to make any inferences from (5.1), because  $\mu_t$  is unobserved, inferences can be drawn from the observed trade and quote processes. Quotes, for example, are set to reflect the information in the fundamental value. In addition, these quotes also incorporate a component that reflects the compensation to the liquidity providers for order processing and inventory costs ( $\phi$ ). Quotes are set around  $\mu_t$ , such that the ask quote ( $p_t^a$ ), is conditional on a buy order arriving and the bid quote ( $p_t^b$ ) is conditional on a sell order arriving,

$$\begin{aligned} p_t^a &= \mu_{t-1} + \theta(1 - \rho x_{t-1}) + \phi + \varepsilon_t, \\ p_t^b &= \mu_{t-1} - \theta(1 + \rho x_{t-1}) - \phi + \varepsilon_t. \end{aligned} \quad (5.2)$$

Since trades occur at the quoted prices, (5.2) also defines the process for transaction prices

$$p_t = \mu_{t-1} + \theta(x_t - \rho x_{t-1}) + \phi x_t + \varepsilon_t + \xi_t, \quad (5.3)$$

where  $\xi_t$  captures the effects of price discreteness. Finally, (5.3) can be expressed in first differences resulting in

$$\Delta p_t = \theta(x_t - \rho x_{t-1}) + \phi(x_t - x_{t-1}) + u_t, \quad (5.4)$$

where  $u_t = \varepsilon_t + \xi_t - \xi_{t-1}$ .

To estimate (5.4) Generalised Methods of Moments (GMM) was employed using the orthogonality conditions

$$E \begin{pmatrix} x_t x_{t-1} - x_t^2 \rho \\ u_t - \alpha \\ (u_t - \alpha) x_t \\ (u_t - \alpha) x_{t-1} \end{pmatrix} = 0, \quad (5.5)$$

where  $\alpha$  captures the drift in returns. The orthogonality conditions applied are essentially OLS conditions with an additional condition to identify  $\rho$ . The advantage of using GMM is that it places no distributional assumptions resulting in more robust standard errors. Since the error term in (5.4) is auto-correlated, the standard errors were computed using a Newey-West (1987) correction. In the estimation of the model all returns data was scaled by 100.

## 5.2 Data and Sample

The New Zealand Exchange is one of the smallest and least liquid of the developed markets around the world (Bhattacharya and Daouk, 2002). Over the course of our sample period, January 2001 to August 2004, the exchange had between 149 and 164 domestic issuers of equity, with a market capitalisation in August 2004 of NZ\$37 billion. Trades averaged between 40,000 and 60,000 per month at a value of around NZ\$2 billion. The market runs an electronic limit order book with no designated market makers. There are, however, a number of market participants that provide liquidity to the market, although they have no regulatory obligation to do so. The exchange runs a pre-opening session (between 9-10am) during which buys and sells can cross and the opening price is set to clear the market. There is also a post-close period (between 5-5:30pm) to allow for post-trading adjustment of orders, although price and trade changes are governed by a tight set of rules. Because prices in these periods are set under different mechanisms, all trades outside the normal trading hours were excluded.

Intraday transaction data, including the bid and ask quotes at the time of the trade, was obtained from the New Zealand Exchange (NZX). The data contain the transaction price, volume, time of the trade (rounded to the nearest second) and the best bid and ask quote at the time of the trade for all listed companies. To ensure enough data was available to estimate the model, the sample was restricted to the 70 most

actively traded stocks. These selected stocks traded on average more than five times per day over the entire sample period. Because the data does not contain any information about the direction of the trade (buyer or seller initiated), the quotes at the time of the trade were used to determine the trade direction. This was accomplished by comparing the transaction price to the prevailing bid/ask prices. A trade that occurred above the midquote (the average of the bid and ask prices) was classified as buyer initiated, while a transaction below the midquote are classified as seller initiated. Quotes at the midquote are left undetermined. Since only quotes at the time of the trade were available, it was impossible to match trades with lagged quotes as suggested by Lee and Ready (1991). However, Peterson and Sirri (2003) showed that success rates of matching trades and quotes are highest when quotes are not lagged. Moreover, since the NZX market runs an electronic limit order book, it was questionable whether there are any reporting delays in trades and quotes at all.

To explore the impact of the SMAA on trading costs two equal time periods were considered covering 18 months before and after the enactment date, 1 December 2002.<sup>15</sup> The pre-change period considered the timeframe June 2001 to November 2002, while the post-change period runs from March 2003 to August 2004. The start of the post-change period was deferred until March 2003 to control for some delays in the implementation of the new legislation by the NZX. While there was no specific phase-in of the provisions, full effective implementation did not occur until early 2003. Delaying the start of the post-change period ensured that the new legislation was fully effective.

Table 5.1 presents summary statistics for the full sample period and for the pre- and post-change subsamples. For the full sample, the average number of trades was around 19 per day, with a median value of 11. This is substantially lower than the mean and median values reported by Madhavan et al. (1997) for NYSE listed stocks (mean and median values 95 and 66, respectively), and by Ahn et al. (2002) for stocks listed on the Tokyo Stock Exchange (lowest reported mean and median values are 296 and 249, respectively). The average dollar spread was relatively low at 2.6 cents per share.

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<sup>15</sup> As a robustness check different pre- and post-change periods were also considered, with equal period of 12 months (the pre-change period covering November 2001 to November 2002 and post-change period covering March 2003 to March 2004), and with a pre-change period that ended in June 2002 (18 months ran from January 2001 to June 2002, 12 months from June 2001 to June 2002). The use of the earlier end date for the pre-change period allowed for checking whether market participants adjusted to the new legislation before it was enacted. All results, however, are consistent with those presented in this chapter and are therefore not reported.

However, given the low average share price of NZ\$3.14, the average percentage spread observed is very large at 1.19%. These percentage spreads are much larger than

**Table 5.1: Descriptive Statistics for the Sample Companies.**

	Full Sample	Pre-Change	Post-Change
<i>Average Number of Trades Per Day</i>			
Mean	18.48	18.10	19.54
Median	10.47	11.26	11.88
Std Deviation	20.26	21.24	20.79
1st Quartile	6.10	5.36	6.51
3rd Quartile	22.80	22.63	24.34
<i>Average Price</i>			
Mean	3.15	3.18	3.16
Median	1.96	2.12	1.97
Std Deviation	3.73	3.94	3.71
1st Quartile	1.12	1.12	1.05
3rd Quartile	3.53	3.17	4.25
<i>Average Quoted Dollar Spread</i>			
Mean	0.0252	0.0291	0.0222 <sup>***</sup>
Median	0.0156	0.0179	0.0142 <sup>**</sup>
Std Deviation	0.0284	0.0323	0.0253
1st Quartile	0.0107	0.0107	0.0097
3rd Quartile	0.0310	0.0370	0.0260
<i>Average Quoted Percentage Spread</i>			
Mean	1.18%	1.28%	1.14% <sup>**</sup>
Median	0.89%	0.98%	0.78% <sup>**</sup>
Std Deviation	0.85%	0.87%	0.98%
1st Quartile	0.64%	0.70%	0.55%
3rd Quartile	1.38%	1.62%	1.27%
<i>Volatility in Daily Prices</i>			
Mean	0.0217	0.0218	0.0206
Median	0.0161	0.0171	0.0137 <sup>**</sup>
Std Deviation	0.0153	0.0139	0.0176
1st Quartile	0.0134	0.0138	0.0114
3rd Quartile	0.0258	0.0252	0.0216

Note: This table reports summary statistics for the full sample (January 2001 and August 2004) and the pre-change (January 2001 and November 2002) and post-change (March 2003 and August 2004) subsamples. *Average Price* is computed as the cross-sectional average of average daily closing prices. *Average Quoted Dollar Spread* is the cross-sectional average of the bid-ask spread. *Average Quoted Percentage Spread* is computed as the cross-sectional average of the bid-ask spread divided by the midpoint of the spread. *Volatility in Daily Prices* is computed as the standard deviation of daily returns. Significance of means between the pre- and post-change samples is calculated using the matched pairs t-test. Significance of the medians is calculated using the Mann-Whitney-Wilcoxon test.

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

spreads observed by other studies. For example, Madhavan et al. (1997) observed a percentage of around 0.6%. Similar results are found for markets with limit order books: See Ahn et al. (2002) (between 0.31% and 0.56%) and Brockman and Chung (1999) (around 0.6%, Hong Kong Stock Exchange). Average daily volatility was around 2.6%, however the median volatility was substantially lower at 1.65%. This indicated a right-skewed distribution of daily volatility across the sample.

When the sample is separated into pre- and post-change periods a significant drop in both absolute and percentage spreads is observed. The average dollar spread decreased by nearly a quarter, and the average percentage spread declined by 0.25%. However, the summary statistics do not indicate a significant change in the number of trades and the average price, which implied that market conditions have remained similar. Finally, there is a significant decrease in median daily volatility, although there was a slight increase in average volatility. This implied, that with the exception of a small number of stocks, the majority appear to be less volatile after the enactment of the new legislation.

## **5.4 Results**

In this section the results for the decomposition model discussed in section 5.2 are discussed. First, the results for the full sample are presented. Second, the sample is split based on the trading activity of the stocks and based on the amount of informational asymmetry. Consecutively, as a robustness check, an alternative model (proposed by Glosten and Harris, 1988) is employed to decompose the spread. Finally, the volatility of the stocks in the sample is decomposed.

### *5.4.1 Impact of Legislation on the Informational Asymmetry Cost of Trading*

If the new legislation had been effective in reducing the incidence or profitability of insider trading, then a decrease in the cost of trading that can be attributed to privately informed traders should be observed. To test whether the new legislation had an effect on the cost of trading, and most importantly on the informational asymmetry cost of trading, the decomposition model (5.4) for the full sample period (June 2001 – August 2004), and the pre-change (June 2001 – November

2002) and post-change (March 2003 – August 2004) sub-periods was estimated. The results of this model for all stocks are reported in Table 5.2.<sup>16</sup>

The results for the informational asymmetry parameter  $\theta$ , which measures the degree to which informed trading affects the fundamental value of an asset are reported first. Since the new legislation was directly targeted at reducing insider trading, and insiders may represent a considerable subset of privately informed traders, it was expected that the informational asymmetry parameter would decrease in the period after the enactment of the legislation. Our results in Table 5.2 show support for this hypothesis. A significant decline in the mean value of  $\theta$  between the pre- and post-change periods from 0.1558 to 0.1369 was observed, a decrease of approximately 12%. A similar decrease is seen in the median values, which decrease (significantly) from 0.1199 to 0.1036. To determine whether the informational asymmetry decreased on a stock-by-stock basis, a Wald test was performed on the parameter estimates for each stock on the pre- and post-change subperiods. The results of this test are reported in the last two columns of Table 5.2, where the number of stocks for which  $\theta$  has decreased or increased at particular significance levels is reported. The results showed that nearly 45% of the stocks observed a significant decrease at the 5% level in the costs associated with information asymmetry. At the 1% level nearly 30% of the stocks see a decrease. In contrast, only five companies had an increase in  $\theta$ .

When considering the order processing and inventory costs parameter  $\phi$ , a decrease of similar magnitude to the decrease in informational asymmetry was observed. On average,  $\phi$  decreases by more than 14%, from 0.1649 to 0.1415. However, in contrast to the informational asymmetry parameter, the decrease was not significant. In addition, there was a slight increase in the median value of  $\phi$ , indicating that the decrease in mean value was driven by a few stocks with large  $\phi$  in the pre-change period. The lack of a significant decrease in mean values is further highlighted by the Wald tests on a stock-by stock basis. Only 17 companies see a significant decrease in the post-change period, while 12 companies had a significant increase. More than half the sample observed no significant change either way.

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<sup>16</sup> All estimated parameters had low standard errors, suggesting the parameters are estimated with great accuracy. Therefore, the low liquidity of the stocks in the sample is of no concern. Further, this study only found implausible results for parameter estimates in less than 6% of cases. This contrasts with the findings of Van Ness et al. (2001), who reported implausible results for the MRR decomposition model in approximately 18% of cases.



**Table 5.2: Parameter Estimates and Proportion of Informational Asymmetry.**

	Full Sample	Pre Change	Post Change		Wald Test of Significance of the Difference	
<i>Informational Asymmetry (<math>\theta</math>)</i>						
Mean	0.1614	0.1558	0.1369	*	Sig Decrease 5%	31
Std Err (average)	0.0109	0.0174	0.0140		Sig Decrease 1%	21
Std Dev	0.1573	0.1136	0.1343		Sig Increase 5%	5
Median	0.1188	0.1199	0.1036	*	Sig Increase 1%	5
<i>Order Processing and Inventory Costs (<math>\Phi</math>)</i>						
Mean	0.1436	0.1649	0.1415		Sig Decrease 5%	17
Std Err (average)	0.0123	0.0199	0.0159		Sig Decrease 1%	14
Std Dev	0.1645	0.2528	0.1690		Sig Increase 5%	12
Median	0.0663	0.0568	0.0681		Sig Increase 1%	7
<i>First Order Autocorrelation in the Order Flow (<math>\rho</math>)</i>						
Mean	0.4135	0.4120	0.4081		Sig Decrease 5%	16
Std Err (average)	0.0104	0.0174	0.0154		Sig Decrease 1%	13
Std Dev	0.0888	0.0951	0.0924		Sig Increase 5%	12
Median	0.3932	0.3939	0.3877		Sig Increase 1%	11
<i>Proportion of Information Asymmetry</i>						
Mean	0.5801	0.5893	0.5518	**	Sig Decrease 5%	40
Std Err (average)	0.0238	0.0587	0.0638		Sig Decrease 1%	39
Std Dev	0.2161	0.2266	0.2213		Sig Increase 5%	16
Median	0.6063	0.6246	0.5743	**	Sig Increase 1%	16

Note: This table reports summary statistics for the parameter estimates of (5.4) for the full sample (June 2001 to August 2004), and the pre- (June 2001 to November 2002) and post-change (March 2003 to August 2004) subsamples. The mean and the mean standard error (standard errors are HAC-corrected following Newey-West, 1987) for all stocks are reported. Additionally, the standard deviation of each parameter and the median parameter value is reported. The last column report the number of stocks for which there was a significant change in parameter value in the pre- and post-change periods. Significant changes between pre- and post-change periods are tested using a matched pairs t-test.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

The next parameter,  $\rho$ , captured the first order autocorrelation in the trade direction variable (order flow). This first order autocorrelation is expected to be positive, because continuations in trade direction are more likely due to, for example, order splitting. The stocks in our sample had on average a first order autocorrelation of approximately 0.41, with no substantial difference between the pre- and post-change periods, for either mean values or on a stock-by-stock basis. The value of  $\rho$  is also very similar to Madhavan et al. (1997), who found values between 0.37 and 0.41, but higher than values observed by Ahn et al. (2002) who found values between 0.23 and 0.31.

The last rows of Table 5.2 report summary statistics for the proportion of the spread attributable to informational asymmetry. Given the specification of the bid and ask prices in (5.2), the expected value of the spread is given as

$$E[(p_t^a - p_t^b)] = 2(\theta + \phi) .$$

The proportion of this spread attributable to informational asymmetry ( $\pi$ ) is therefore defined as

$$\pi = \frac{\theta}{(\theta + \phi)} .$$

Full sample estimates show an average proportion of information asymmetry of around 58%, with a slightly higher median value of 60%. This value was substantially larger than found in most other studies. The proportion of informational asymmetry typically made up less than 50% of the spread, regardless of the decomposition models used and markets studied. For the USA, studies found values for  $\pi$  between 35-50% (Stoll, 1989 (43%); Madhavan et al. (1997) (35-51%); Affleck-Graves et al., 1994 (43%); Lin et al., 1995 (39.2%); Kim and Ogden, 1996 (50%)). Similar results are found for the London Stock Exchange (Menyah and Paudyal, 2000 (47%)), Tokyo Stock Exchange (Ahn et al., 2002 (between 44-57%)) and Hong Kong Stock Exchange (Brockman and Chung, 1999 (33%)).

The results for the pre- and post-change periods showed a significant decrease in the proportion of the spread attributable to informational asymmetry, in both mean and median value. This provided evidence that the new legislation has been effective in reducing insider trading. Besides the significant decrease in mean and median, the results also indicated that nearly 60% of the stocks in our sample decreased in the proportion of informational asymmetry.

#### *5.4.2 The Role of Informational Asymmetry for Liquid versus Illiquid Stocks and High versus Low Pre-Change Asymmetry Stocks*

While the previously presented results showed a significant reduction in the cost of informational asymmetry and its contribution to the bid-ask spread, the benefits of the new legislation and its effect on the cost of trading are in no way guaranteed to affect each stock uniformly. Companies with a high propensity towards insider trading are typically small and less liquid companies (Friederich et al., 2002; Lakonishok and Lee, 2001), and it is these companies that are likely most affected by the new legislation. Therefore it is conjectured that companies showing a significant decrease in

the proportion of the spread attributable to information asymmetry were less liquid companies.

To examine this hypothesis, the results were sorted into two sub-samples based on trading activity (average number of daily trades) over the full sample. The 30 most actively traded stocks and the 30 least actively traded stocks were considered and the results reported for the proportion of the spread attributable to informational asymmetry in Table 5.3, Panel A. The results showed that the reduction in the cost of trading due to informational asymmetry (“IA”) mainly manifests itself in the least actively traded stocks. For these stocks the decrease in this proportion was significant, decreasing from over 66% to less than 60%. For the most actively traded stocks the decrease was marginal and insignificant. These results provided strong evidence for our hypothesis. In addition it was observed that the average level of the proportion of informational asymmetry was lower for the more actively traded stock. This confirmed the notion that less actively traded stocks are more affected by informed trading.

As a secondary analysis, the sample was also sorted based on the pre-change proportion of asymmetry to determine if the effect of the new legislation was greatest for those stocks most affected by insider trading (high pre-change proportion of informational asymmetry). Results for the top and bottom 30 stocks in this sort are reported in Panel B. The results were even more pronounced. Virtually all of the reduction in the proportion of informational asymmetry comes from those stocks with a high pre-change proportion, where a significant decrease from 0.7716 to 0.6934 was observed. This again indicated that the legislation had been most effective for these companies.

The previously presented results all indicated that the proportion of informational asymmetry decreased after the enactment of the new legislation. To investigate whether this decrease actually occurred immediately following the enactment, the decomposition model was estimated using a 12 month rolling window, which is moved forward by one month. Based on these rolling windows the total proportion of informational asymmetry was calculated for each period, and for the top and bottom 30 stocks in terms of trading activity. The results are presented in Figure 5.1.

Figure 5.1 shows a steep and long-lived decrease in the average proportion of both the full sample and the low trade firms starting immediately after the introduction of the new laws. High trade firms on the other hand showed only a very slight decrease

**Table 5.3: Proportion of Informational Asymmetry Sorted on Trading Activity and Pre-Change Informational Asymmetry.**

Panel A: Sort on Trading Activity					
	Low Trades			High Trades	
	Pre-Change	Post-Change		Pre-Change	Post-Change
<i>Proportion of Information Asymmetry</i>					
Mean	0.6650	0.5992 **		0.5210	0.5121
Std Err (average)	0.0692	0.0767		0.0504	0.0498
Std Dev	0.2053	0.2247		0.2264	0.2092
Median	0.7240	0.6526 **		0.5567	0.5103
Panel B: Sort on Pre-Change Proportion of Information Asymmetry					
	Low Asymmetry			High Asymmetry	
	Pre-Change	Post-Change		Pre-Change	Post-Change
<i>Proportion of Information Asymmetry</i>					
Mean	0.4131	0.4045		0.7716	0.6934 ***
Std Err (average)	0.0199	0.0233		0.0997	0.1029
Std Dev	0.1527	0.1851		0.0890	0.1483
Median	0.4338	0.4597		0.7511	0.6741 **

Note: The proportion of information asymmetry is defined as  $\theta/(\theta + \phi)$ . Low and High Trades contain the estimates of the lowest and highest 30 companies when sorted by number of trades. Low Asymmetry and High Asymmetry contain the lowest and highest 30 companies when sorted by pre-change proportion of information asymmetry.

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

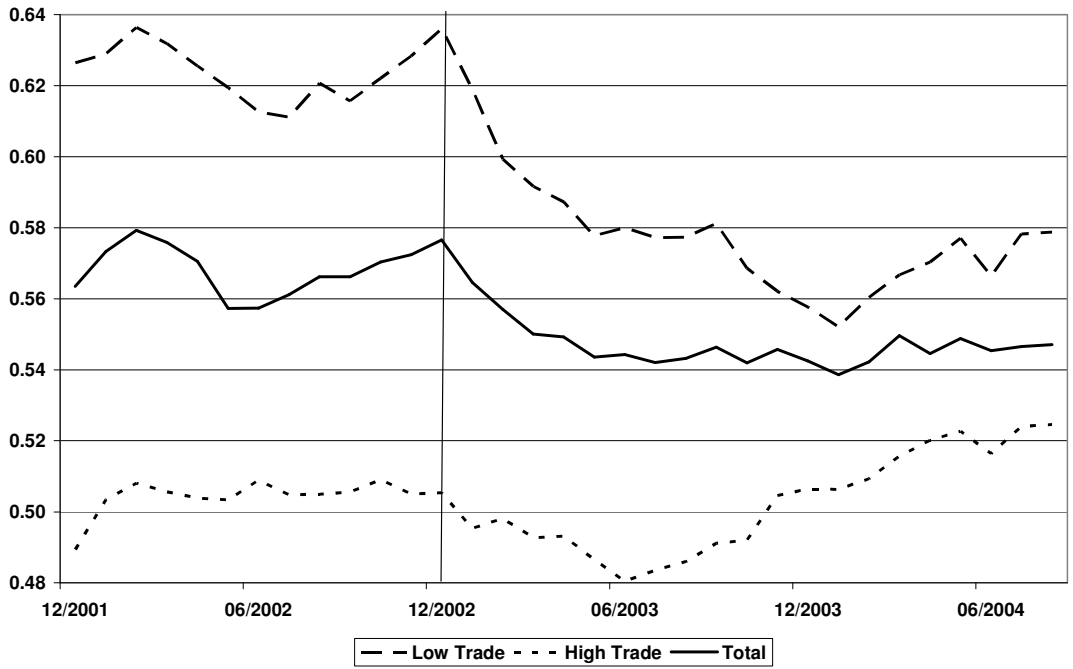
in the information asymmetry component around the time of the introduction of the new law, and towards the end of the sample period had higher proportions than the pre-change period. The timing of the decreases for the low trade firms and the size of the decrease certainly suggested the new regulations have been effective in reducing the IA component of the spreads.

#### 5.4.3 Robustness analysis: The Glosten and Harris (1988) decomposition model

Since De Jong et al. (1996) showed that parameter estimates of a decomposition model strongly depend on the specification of the model, estimates for informational asymmetry and order processing and inventory costs were obtained using an alternative model. Specifically, the Glosten and Harris (1988) decomposition model was employed which has been used in markets with electronic limit order books (Ahn et al., 2002). Similar to the MRR model, this model is also a trade indicator model. In contrast to the MRR model, it allows informational asymmetry and order processing and inventory costs to be a function of traded volume. The model reads

$$\Delta p_t = \alpha + \theta_0 x_t + \theta_1 x_t V_t + \phi_0 \Delta x_t + \phi_1 \Delta x_t V_t + \eta_t, \quad (5.6)$$

where  $\alpha$  captures the drift in returns,  $V_t$  was the traded volume at time  $t$  and  $\eta_t$  captures the arrival of new public announcements and the effects of price discreteness. The parameters  $\phi_0$  and  $\phi_1$  related to the order processing and inventory costs, while  $\theta_0$  and  $\theta_1$  relate to the informational asymmetry costs. (5.6) was estimated using ordinary least squares where all the traded volumes were normalised by dividing by 1000. Similar to (5.4), the error term of the model is autocorrelated. Therefore, standard errors were computed using a Newey-West correction. In line with De Jong et al. (1996), the sample was truncated by removing all transactions that have more than twice the median traded volume. This removed the effect of extremely large trades, which have a huge impact on the parameter estimates (see Hausman et al., 1992).



**Figure 5.1: 12 Month Rolling Average Proportion of Information Asymmetry**

The inclusion of traded volume in Glosten and Harris (1988) model allowed for examination of the question of whether informed traders prefer to trade at large or small volumes. Glosten and Harris, for example, postulated that insiders try to maximise profits, by trading large volumes of shares and supported their hypothesis by showing that  $\theta_1$  is positive. Similar findings in different settings are found by, for example, Seppi

(1992), Easley, Keifer and O'Hara (1997), and Chung and Charoenwong (1998). However, the evidence on the informational role of large trades was not unanimous. Barclay and Warner (1993), for example, found that medium sized trades are most informative and concluded that informed traders attempt to maintain anonymity by splitting trades into several medium sized transactions. This so-called stealth hypothesis is supported by Chakravarty (2001). In our analysis therefore  $\theta_l$  is expected to be positive if informed traders prefer large volumes or  $\theta_l$  to be insignificantly different from zero if informed traders split orders.

In Table 5.4, Panel A, the summary statistics for the parameter estimates of (5.6) are presented. The results are in line with findings of the Madhavan et al. (1997) estimates. The parameter relating to informational asymmetry  $\theta_0$  experienced a significant reduction between the pre- and post-change periods. A reduction in the order processing and inventory costs,  $\phi_0$ , is also observed however, this reduction was insignificant. Overall, the value for  $\theta_l$  provided some evidence for the hypothesis that large trades are more informative, however, in the post-change period  $\theta_l$  decreased significantly. This may be a consequence of the fact that insiders typically traded large volumes. With the reduction in insiders trading, the impact of large trades on the value of the asset also reduced. The negative value for  $\phi_l$  indicates that large trades lead to lower order processing and inventory costs (in line with Ahn et al., 2002). This indicated that order processing costs (which reduce proportional to traded volume) are the most important costs in this market. If market participants needed to be covered for inventory costs, it would be expected that  $\phi_l$  would be positive, as large trades lead to large inventory imbalances.

Panel B presents the informational asymmetry ( $\theta_0 + \theta_l \tilde{V}$ ) and order processing and inventory costs ( $\phi_0 + \phi_l \tilde{V}$ ) for median trade volumes. The proportion of the spread attributable to informational asymmetry,  $\frac{(\theta_0 + \theta_l \tilde{V})}{(\theta_0 + \theta_l \tilde{V}) + (\phi_0 + \phi_l \tilde{V})}$ , is also reported.

The results again supported the findings of the MRR model, with a significant decrease in the informational asymmetry component from 0.185 to 0.154. The same conclusion can be drawn from the proportion of the spread attributable to informational asymmetry, where it was found a significant decrease in the post-change period.

**Table 5.4: Glosten and Harris Model Parameter Estimates.**

Panel A: Summary Statistics for Parameter Estimates				
	Full Sample	Pre-Change	Post Change	
<i>Informational Asymmetry</i>				
$\theta_0$				
Mean	0.1390	0.1692	0.1515	*
Std Dev	0.0169	0.0329	0.0227	
Median	0.1167	0.1105	0.1247	
$\theta_1$				
Mean	0.0056	0.0061	0.0019	*
Std Dev	0.0106	0.0154	0.0127	
Median	0.0007	0.0013	-0.0003	
<i>Order Processing and Inventory Costs</i>				
$\phi_0$				
Mean	0.4216	0.4823	0.4619	
Std Dev	0.0188	0.0481	0.0368	
Median	0.2904	0.3088	0.3183	
$\phi_1$				
Mean	-0.0027	-0.0129	-0.0050	
Std Dev	0.0079	0.0226	0.0207	
Median	-0.0013	-0.0015	-0.0017	
Panel B: Componentes and Proportions at Median Traded Volumes				
Informational Asymmetry	0.2880	0.3728	0.3013	**
Order-Processing and Inventory Costs	0.8352	0.9091	0.9150	
Proportion of Inf. Asymmetry	0.2817	0.2892	0.2746	**

Note: This table presents summary statistics for the parameter estimates of the Glosten and Harris (1988) decomposition model (6) in Panel A. Panel B reports the different components of the model and the proportion of informational asymmetry in the spread measured at median traded volumes. The asymmetric information component is defined as  $(\theta_0 + \theta_1 \tilde{V})$  and the order processing and inventory component is defined as  $(\phi_0 + \phi_1 \tilde{V})$ , where  $\tilde{V}$  is the median traded volume. The proportion of informational asymmetry is defined as

$$\frac{(\theta_0 + \theta_1 \tilde{V})}{(\theta_0 + \theta_1 \tilde{V}) + (\phi_0 + \phi_1 \tilde{V})}.$$

Significance between pre- and post-change periods is tested using a matched pairs t-test.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Interestingly, it was found that the proportion of the spread is roughly half of the proportion calculated using the MRR model. However, similar results are found by Ahn et al. (2002) and these results confirm that findings are highly dependent on model specification.

#### 5.4.4 The Contribution of Informational Asymmetries to Price Volatility

The decomposition model of MRR also allowed us to infer the impact of informational asymmetries on the price volatility of a stock. Using the model for price processes (5.4), MRR showed that price volatility can be decomposed into several components: the variance in public news shocks; price discreteness; trading costs (order processing, etc.); and informational asymmetry. In this section therefore the questions of whether the new legislation resulted in a decrease in price volatility, and more specifically in the proportion of price volatility attributable to informational asymmetry is investigated.

Expressing (5.4) in terms of variances gives

$$\text{var}[\Delta p_t] = \sigma_\varepsilon^2 + 2\sigma_\xi^2 + (1-\lambda)[(\theta + \phi)^2 + (\rho\theta + \phi)^2 - 2(\theta + \phi)(\rho\theta + \phi)\rho], \quad (5.7)$$

where  $\sigma_\varepsilon^2$  measured the volatility caused by public news shocks,  $\sigma_\xi^2$  measured the effect of price discreteness on volatility, and  $\lambda$  measured the variance of the trade indicator  $x_t$ . To identify the additional parameters, two extra orthogonality conditions were added to (5.5)

$$E \begin{pmatrix} (u_t - \alpha)^2 - (\sigma_\varepsilon^2 + 2\sigma_\xi^2) \\ (u_t - \alpha)(u_{t-1} - \alpha) + \sigma_\xi^2 \end{pmatrix} = 0. \quad (5.8)$$

The variance of the trade indicator,  $\lambda$ , can be estimated outside the GMM as it does not affect any of the other parameters.

Expression (5.7) can be decomposed in to several components that affect price volatility. The contribution of public news shocks total volatility is measured by  $\sigma_\varepsilon^2$ , the contribution of price discreteness by  $2\sigma_\xi^2$ , information asymmetry is captured by the component relating to  $\theta$ ,  $(1-\lambda)(1-\rho^2)\theta^2$  and the trading frictions are captured by the components relating to  $\phi$ ,  $2(1-\lambda)(1-\rho)\phi^2$ . Additionally, there remains an interaction term between trading frictions and informational asymmetry of the magnitude  $2\phi\theta(1-\lambda)(1-\rho^2)$ . Apart from the first component, all these components relate to market frictions.



In Table 5.5 the total price volatility (on a transaction basis) and the relative contributions of each of the components to either price volatility or to the total amount of market frictions are presented. Following the introduction of the new law, a substantial drop in total price volatility from 0.0057 to 0.0048 was observed. To determine which factors contributed to this decrease in volatility the separate components were examined. First, it was observed that more than 50% of the total price volatility was caused by public news announcement. However, the post-change period saw a decrease in this proportion. This could be one contributing factor that explains the decrease in total volatility. However, it also indicated that more volatility is generated by the market frictions in the post-change period.

The components of the market frictions are expressed as proportions of the total market frictions. Of these components, price discreteness contributed most to the total frictions. This component was one of the smallest contributors observed by MRR, but is likely a consequence of the minimum tick size of 1 cent in conjunction with the low average share prices for stocks listed on the NZX. When considering the contribution of informational asymmetry to the total market frictions, a significant decrease in the post-change period was observed. Both mean and median proportions decreased by more than 3%. The importance of this decrease is further highlighted by the number of companies that saw a decrease in this proportion. For 48 companies this proportion decreased. When considering the portion of market frictions attributable to trading frictions a significant increase of 4% was found. Again the increase was experienced by a substantial number of stocks. For 40 stocks this proportion increased. Lastly, for the interaction term little change was observed between the pre- and post-change periods.

As noted before, the impact of the new legislation was expected to be most effective for small and less actively traded firms. Therefore, the sample was split based on trading activity (average daily number of trades) and considered the top 30 stocks and the bottom 30 stocks in terms of trading activity. In Table 5.6 Panel A the results for the proportion of market frictions attributable to informational asymmetry are reported. For the average proportion of market frictions a similar decrease was found in the proportion. However, only the decrease for the low trades stocks was significant. Findings are more pronounced when turning to median values, the decrease was large and significant for the least actively traded stocks and only marginal and insignificant for the most actively traded stocks.

**Table 5.5: Components of Price Volatility.**

	Full Sample	Pre Change	Post Change	Breakdown of Changes	
<i>Total Volatility</i>	0.0053	0.0057	0.0048		
<i>Public Information</i>					
Proportion of Total Volatility	0.5403	0.5644	0.5101 *	Prop Decreased	35
Standard Deviation	0.2159	0.1898	0.1977	Prop Increased	26
Median	0.5554	0.5801	0.5419		
<i>Price Discreteness</i>					
Proportion of Market Friction	0.4796	0.4766	0.4667	Prop Decreased	33
Standard Deviation	0.1859	0.1965	0.1950	Prop Increased	28
Median	0.5219	0.5290	0.5020		
<i>Information Asymmetry</i>					
Proportion of Market Friction	0.2035	0.2030	0.1705 *	Prop Decreased	48
Standard Deviation	0.1890	0.1553	0.1383	Prop Increased	13
Median	0.1486	0.1771	0.1381 *		
<i>Transaction Cost</i>					
Proportion of Market Friction	0.1416	0.1392	0.1761 **	Prop Decreased	21
Standard Deviation	0.1646	0.1596	0.1890	Prop Increased	40
Median	0.0891	0.0814	0.0972		
<i>Interaction</i>					
Proportion of Market Friction	0.1753	0.1812	0.1867	Prop Decreased	29
Standard Deviation	0.0791	0.0872	0.0843	Prop Increased	32
Median	0.1806	0.1790	0.1917		

Note: This table presents the several components of price volatility. Total price volatility is computed as the volatility on a transaction basis. The five components of the price volatility follow from the decomposition of volatility as given in equation (7) and are reported as a proportion of total volatility or as a proportion of total market frictions. Significance between pre- and post-change periods is tested using a matched pairs t-test.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

**Table 5.6: Informational Asymmetry as a Proportion of Market Frictions Sorted on Trading Activity and Pre-Change Informational Asymmetry.**

Activity and Pre-Change Informational Asymmetry:						
Panel A: Sort on Trading Activity						
	Low Trades			High Trades		
	Pre-Change	Post-Change		Pre-Change	Post-Change	
<i>Information Asymmetry</i>						
Proportion of Market Friction	0.2315	0.1999	*	0.1762	0.1487	
Standard Deviation	0.1382	0.1376		0.1763	0.1381	
Median	0.2142	0.1595	*	0.1247	0.1156	
Panel B: Sort on Pre-Change Proportion of Information Asymmetry						
	Low Asymmetry			High Asymmetry		
	Pre-Change	Post-Change		Pre-Change	Post-Change	
<i>Information Asymmetry</i>						
Proportion of Market Friction	0.0867	0.0888		0.3117	0.2480	**
Standard Deviation	0.0532	0.0686		0.1571	0.1515	
Median	0.0787	0.0721		0.2796	0.1985	*

Note: Low and High Trades contain the estimates of the lowest and highest 30 companies when sorted by number of trades. Low Asymmetry and High Asymmetry contain the lowest and highest 30 companies when sorted by pre-change proportion of information asymmetry. Significance between pre- and post-change periods is tested using a matched pairs t-test.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Additionally, firms were also sorted by pre-change informational asymmetry and reported results for the top 30 and bottom 30 firms in Panel B. The results showed a huge difference between the low and high asymmetry groups. Low asymmetry stocks had a proportion of only 8% of total market frictions, and this proportion remained stable over the pre- and post-change periods. For high asymmetry firms the proportion was over 30% in the pre-change period. This, however, decreased significantly in the post-change period to less than 25%.

## 5.5 Conclusion

In this chapter the impact of a significant tightening in regulations targeted directly at all aspects of insider trading and dealing in New Zealand was examined. The New Zealand Stock market is a small and illiquid market, and was previously poorly regulated with respect to insider trading. Recent changes in the regulatory regime provided an ideal setting to examine the impact of effective government intervention on the cost of trading. This issue was explored by decomposing the spread into separate components and showed strong evidence of a relationship between the efficacy of

insider trading rules and proportion of the spread attributable to information asymmetry. These results were robust over different model specifications. Splitting the sample based on a proxy for liquidity (number of trades) and pre-change information asymmetry, it was found that the results were mainly driven by illiquid firms who suffer from high pre-change informational asymmetry. This implies that the legislation is most beneficial for these firms. Lastly, it was found that overall stock price volatility decreased after the introduction of the new law and that the contribution of informational asymmetry to the total frictions that cause volatility decreased significantly.

The findings of this chapter suggest that the introduction of effective measures to limit insiders may be beneficial for other markets. Many countries suffer a similar lack of appropriate regulation to address insider trading. While the liquidity of the New Zealand market is not representative of other developed markets, a majority of stocks listed on these markets may suffer from a similar lack of market attention. For these stocks and countries effective government intervention may prove beneficial. However, while effective intervention may prove worthwhile, the literature is quiet on the aspects that make for good insider trading laws. This absence is addressed in the next chapter.

## **Chapter 6**

### **Elements of Effective Insider Trading Laws**

#### **6.1 Introduction**

As has been shown in the previous chapters and in other studies, insider trading laws can be effective in controlling the impact insiders have on a number of aspects relating to financial markets. Strong insider trading laws can increase liquidity and share ownership (Beny, 2005), alter the informational basis of insiders trades, reduce the abnormal returns insiders receive and reduce the volatility of share prices, the cost of capital (Bhattacharya and Dauok, 2002), and the bid-ask spread (Chung and Charoenwong, 1998). However, this only occurs when the legal regime makes the cost of insider trading sufficiently high and/or the benefit low enough that the incentive for insiders to trade is significantly reduced. The benefits to the market of such laws however are high and include a stronger, more efficient capital market with lower risks of transacting, reduced transaction costs and more appeal to small and foreign investors. Given the well established benefits of efficiently functioning capital markets there should therefore be a desire to control insider behaviour.

While the harm from insider trading has been firmly established both theoretically and empirically (see previous chapters for a discussion of these), the benefits of insiders are equally well accepted. The response from regulators has been to attempt to achieve a balance between beneficial and harmful insider activity via regulation. However, while such laws have been implemented in the vast majority of financial markets (Bhattacharya and Dauok, 2002), the most effective combination of prohibited behaviours and punishments for reducing insider trading and by extension information asymmetry in the market has remained largely unexplored.

There has been a growing belief that the construction of the laws is important both generally and with respect to insider trading. The law and finance literature in particular has examined how the quality and coverage of institutional settings affects the development of financial markets. La Porta et al., (hereafter LLSV) in a series of papers showed that numerous aspects of financial market development were dependent on effective and enforceable investor protection regimes. These included access to equity and debt capital (1997), share ownership concentration (1998), corporate valuations

(1999) and ease of access to new equity capital from the public (2003). Further, Johnson et al., (2000) showed that variables such as investor protection and quality of law enforcement were related to the extent of market declines during periods of financial crisis.

While the evidence on the impact of insider trading laws on the market is more limited than the law and finance literature, it reinforces the findings on the role of regulation. In particular the literature shows stronger and enforced laws reduce the impact of insiders on the market. Beny (2005) established that stronger laws are associated with higher liquidity, wider share ownership and increased price accuracy. In particular Beny concluded that deterrents are the most important formal legal factor affecting these aspects of the market, although enforcement is also vital. Garfinkel (1997) explored changes in the regulatory regime within the USA following the enactment of tighter new laws. He concluded that significant changes in insider trading behaviour, including the timing around announcements, followed from the regulatory change, suggesting the impact from stronger laws is due to changes in insiders' behaviour. While Bhattacharya and Daouk (2002) found that reductions in the cost of capital require the laws to be enforced, which is also supported by Beny (2005). Bushman, Pitroski and Smith (2005), when looking at analyst following within countries, found a slightly different outcome, with only developing and emerging markets requiring actual enforcement. Developed markets were found to be given the benefit of the doubt. This finding however is likely to be due to the high overall ratings for developed markets in terms of the quality and independence of legal systems. The earlier chapters of this thesis also show that when insider trading laws were more likely to be enforced, and therefore arguably stronger, the market saw major improvements in a number of areas. The evidence, does therefore, suggest that the structure of the rules governing insider trading and the potential for enforcement are important in limiting insiders activities.

This thesis sought to further develop the literature on the role that insider trading laws have in controlling insiders. In particular, the aim was to extend the work of Beny (2005) by exploring the specific elements of insider trading laws that resulted in a reduction in the level and harm from insider trading. Specifically, the transaction costs of 1073 companies within 18 countries over the period September 2004 to August 2005 were examined in relation to specific and quantifiable aspects of the insider trading regimes within those countries. In particular, the contribution of information asymmetry to trading costs by employing the Madhaven, Richardson and Roomans (1997)

decomposition model was examined. Two additional variables were utilised, the average percentage spread and the average effective spread. The first proxies the cost of informed trading and the other two the trading costs in general. Each variable was averaged cross-sectionally for each company belonging to a country to create a country measure of these variables. Against this a number of variables designed to capture elements of the coverage of the laws, the sanctions that can be imposed, the overall strength of the laws and the strength of enforcement within the country were examined.

The impact of the laws on the transaction costs was examined as they are directly affected by the prevalence of insiders. The spread is widely perceived as being made up of three components representing the various financial costs and risks facing a liquidity provider. The order-processing costs represent the ordinary costs of executing a trade while the inventory-holding component compensates the provider for the risk of holding an inventory position in that particular stock. The final cost component is information asymmetry, or the risk that the provider will trade against a better informed trader, a class that includes most notably insiders (Copeland and Galai, 1983; Glosten and Milgrom, 1985). To compensate for losses from trading against better informed traders, liquidity providers widen the spreads so that the extra they make on each trade will balance out the expected losses over time. Therefore the transaction costs are inherently linked to the level and harm from insider trading within the market via the information asymmetry component. Eleswarapu and Venkataraman (2006) took this one step further and pointed out that the legal environment will affect the equity trading costs. Where the laws are weak or ineffective in limiting insiders, the risk to liquidity providers is much greater, resulting in wider spreads than would occur in markets where the laws were effective or enforced.

This chapter shows strong support for the hypothesis that the strength of insider trading laws positively affects the cost of transacting within a market. This is driven predominantly by specific aspects of both the scope of the laws and sanctions available. Particularly, it was found that laws that stop insiders from passing on confidential price-sensitive information and laws that allow for financial penalties above the potential level of the gain or loss avoided are most effective. Further it was found that enforcement strength is also a key aspect of an insider trading regime. Countries that have enforced laws have lower trading costs than those that have not according to Bhattacharya and Dauok (2002). Also, private enforcement was found to have had little effect on the level of information asymmetry within the market while public enforcement does seem capable of controlling insider trading. The findings suggest that

the laws do matter and that careful consideration needs to be given when constructing insider trading laws to incorporate those elements that will be most effective in controlling insider trading.

The chapter is structured as follows. Section 6.2 details the sample employed and the variables constructed in this chapter. Section 6.3 presents summary statistics for the variables collected and presents the findings of the regression analysis. Section 6.4 concludes the chapter and discusses the implications of our findings.

## **6.2 Sample**

To determine the important components of an insider trading regime 18 countries were selected where data on specific aspects of their insider trading regime were available. It was also required that the primary financial market within each country be either a limit order book (“LOB”) or a dealer market. Other market structures have different pricing processes that make determining the components of the bid-ask spread problematic. Some markets however run several systems, usually employing LOBs and dealer markets for the more liquid stocks and other systems, such as auctions, to improve liquidity in smaller firms. Where this occurred shares trading under other systems were excluded from the sample. For each of these countries 70 non-financial firms were randomly selected and intra-day transaction data collected for the period 1 September 2004 to 31 August 2005 from SIRCA. The transaction data contained details on all trades including the transaction price, volume, time of the trade (to the nearest minute) and the best quotes at the time of the trade as well as information on changes to the best bid and ask price over the course of the trading day. To ensure sufficient data was available to allow for accurate estimation of the MRR model any firms that had less than 1000 trades over the course of the sample period were removed, the equivalent of approximately four trades per day.

### *6.2.1 Dependent Variables*

To explore the impact of various elements of insider trading laws on insider trading the relationship between variables that measure or proxy the level of information asymmetry within the market was examined. The decomposed cost of information asymmetry as a proportion of the total spread was the variable primarily relied upon for the analysis. This variable has the advantage of directly measuring market estimates of



the level of informed trading, of which insiders make a substantial component. However, as this is an estimated variable, two other measures of the cost of trading, average percentage spread and the average effective spread, were also employed. As any reduction in the cost of information asymmetry in the spread should reduce the total spread as well, these variables should act as good robustness checks on the estimated variable.

The first and most direct measure of information asymmetry is the proportion of its cost to the total spread. This measure was calculated by employing a bid-ask spread decomposition model. Specifically a trade indicator model such as those developed by Glosten and Harris (1988) and Madhavan et al. (1997) (hereafter MRR) was applied<sup>17</sup>. The advantage of the Glosten and Harris (1988) and MRR models is that they decompose both the inventory-holding and order-processing components of the spread as one transitory price effect, which is more suitable for Limit Order Book markets which make up the majority of the countries in the sample. A notable concern with the Glosten and Harris (1988) model, however, is its assumption that continuations, that is buyer initiated trades followed by another buyer initiated trade, are equally as likely as reversals. Most MRR studies have found that continuations are more likely as a result of factors, such as large trades being split into a number of smaller trades. Therefore the MRR model which uses the first order autocorrelation of the trade indicator variable to model surprise in the order flow was preferred.

MRR decomposes the bid-ask spread components by relating the changes in prices to the direction of the trade, either buyer or seller initiated, based on

$$p_t - p_{t-1} = \theta(x_t - \rho x_{t-1}) + \phi(x_t - x_{t-1}) + u_t \quad (6.1)$$

where  $p_t$  is the transaction price at time  $t$ ,  $x_t$  is a trade indicator that equals 1 for buyer initiated trades, -1 for seller initiated trades and 0 for trades at the midpoint for a trade at time  $t$ ,  $\theta$  is the per share cost of information asymmetry,  $\phi$  is the per share compensation for inventory holding and order processing costs,  $\rho$  is the first-order autocorrelation of the expected trade direction conditional on the previous trade and  $u_t$  captures the impact of price discreteness and new public market-wide information releases. Under this model the arrival of informed traders is announced by unexpected trades in a given direction and causes the market to adjust the fundamental value by  $\theta$ . Larger price reactions as a result of surprises in the order flow occur where there is a greater

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<sup>17</sup> We do not apply the Huang and Stoll (1997) model as it explicitly models the inventory-holding cost, which according to Ahn et al. (2002) is largely irrelevant in limit order book markets.

likelihood of trading against an informed trader hence requiring larger compensation for the risk this poses<sup>18</sup>.

As the data does not contain information on who initiated the trade, the trade indicator variable was calculated by comparing the quotes to the transaction price. If the price occurs above the midpoint of the quoted spread the trade was identified as buyer initiated, while trades that occurred below the midpoint were classed as seller initiated. Trades that occurred at the midpoint were left undetermined. Unlike the Lee and Reedy (1991) classification method lags were not introduced into the quotes used to determine the trade indicator for two reasons. First, the data only provided information to the nearest minute leading to longer than recommended minimum lags. Second, the majority of the markets examined were electronic markets where the risk of quotes and trades being recorded in the wrong order were dramatically lower (Sirri and Peterson, 2003).

This model was estimated by employing Generalised Methods of Moments (GMM) using the orthogonality conditions

$$E \begin{pmatrix} x_t x_{t-1} - x_t^2 \rho \\ u_t - \alpha \\ (u_t - \alpha) x_t \\ (u_t - \alpha) x_{t-1} \end{pmatrix} = 0 \quad (6.2)$$

where  $\alpha$  captures the drift in returns and  $u_t$  follows from (6.1). The orthogonality conditions applied are essentially OLS conditions with an additional condition to identify  $\rho$ . Since the error term in (6.1) is auto-correlated and possibly heteroskedastic, a Newey-West (1987) correction was employed. In the estimation of the model all price data was also scaled by 100.

Based on the estimated parameter estimates for (6.1), the proportion of the spread made up of information asymmetry was calculated for each company based on  $\theta/(\theta + \phi)$ . This value was used as the dependent variable rather than the cross-sectional estimates of  $\theta$  as it offered an estimate of the importance of information asymmetry unaffected by the size of the spread itself. This is a more comparable measure as it accounted for differences in spreads as a result of differing price levels. Each country's company's values were then accumulated and averaged to get a country average.

As shown in chapter five of this thesis, the effects of marked changes in insider trading laws can be observed in changes to the proportion of the trading cost attributable to information asymmetry. Further, this measure provides a relatively clear and direct

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<sup>18</sup> More detail on this model can be found in the previous chapter.

method of observing the impact of legal structures as the values are based on the markets estimates of the threat of informed trading.

Two other variables that measure the trading cost were also applied, first, the percentage spread, measured as  $Percentage\ Spread = 100 * \frac{(ask - bid)}{(ask + bid)/2}$  and second, the percentage effective spread, measured as  $Percentage\ Effective\ Spread = 200 * x_{it} * (p_{it} - mid_{it}) / mid_{it}$  where  $x_{it}$  is the trade indicator for company  $i$  at time  $t$ ,  $p_{it}$  is the price and  $mid_{it}$  is the midpoint of the quoted ask and bid prices at time  $t$ . The percentage effective spread represents the cost of the traded spread as a percentage of the price, which differs from the percentage spread in that traded spreads can occur both in and outside of the quoted spreads. These variables allow for observation of the impact of insider trading laws on the cost of trading while controlling for differences in spread relating to differences in the price level of securities. As for the proportion of information asymmetry in the spread, if insiders are less active in a stock then there should be less informed trading overall resulting in a reduced cost of information asymmetry in the spread.

These variables were then regressed against a number of insider trading law and control variables. As the proportion of the spread composed of information asymmetry costs can only take values between zero and one, a doubly censored Tobit model was employed to estimate the model. For the percentage spread and percentage effective spread standard ordinary least squares regression was used.

### 6.2.2 Insider Trading Law Variables

To identify the aspects of the legal system that promote an effective insider trading regime, that is one that reduces the cost of information asymmetry in the market, data was collected on the specific structure of the laws in each country from Beny (2005). Beny identifies a number of variables that are potentially important in creating an effective legal regime which can be categorised into three broad areas, the scope of the laws, the sanctions available and the probability of enforcement.

In terms of the scope of the law Beny constructed two dummy variables *Tipping* and *Tippee*. *Tipping* is a dummy variable that equals 1 if the law prevents insiders from passing on non-public price sensitive information to outsiders with the intention of them trading on that information. Brudney (1979) noted that allowing insiders to pass information to outsiders without penalty is the equivalent of allowing them to sell the

information where the remuneration they gain can be cash, information they can then trade upon or other things of value. *Tippee*, the flipside of *Tipping*, is a dummy variable that equals 1 if the recipient of non-public price sensitive information is forbidden from trading on this information and 0 otherwise. Preventing trading by related parties to insiders is desirable given the damage to investor confidence when those with an unfair informational advantage are allowed to trade. However, while it is desirable to prevent such trading, the realities of enforcing such rules may make it irrelevant in terms of reducing information asymmetry.

These two dummies were summed to create a general measure, *Scope*, that measures the breadth of the restrictions on insider trading. Laws that more broadly define prohibited insider trades should reduce the amount of information asymmetry in the market due to the lower probability of trading against a better informed party.

In examining the role of sanctions two variables Beny identified as being relevant, *Damages* and *Criminal*, were explored. *Damages* is a dummy variable that equals 1 if monetary penalties are potentially greater than the profit gained or loss avoided by an insider and 0 otherwise. Restrictions that simply require restitution will have little impact on preventing insider trading as they offer no downside to being caught. Given that insider trading is often hard to detect, financial penalties will need to be significantly greater than the potential gain to dissuade insiders from trading on their information (Polinsky and Shavell, 2000; Dooley, 1980). *Criminal* is a dummy variable that equals 1 if insider trading may be prosecuted as a criminal offence and 0 otherwise. Criminal charges offer the highest possible punishment given potential non-financial penalties such as prohibition from being a director, loss of reputation and incarceration. Where extremely large, and therefore unworkable financial punishments are required to counteract low probabilities of detection, criminal sanctions may be the most efficient deterrent. However, in many countries the burden of proof required for a criminal sanction is significantly higher than that for civil proceedings. Given insider trading is often described as largely an inferential crime, proving the intention of the defendants to the required criminal burden may be unlikely, making criminal sanctions less effective (Beny, 2005).

Again a variable that is the sum of the two sanction variables was created, *Sanction*, to measure the strength of the penalties an insider that is caught can face. Intuitively, legal regimes with more onerous sanctions increase the cost to insiders and therefore reduce the incidences when it will be beneficial to trade on inside information

(Polinsky and Shavell, 2000). An index of the overall strength of the insider trading regime was also created, *IT LAW*, by summing *Scope* and *Sanction*.

The final element examined is the importance of the probability of enforcement. For the rules to be effective in controlling insiders there must be a real threat of enforcement. However, few reliable measures of actual enforcement are available on a per country basis. To proxy the enforceability of insider trading laws, three measures were examined, past enforcement (*Enforced*) and two measures proposed by Beny (2005), the strength of public (*Public*) and private (*Private*) enforcement within the country. The data collected by Bhattacharya and Daouk (2002) was used to measure whether a country had prosecuted an insider prior to 1998, either successfully or unsuccessfully. Such actions should demonstrate a will to enforce insider trading and therefore effectively increase the probability of enforcement. The impact of enforcement on insiders has been shown in several papers to be associated with a reduction in the country cost of capital (Bhattacharya and Daouk, 2002) and an increase in analyst following (Bushman et al., 2005), both argued as indicating a reduction in the presence of insiders.

The measures of public and private enforcement strength are used to proxy the probability of an insider being prosecuted. Where the ability of the public and private groups to enforce the laws is weak the possibility of a prosecution is significantly reduced. The measure of public enforcement strength proposed by Beny (2005) is constructed based on information collected from La Porta et al. (2005). In that paper, information is collected via a survey of domestic lawyers regarding various aspects of the market supervisors. The aspects most relevant to insider trading enforcement are the attributes of the supervisor and their investigative power. La Porta et al. (2005) examined the supervisor attributes to quantify the independence, authority and focus of the organisation. They achieve this by looking at four attributes: the independence of the appointment process; the process for firing key members of the supervisor; how focussed on securities markets the supervisor is; and the ability to regulate the security markets without legislative or executive interference. They took the mean of the four variables to come up with a measure of the supervisor attributes. La Porta et al. (2005) also examined the investigative powers of the supervisor by creating an index based on their ability to command documents from relevant parties and subpoena the testimony of witnesses when investigating breaches of securities law. The mean of these two values were taken to create an index of the public enforcement power of supervisors.

While the merits of public enforcement of securities law is well understood (the ability to investigate breaches including commanding documents and subpoenaing witnesses plus the ability to impose sanctions) the role of private enforcement is less well understood. La Porta et al. (2005) made a case for private enforcement of securities law breaches being important from a private contracting perspective. They argue that if the law sets out the obligations of both parties and the burden of proof then the role of courts is simplified and private enforcement can be a cheap and effective method of dealing with breaches benefiting markets. However, anecdotal evidence from New Zealand where the law specified private enforcement for insider trading raises questions about the efficacy of such a system. In particular the difficulty and cost of collecting evidence proved to be a disincentive to private enforcement. Bainbridge (2000) noted that the evidence from the USA shows most private enforcement efforts are attached to public efforts, with the public enforcer doing all the work. The role of private enforcement of insider trading was examined by employing the measure established by Beny (2005). *Private* is the product of the right to enforce, a dummy that equals 1 if a private right to prosecute exists and 0 otherwise, and a measure of the efficiency of the judiciary. Obviously the private right can only be enforced if individuals have good access to the courts and the process is reliable and efficient. The Law and Order ratings from the International Country Risk Guide were used to measure of the efficiency of the judiciary.

### 6.2.3 Control Variables

To control for other determinants of the bid-ask spread and non-insider trading related causes of differences a number of control variables were included. First, differences in liquidity were controlled for using several proxies. The first is the market capitalisation on the basis that larger firms typically are also more liquid firms. Also larger firms tend to be subject to less insider trading activity (Lakonishok and Lee, 2001). This was calculated as the natural logarithm of the average of the local currency market capitalisation over the sample period adjusted daily to US dollars. As an alternative, the average trades per day for each company were used in the regressions. It was found that this measure generally leads to the same results as the market capitalisation and therefore was not report in the tables.

The effect of any price discreteness was also controlled for due to the imposition of minimum tick sizes by the market. The results of the price volatility analysis in the

previous chapter showed that price discreteness can have a significant impact on the size of price movements and therefore needs to be controlled for, especially given the significant differences in the liquidity of the exchanges being examined. This was achieved by determining the average minimum tick that applies to the firm at the time a trade occurs and dividing that tick size by the price. A dummy variable was also included to control for potential differences as a result of differing market structures. However, due to significant correlation between this dummy and legal origin, all but one of the French civil law countries are markets with dealers to one degree or another while all but one of the German civil law countries are limit order books, the effects of this are largely subsumed by the legal origin variables and therefore added little to the regressions.

Finally, the origin of the legal system in each country was controlled for. These could be classed into three groups, common law countries, French civil law and German civil law countries. Research by La Porta et al. (1997, 1998, 2005) and Beny (2002) found that the institutional setting and the quality of investor protection within a country is related to the legal origin of the laws within that country. As a general rule the studies have shown that common law provides the best investor protection, while French civil law offers the least protection. As this also affects a number of other aspects such as accounting disclosure quality, it is important to control in an attempt to isolate the impact of insider trading laws on information asymmetry in the market.

## 6.3 Results

### 6.3.1 Summary Statistics.

Table 6.1 provides summary statistics on the insider trading law variables employed and the legal origin of each country. The sample contains ten common law countries with four each for the French and German civil law countries. It should also be noted that the countries represented in the French and German civil law sub-samples are for the most part large and well developed markets. In spite of the low numbers for these categories however the averages for the legal elements are similar to those observed by Beny (2005), although French civil law is consistently slightly higher in our study and German is slightly lower. In terms of the specific components, virtually all countries prohibit both tipping and tippees from trading. Although interestingly Japan and South Africa both prohibited recipients of confidential information from

**Table 6.1: Summary of Insider Trading Law Variables by Country**

Country	Market	Legal Origin	IT Law	Scope	Tippee	Tipping	Sanction	Criminal	Damages	Enforced	Private	Public
AUSTRALIA	Australian	Common	3	2	1	1	1	1	0	1	5	0.88
CANADA	Toronto	Common	4	2	1	1	2	1	1	1	5.5	0.81
HONG KONG	Hong Kong	Common	3	2	1	1	1	0	1	1	0	0.75
INDIA	Bombay	Common	2	1	0	1	1	1	0	1	0	0.69
MALAYSIA	Kuala Lumpar	Common	2	1	0	1	1	1	0	1	2.5	0.69
NEW ZEALAND	New Zealand	Common	3	2	1	1	1	0	1	0	5.5	0.63
SINGAPORE	Singapore	Common	3	2	1	1	1	1	0	1	4.5	0.75
SOUTH AFRICA	Johannesburg	Common	2	1	1	0	1	1	0	0	2	0.38
UNITED KINGDOM	London	Common	3	2	1	1	1	1	0	1	0	0.63
UNITED STATES	New York	Common	4	2	1	1	2	1	1	1	5	1
<i>Common Law Averages</i>			2.9	1.7	0.8	0.9	1.2	0.8	0.4	0.8	3	0.721
BELGIUM	Euronext Brussels	French	3	2	1	1	1	1	0	1	0	0.13
FRANCE	Euronext Paris	French	4	2	1	1	2	1	1	1	0	0.94
GREECE	Athens	French	2	2	1	1	0	0	0	1	0	0.38
NETHERLANDS	Euronext Amsterdam	French	3	2	1	1	1	1	0	1	0	0.5
<i>French Civil Law Averages</i>			3	2	1	1	1	0.75	0.25	1	0	0.4875
AUSTRIA	Vienna	German	2	2	1	1	0	0	0	0	0	0.13
GERMANY	XETRA	German	3	2	1	1	1	1	0	1	0	0.25
JAPAN	Tokyo	German	2	1	1	0	1	1	0	1	0	0
TAIWAN	Taiwan	German	3	2	1	1	1	1	0	1	3	0.38
<i>German Civil Law Averages</i>			2.5	1.75	1	0.75	0.75	0.75	0	0.75	0.75	0.19

Note: *IT Law* is an index created by adding *Scope* and *Sanction*. *Scope* is a sub-index created by adding *Tipping* and *Tippee*. *Tipping* is a dummy variable that equals 1 if an insider is prohibited from passing on confidential information and 0 otherwise. *Tippee* is a dummy variable that equals 1 if an outsider given confidential information by an insider is prohibited from trading and 0 otherwise. *Sanction* is a sub-index created by adding *Damages* and *Criminal*. *Damages* is a dummy variable that equals 1 if the potential financial penalties may be greater than the trading gain or loss avoided and 0 otherwise. *Criminal* is a dummy variable that equals 1 if criminal sanctions are available and 0 otherwise. *Enforced* is a dummy variable that equals 1 if insider trading had been prosecuted before 1998 and 0 otherwise. *Private* is the product of the right of private enforcement, a dummy that equals 1 where private prosecutions are allowed and 0 otherwise, and the law and order rating collected from International Country Risk Guide. *Public* is the mean of the supervisor attributes and investigative powers from La Porta et al. (2003).



trading, a category that is virtually impossible to detect, but did not stop insiders from passing on the information initially.

In terms of sanctions imposed on insiders, only three countries made insider trading both a criminal offence and allowed for penalties to be greater than the gain or lose avoided, France, Canada and the United States. Criminal penalties are the most common form of sanction with insider trading being a criminal offence in 14 countries, but only five allow for damages to be greater than the gain. Given the difficulty in proving breaches of insider trading laws and the higher burden of proof required for criminal sanctions, it is an interesting finding that they are relied on to prevent insider trading so heavily. Overall it was found that just three countries had an IT law rating of 4, Canada, France and the USA with most countries rating a 3 and 6 scoring 2, Japan, Austria, Greece, South Africa, Malaysia and India.

In terms of the enforcement variables however the differences are much starker. The highest rate of past enforcement was again in French civil law countries where all the sample countries had enforced before 1998 followed by common law and German civil law countries at similar levels. However, civil law countries had significantly lower instances of private enforcement with just Taiwan allowing private prosecutions. The civil law countries also have much lower ratings for public enforcement power than common law countries, .72, .49 and .19, for common, French and German civil law countries respectively. Japan has the lowest public enforcement with a 0 rating while the US has the highest at 1. The results suggest that while virtually all countries (with the exception of three) have enforced insider trading, the greatest probability of enforcement occurs in common law countries where there is also the highest sanctions.

Table 6.2 provides summary statistics on the cross-sectional variables employed in this chapter. The market capitalisation in US\$ shows that Belgium had the largest average followed by the USA with Greece and Singapore having the smallest market caps. Of note is the relatively small capitalisation of the UK market at just US\$859 million. This low value is possibly responsible for the higher than expected percentage spread and effective spread values that were observed. The markets also demonstrated significantly different liquidity as demonstrated by the trades per day ranging from 21.6 for New Zealand to 1212.6 for the United States, which is twice the average for the next largest market France. India had the lowest relative minimum tick value at just .0005, largely due to high prices while Australia had the largest due to much lower prices. It was also observed that the percentage spreads and effective spreads have similar mean

**Table 6.2: Cross-Sectional Averages by Country of Origin**

Country	Market System	Trades	Mkt Cap (local millions)	Mkt Cap (US\$ millions)	Relative Minimum Tick	Spread	Trades/ Day	Average Price	%Spread	Effective Spread
AUSTRALIA	Limit Order Book	34999	1010.86	751.24	0.0547	0.0042	130.51	3.25	0.9126	1.8131
AUSTRIA	Limit Order Book	16426	1360.00	1148.45	0.0009	0.3434	63.46	59.54	0.6690	0.7861
BELGIUM	Affirmative Dealers	17774	10757.45	9084.15	0.0013	0.2830	65.09	42.05	0.8601	1.0452
CANADA	Limit Order Book	46276	1897.38	1566.27	0.0065	0.0569	180.44	14.83	1.5804	1.7028
FRANCE	Affirmative Dealers	124922	5980.30	5050.08	0.0034	0.2564	486.77	43.56	0.7913	0.8986
GERMANY	Affirmative Dealers	66389	4289.90	3622.61	0.0021	0.0757	245.33	21.37	1.0040	1.2001
GREECE	Limit Order Book	21597	251.36	212.26	0.0100	0.0235	81.71	3.19	1.0008	2.2923
HONG KONG	Limit Order Book	23366	7546.09	970.27	0.0169	0.0271	91.53	4.28	1.4883	1.4591
INDIA	Limit Order Book	64026	31715.23	719.17	0.0005	1.4491	243.65	305.60	0.5409	0.6197
JAPAN	Limit Order Book	30282	182547.50	1657.45	0.0024	36.1897	117.47	9352.50	0.4079	0.4151
MALAYSIA	Limit Order Book	10855	969.06	256.71	0.0074	0.0172	42.41	2.08	1.0119	1.0155
NETHERLANDS	Affirmative Dealers	89655	1964.35	1658.80	0.0033	0.0612	330.67	17.14	0.6444	0.7950
NEW ZEALAND	Limit Order Book	5469	3173.32	2168.60	0.0067	0.0316	21.66	4.50	0.9167	1.0034
SINGAPORE	Limit Order Book	9399	408.73	245.78	0.0175	0.0139	35.82	1.86	1.9669	1.6919
SOUTH AFRICA	Limit Order Book	17995	7869.53	1240.76	0.0001	14.3077	68.39	2675.52	1.4668	1.5497
TAIWAN	Limit Order Book	30871	9296.78	288.91	0.0047	0.0940	118.63	20.31	0.6382	0.6866
UNITED KINGDOM	Affirmative Dealers	32094	472.24	859.34	0.0002	0.0293	120.42	248.70	1.2820	1.1175
UNITED STATES	Affirmative Dealers	321896	7260.75	7260.75	0.0031	0.0443	1212.61	35.06	0.1630	0.1155

Note: *Mkt Cap (Local)* is the average of the market capitalisation averaged over the sample period for all sample companies in that country. *Mkt Cap (\$US)* is the market capitalisation averaged over the sample period adjusted daily for the US\$ exchange rate averaged for all sample companies in that country. *Relative Minimum Tick* is measured as the minimum tick size divided by price for each trade, averaged over the sample period and then over all the sample companies in that country. *Spread* is measured as the ask price minus the bid price averaged over the sample period and then over all sample companies in that country. *Trades/Day* is measured as the total number of observed trades divided by the number of trading days averaged over all sample companies in that country. *Average Price* is the cross-sectional average price at which trades occurred averaged over all sample companies in that country. *% Spread* is measured as the cross-sectional average of the (ask price – bid price)/((ask + bid)/2) then averaged over all sample companies in that country. *Effective Spread* is measured as the cross-sectional average of  $200 * x_{it} * (p_{it} - mid_{it}) / mid_{it}$  then averaged over all sample companies in that country where  $mid_{it}$  is the midpoint and  $x_{it}$  is the trade direction.

and medians suggesting an even distribution of the values. The lowest values are shown in the USA with .16 and .12 respectively while the country with the largest average percentage spreads is Singapore at 1.96% and the largest effective spreads occurred in Greece at 2.29%.

Table 6.3 shows the correlation coefficients matrix for the insider trading law variables. As expected the constructed indices *Scope*, *Sanction* and *IT Law* are all highly correlated with the elements that were used to create them, that is *IT Law* is highly correlated with *Scope* and *Sanction* while *Scope* is correlated with *Tipping and Tippee* and *Sanctions* with *Criminal* and *Damages*. It was also found that there are strong correlations between *IT Law* and the private and public variables indicating that countries that can better enforce their laws are more likely to make the laws more restrictive. Likewise those countries that are better able to enforce their laws are more likely to have larger potential sanctions. This is counter-intuitive as the disincentive to insiders is likely to be a combination of the likelihood of being prosecuted and the associated penalty. If countries are less able to enforce the laws they should impose stronger sanctions to counter the weaker enforcement probability.

It was also observed that there was a strong positive correlation between public and private suggesting that countries with strong supervisors were more likely to both allow private prosecutions and have legal systems that made such prosecutions possible. The results also indicated that *Public* is strongly correlated with *Tipping*, indicating that countries that prevent insiders from passing on information are marked by independent supervisors with the ability to compel documents and witnesses. This may indicate a pragmatic response from countries as the tipping of outsiders is extremely difficult to detect and establish, and weak supervisors would have little chance with respects to this type of offending.

### 6.3.2 MRR Parameter Estimates

Table 6.4 presents a summary of the country average parameter estimates from the MRR model.  $\theta$  represents the per share cost of information based on the size of the market reaction to unexpected orders in a particular direction. Due to the greater chance of trading against an insider the market maker will react more to compensate the higher expected losses incurred from trading against informed traders. The range of values observed for  $\theta$  fell between .02 (United States) and .38 (Greece). In general the German civil law countries are lower than the common law countries with French civil law

**Table 6.3: Insider Trading Law Variable Correlation Coefficients**

	IT Law	Sanction	Scope	Enforced	Public	Private	Tippee	Tipping	Criminal	Damages
IT Law	1									
Sanction	0.792	1								
Scope	0.695	0.111	1							
Enforced	0.204	0.183	0.118	1						
Public	0.601	0.57	0.307	0.145	1					
Private	0.508	0.489	0.252	-0.215	0.548	1				
Tippee	0.454	0.073	0.653	-0.143	-0.157	0.118	1			
Tipping	0.456	0.073	0.655	0.297	0.558	0.211	-0.145	1		
Criminal	0.181	0.511	-0.307	0.63	0.037	0.132	-0.2	-0.201	1	
Damages	0.71	0.646	0.395	-0.119	0.594	0.421	0.258	0.259	-0.326	1

Note: *IT Law* is an index created by adding *Scope* and *Sanction*. *Scope* is a sub-index created by adding *Tipping* and *Tippee*. *Tipping* is a dummy variable that equals 1 if an insider is prohibited from passing on confidential information and 0 otherwise. *Tippee* is a dummy variable that equals 1 if an outsider given confidential information by an insider is prohibited from trading and 0 otherwise. *Sanction* is a sub-index created by adding *Damages* and *Criminal*. *Damages* is a dummy variable that equals 1 if the potential financial penalties may be greater than the trading gain or loss avoided and 0 otherwise. *Criminal* is a dummy variable that equals 1 if criminal sanctions are available and 0 otherwise. *Enforced* is a dummy variable that equals 1 if insider trading had been prosecuted before 1998 and 0 otherwise. *Private* is the product of the right of private enforcement, a dummy that equals 1 where private prosecutions are allowed and 0 otherwise, and the law and order rating collected from International Country Risk Guide. *Public* is the mean of the supervisor attributes and investigative powers from La Porta et al. (2003).

countries having the highest average, due largely to the country average for Greece.  $\phi$  measures the cost per share of transitory price effects such as inventory-holding and order processing. Again it was found that the USA has the lowest observed value at .02 while the largest is the United Kingdom at 1.04, a result likely caused by the large percentage of smaller firms that seem to be in the UK sample as evidenced by the low market capitalisation. Again it was found that the German civil law countries have the lowest average although the difference between them and common law is much larger than for  $\theta$ . Again French civil law countries have the largest average, again related to the Greek companies.

$\rho$  measures the first-order autocorrelation in the trade direction variable. MRR, unlike Glosten and Harris (1988), argued that trade continuations (a buy (sell) followed by a buy (sell)) do not occur at an equal rate to reversals (a buy (sell) followed by a sell (buy)). As large trades typically get broken into smaller orders for easier execution, MRR suggested continuations are more likely. If this contention is true, then if trades cannot occur at the midpoint,  $\rho$  would be greater than 0. In our observations, even taking into account the small percentage of trades that occur at the midpoint,  $\rho$  is significant and its inclusion in the model justified. The lowest  $\rho$  occurs in India at .15 while the largest is in Canada indicating that continuations are far more likely than reversals.

Only in terms of the proportion of the spread composed of information asymmetry costs was it found that common law countries had a lower average, in large part due to the UK, Singapore and Hong Kong which had significantly lower averages than was typical. For the most part the average proportions fell within the 40-55% range, with only the previously mentioned countries below that and Germany and Japan above it. With the exception of the UK, the reported proportions were close to the values reported in other studies where countries in the sample have been examined. USA studies have found the IA proportion lies between 35-50% (Stoll, 1989 (43%); MRR (35-51%); Affleck-Graves et al., 1994 (43%); Lin et al., 1995 (39.2%); Kim and Ogden, 1996 (50%)) while our results show 41%. Ahn et al. (2002) reported between 44-57% for the Tokyo Stock Exchange while this study found 59% and Brockman and Chung (1999) found 33% for Hong Kong while this study reported 34%. Even the results for NZ at 52% are lower than the 55% reported in the previous chapter, though not significantly so.

**Table 6.4: Cross-Sectional MRR Parameter Estimates Averaged by Country of Origin**

Country	Market		$\theta$	S.E	$\phi$	S.E	$\rho$	S.E	Proportion	S.E
AUSTRALIA	Australian	Common	0.2796	(0.0280)	0.2341	(0.0309)	0.4702	(0.0121)	0.5343	(0.0898)
CANADA	Toronto	Common	0.2805	(0.0278)	0.2946	(0.0318)	0.5227	(0.0109)	0.5258	(0.0258)
HONG KONG	Hong Kong	Common	0.2002	(0.0206)	0.3811	(0.0249)	0.2367	(0.0135)	0.3444	(0.0280)
INDIA	Bombay	Common	0.1420	(0.0072)	0.1256	(0.0077)	0.1575	(0.0070)	0.5508	(0.0077)
MALAYSIA	Kuala Lumpur	Common	0.1651	(0.0206)	0.1565	(0.0213)	0.3078	(0.0192)	0.5300	(0.0733)
NEW ZEALAND	New Zealand	Common	0.1367	(0.0229)	0.1360	(0.0240)	0.3727	(0.0201)	0.5213	(0.1260)
SINGAPORE	Singapore	Common	0.0772	(0.0267)	0.3015	(0.0326)	0.4352	(0.0192)	0.1886	(0.0917)
SOUTH AFRICA	Johannesburg	Common	0.1645	(0.0300)	0.2003	(0.0369)	0.3793	(0.0190)	0.5228	(0.1054)
UNITED KINGDOM	London	Common	0.1908	(0.0742)	1.0410	(0.1234)	0.2947	(0.0195)	0.1707	(0.0594)
UNITED STATES	New York	Common	0.0101	(0.0008)	0.0143	(0.0007)	0.2599	(0.0029)	0.4121	(0.1453)
<i>Common Law Averages</i>			0.1647	(0.0259)	0.2885	(0.0334)	0.3437	(0.0143)	0.4301	(0.0752)
BELGIUM	Euronext Brussels	French	0.1803	(0.0213)	0.2122	(0.0262)	0.4966	(0.0176)	0.4581	(0.0191)
FRANCE	Euronext Paris	French	0.1149	(0.0140)	0.2491	(0.0171)	0.5148	(0.0121)	0.4074	(0.0265)
GREECE	Athens	French	0.3803	(0.0361)	0.5458	(0.0471)	0.4950	(0.0114)	0.4698	(0.0035)
NETHERLANDS	Euronext Amsterdam	French	0.1156	(0.0138)	0.1774	(0.0155)	0.5090	(0.0092)	0.4420	(0.0606)
<i>French Civil Law Averages</i>			0.1978	(0.0213)	0.2961	(0.0265)	0.5038	(0.0126)	0.4443	(0.0274)
AUSTRIA	Vienna	German	0.1373	(0.0128)	0.1584	(0.0141)	0.3865	(0.0135)	0.4621	(0.0116)
GERMANY	XETRA	German	0.2597	(0.0250)	0.1900	(0.0255)	0.3173	(0.0148)	0.6102	(0.0391)
JAPAN	Tokyo	German	0.1030	(0.0070)	0.0694	(0.0064)	0.2174	(0.0109)	0.5867	(0.0483)
TAIWAN	Taiwan	German	0.1228	(0.0100)	0.1455	(0.0109)	0.2800	(0.0108)	0.4168	(0.0076)
<i>German Civil Law Averages</i>			0.1557	(0.0137)	0.1408	(0.0142)	0.3003	(0.0125)	0.5190	(0.0267)

Note: The table presents the mean value for each parameter estimate averaged over all the sample companies from that country. Standard errors are also reported and are HAC-corrected following Newey-West, 1987. The proportion of the total spread represented by information asymmetry (*Proportion*) defined as  $\theta/(\theta + \phi)$  was also reported.

### 6.3.3 Regression Analysis

The results of the regression analysis are presented in Tables 6.5-6.8 with the results for all three dependent variables presented together. The independent insider trading law variables are categorised together into those affecting the scope of the law, the sanctions of the law and the enforcement of the law. The first table presents the results for the overall strength of the law and the base case where no insider trading law variables are included. The base case allowed for examination of the impact of the controls and more importantly provided a basis for the log likelihood estimates to allow us to evaluate the importance of the inclusion of a variable.

The base case findings confirmed prior expectations about the direction of the control variables, although the variables are typically insignificant. Log market capitalisation (*Log Mkt Cap*) is negative for all three dependent variables indicating that larger companies are associated with small spreads, most likely a result of the higher liquidity for larger companies. *Min Tick* is negative for both the total spread component measures, *%Spread* and *Effective*, indicating that smaller tick sizes result in smaller spreads. The values for the proportion of information asymmetry however are positive. This is possibly a result of the fact that smaller relative minimum tick sizes are likely to result in increased liquidity as the trading costs are lower for those companies. As liquidity improves, the transitory component of spreads should be lower as a proportion of the total spread therefore increasing the contribution of asymmetric information. The expected relationships between the spreads and the legal origin of the country were also observed, indicating that companies in both Germanic and French Civil law countries are associated with higher trading costs and a high cost of asymmetric information. These findings confirmed those in other studies (Eleswarapu and Venkataraman, 2006). Although interestingly, it was found that it is the German civil law countries that are most affected, not the French. This may well be a result of the sample composition although the averages for the law variables were similar to those found in Beny (2005).

Table 6.5 also presents the results for the *IT Law* variable which is a measure of the overall strength of the laws themselves within the country. As is shown, even with a very small sample the results indicate a negative and significant relationship, signifying that tougher laws are associated with less informed trading, and hence a reduced cost of trading as a result. This reduction in the cost of information asymmetry also results in lower total spreads as evidenced by the *%Spread* and *Effective* variables. The inclusion

**Table 6.5: Regression Results for the Base Case and IT LAW Variable**

	Prop		% Spread		Effective		Prop		% Spread		Effective	
Constant	0.5094	**	0.0699	*	0.1898	*	0.5311	***	0.0672		0.3675	
	(0.1981)		(0.0324)		(0.9288)		(0.1886)		(0.0420)		(0.7392)	
Relative Minimum Tick	0.3047		-0.2073		-8.0920		1.6279		-0.0825		-18.9004	*
	(2.7090)		(0.4433)		(12.7015)		(2.7358)		(0.6089)		(10.7240)	
Log Mkt Cap	-0.0214		-0.0093		-0.1018		0.0111		-0.0059		-0.3670	
	(0.0335)		(0.0055)		(0.1572)		(0.0393)		(0.0087)		(0.1539)	
German	0.1296		0.0344		0.6740		0.1062		-0.0148		0.4831	
	(0.0762)		(0.0125)		(0.3571)		(0.0741)		(0.0165)		(0.2906)	
French	0.0541		0.0028		0.2630		0.0613		-0.0147		0.3212	
	(0.0748)		(0.0122)		(0.3508)		(0.0712)		(0.0158)		(0.2790)	
IT Law							-0.0726	**	-0.0174	*	-0.5928	**
							(0.0314)		(0.0104)		(0.2015)	
R <sup>2</sup>	0.1608		0.1152		-0.0046		0.2446		0.1361		0.3679	
Log Likelihood	8.15		1104.61		-691.73		13.10	**	1114.37	***	-567.51	***

Note: Standard Errors are shown in parentheses. *Prop* is measured as  $\theta/(\theta + \phi)$  averaged over the sample companies for each country. *%Spread* is defined as cross-sectional average of the (ask price – bid price)/((ask + bid)/2) then averaged over all sample companies in that country. *Effective Spread* is measured as the cross-sectional average of  $200 * x_{it} * (p_{it} - mid_{it}) / mid_{it}$  then averaged over all sample companies in that country where  $mid_{it}$  is the midpoint and  $x_{it}$  is the trade direction. *Mkt Cap* (\$US) is the market capitalisation averaged over the sample period adjusted daily for the US\$ exchange rate averaged for all sample companies in that country. *Relative Minimum Tick* is measured as the minimum tick size divided by price for each trade, averaged over the sample period and then over all the sample companies in that country. *German* is a dummy variable that equals 1 if a countries legal origin is German Civil Law and 0 otherwise. *French* is a dummy variable that equals 1 if a countries legal origin is French Civil Law and 0 otherwise. *IT Law* is an index created by adding *Scope* and *Sanction*. *Prop* was regressed using a doubly censored Tobit model while *%Spread* and *Effective* were regressed with OLS. \*\*\* indicates significant at 1%, \*\* Indicates significant at 5%, \* indicates significant at 10.



of *IT Law* also resulted in a significant improvement in the log likelihood results for all three models. In addition, there is a general increase in the  $R^2$  values with a large increase for *Effective*. The findings therefore provide general support for the belief that strong insider trading laws do impact on the level and costs of informed trading in the market.

The evidence on the impact of the breadth of the laws is however less empathic in its support for the effect of stronger laws. *Scope* is a sub-index constructed by adding the two dummies *Tipping* and *Tippee* together. Only the proportion of information asymmetry costs in the spread was significantly affected by having broader laws. The percentage spread and the effective spread by contrast are both in the expected direction but insignificant. Further, the log likelihood estimates are insignificant indicating that the introduction of this variable does not significantly improve the regression. When the individual components of the *Scope* variable were examined it was found that only the *Tipping* variable is important. *Tippee*, a dummy variable that equals 1 if those receiving confidential information from insiders are prohibited from trading or 0 otherwise, is insignificant in all cases and in the case of *%Spread* in the wrong direction. Further the log likelihood value for *%Spread* is also insignificant, indicating the model is not improved by the addition of this variable. By contrast, *Tipping*, a dummy variable that equals 1 if insiders are prohibited from passing on confidential information to others or 0 otherwise, was significant for two of the three models it is included in and also results in improvements in the log likelihood values for those models. However, *%Spread* is both insignificant, although in the right direction, and the regression is not improved by the inclusion of *Tipping* although this maybe a result of the small sample size.

The finding that *Tipping* significantly affects the cost of trading was not overly surprising. Preventing an insider from passing on their information for someone else to trade upon is important for avoiding the situation where insiders sell their information to others. Such a law should therefore provide some assurance to the market that the insider's information is not simply being used by a proxy, especially in light of laws in some countries making the insider responsible for the trading profits of a tippee. However, the insignificance of the *Tippee* variable was possibly due to the fact that banning these individuals from trading is practically unenforceable. While tracing the trading activities of an insider is possible largely due to the known association between themselves and the company, such an association is not known in the case of a tippee. This adds complications in terms of getting a prosecution and makes laws banning these people from trading largely ineffective.

**Table 6.6: Regression Results for Scope of Law Variables**

	Prop		% Spread		Effective	Prop		% Spread		Effective	Prop		% Spread		Effective
Constant	0.6708	***	0.0767	**	0.5941	0.4903	***	0.0576		0.1641	0.6277	***	0.0275	**	0.6508
	(0.1681)		(0.0349)		(0.9440)	(0.1777)		(0.0436)		(0.9569)	(0.2047)		(0.0394)		(1.0013)
Relative Minimum Tick	3.3536		-0.0778	*	-15.7269	2.5485		-0.6979		-11.1306	0.8798		-0.0834		-10.3332
	(2.3967)		(0.4976)		(13.4579)	(2.6517)		(0.6498)		(14.2764)	(2.5955)		(0.4993)		(12.6978)
Log Mkt Cap	-0.0063		-0.0081		-0.1712	-0.0086		-0.0077		-0.1425	-0.0223		-0.0002		-0.0982
	(0.0285)		(0.0059)		(0.1600)	(0.0333)		(0.0082)		(0.1791)	(0.0318)		(0.0061)		(0.1554)
German	0.1615	***	0.0357	**	0.7539	*	0.1856	**	0.0034		0.7499	*	0.0341	**	0.6166
	(0.0623)		(0.0129)		(0.3499)	(0.0733)		(0.0180)		(0.3944)	(0.0728)		(0.0140)		(0.3562)
French	0.1279	**	0.0059		0.4477	0.1028		0.0128		0.3289	0.0717		0.0045		0.3312
	(0.0649)		(0.0135)		(0.3644)	(0.0709)		(0.0174)		(0.3819)	(0.0719)		(0.0138)		(0.3516)
Scope	-0.2025	***	-0.0086		-0.5071										
	(0.0652)		(0.0135)		(0.3663)										
Tippee						-0.1332		0.0209		-0.2830					
						(0.1394)		(0.0244)		(0.5351)					
Tipping											-0.2090	**	-0.0340		-0.5190
											(0.0923)		(0.0378)		(0.2515)
R <sup>2</sup>	0.4534		0.2823		0.0616	0.3262		0.2282		0.0635	0.2478		0.1550		0.0197
Log Likelihood	16.01	***	1091.79		-693.47	10.1349		947.65		-707.03	14.13	**	1047.35		-685.19
															**

Note: Standard errors are shown in parentheses. *Prop* is measured as  $\theta/(\theta + \phi)$  averaged over the sample companies for each country. *%Spread* is defined as cross-sectional average of the (ask price – bid price)/((ask + bid)/2) then averaged over all sample companies in that country. *Effective Spread* is measured as the cross-sectional average of  $200 * x_{it} * (p_{it} - mid_{it}) / mid_{it}$  then averaged over all sample companies in that country where  $mid_{it}$  is the midpoint and  $x_{it}$  is the trade direction. *Mkt Cap* (\$US) is the market capitalisation averaged over the sample period adjusted daily for the US\$ exchange rate averaged for all sample companies in that country. *Relative Minimum Tick* is measured as the minimum tick size divided by price for each trade, averaged over the sample period and then over all the sample companies in that country. *German* is a dummy variable that equals 1 if a countries legal origin is German Civil Law and 0 otherwise. *French* is a dummy variable that equals 1 if a countries legal origin is French Civil Law and 0 otherwise. *Scope* is a sub-index created by adding *Tipping* and *Tippee*. *Tipping* is a dummy variable that equals 1 if an insider is prohibited from passing on confidential information and 0 otherwise. *Tippee* is a dummy variable that equals 1 if an outsider given confidential information by an insider is prohibited from trading and 0 otherwise. *Prop* was regressed using a doubly censored Tobit model while *%Spread* and *Effective* were regressed with OLS. \*\*\* indicates significant at 1%, \*\* Indicates significant at 5%, \* indicates significant at 10.

The results for the penalties employed also revealed some intriguing findings. *Sanction* is a sub-index created by adding the dummies for *Criminal* and *Damages* together. The evidence for the importance of stronger sanctions is surprisingly mixed. Given that insider trading is a difficult crime to detect it is widely argued that you need stronger sanctions to act as an effective deterrent to insiders (Beny, 2005). A negative relationship was found for all the models, although only in the equation for *Effective* is the effect of sanction significant. When the individual components are explored the reason for this becomes apparent. The coefficients for *Criminal*, the dummy variable that equals 1 when insider trading is a criminal offence and 0 otherwise, are insignificant for all three models and positive for two, *Prop* and *%Spread*. Further its inclusion in the regressions did not significantly improve the log likelihood estimates. *Damages*, a dummy that equals 1 if the financial penalties can exceed the profit gained or loss avoided and 0 otherwise, by contrast showed strong evidence of having a negative effect on the costs of trading and information asymmetry. All three models showed both negative and significant coefficients for *Damages* and the inclusion of this variable improves the log likelihood values in all three cases at the 1% level.

The finding that criminal damages are largely ineffective in reducing the level of insider trading is interesting given its frequent use as a sanction but not totally surprising. Insider trading is a large inferential crime relying on evidence of trading in conjunction with confidential price sensitive information to create a circumstantial link between the trading and information and thus establish illegality. This works fine for civil proceedings where the burden of proof is merely that it was more likely that they traded on the information than not. However, a criminal proceeding occurs at a much higher burden of proof that would be difficult to meet given the circumstantial nature of the evidence. If criminal sanctions are difficult to achieve and are not tied to effective financial penalties in excess of the profit gain or loss avoided, as is the case with many of the sample countries, then the law's efficacy is largely negated as there is no effective deterrent. *Damages*, on the other hand, while not as extreme as the available penalties under a criminal prosecution are far more widely available due to the lower burden of proof and therefore act as a more realistic penalty that can be applied more widely. What is most interesting is that damages in excess of the trading gain or loss avoided are only available in five of the sample countries, most countries preferring to rely on criminal sanctions.

**Table 6.7: Regression Results for Legal Sanction Variables**

	Prop		% Spread		Effective	Prop		% Spread		Effective	Prop		% Spread		Effective
Constant	0.5256 (0.2002)	***	0.0759 (0.0329)	**	-0.1322 (0.8325)	0.4844 (0.1984)	**	0.0691 (0.0365)	*	0.2645 (0.9743)	0.4835 (0.2141)	**	0.0008 (0.0411)		-0.4593 (0.9284)
Relative Minimum Tick	0.2013 (2.7032)		-0.2457 (0.4440)		-10.1472 (11.2431)	0.3071 (2.6711)		-0.3547 (0.4917)		-8.0848 (13.1163)	0.3882 (2.7148)		-0.0997 (0.5216)		-10.1882 (11.7701)
Log Mkt Cap	-0.0315 (0.0401)		-0.0131 (0.0066)	*	-0.3028 (0.1668)	* -0.0242 (0.0333)		-0.0105 (0.0061)		-0.1102 (0.1635)	-0.0148 (0.0395)		-0.0057 (0.0076)		-0.2673 (0.1713)
German	0.1452 (0.0832)	*	0.0402 (0.0137)	**	0.3636 (0.3459)	0.1327 (0.0752)	*	0.0310 (0.0138)	**	0.6649 (0.3693)	* 0.1188 (0.0835)		0.0202 (0.0160)		0.4017 (0.3619)
French	0.0628 (0.0768)		0.0060 (0.0126)		0.0908 (0.3195)	0.0574 (0.0739)		0.0001 (0.0136)		0.2531 (0.3630)	0.0490 (0.0764)		0.0072 (0.0147)		0.1330 (0.3314)
Sanction	-0.0326 (0.0717)		-0.0121 (0.0118)		-0.6473 (0.2983)	*									
Criminal						0.0499 (0.0696)		0.0149 (0.0128)		-0.1492 (0.3417)					
Damages											-0.1859 (0.0827)	**	-0.0232 (0.0139)	*	-0.6502 (0.3587)
R <sup>2</sup>	0.1703		0.3181		0.2184	0.1841		0.2353		0.0713	0.1653		0.1477		0.1457
Log Likelihood	12.25	**	1115.42	***	-624.42	*** 8.40		1049.17		-708.98	16.20	***	1120.29	***	-648.30

Note: Standard Errors are shown in parentheses. *Prop* is measured as  $\theta/(\theta + \phi)$  averaged over the sample companies for each country. *%Spread* is defined as cross-sectional average of the  $(\text{ask price} - \text{bid price})/((\text{ask} + \text{bid})/2)$  then averaged over all sample companies in that country. *Effective Spread* is measured as the cross-sectional average of  $200 * x_{it} * (p_{it} - mid_{it}) / mid_{it}$  then averaged over all sample companies in that country where  $mid_{it}$  is the midpoint and  $x_{it}$  is the trade direction. *Mkt Cap* (\$US) is the market capitalisation averaged over the sample period adjusted daily for the US\$ exchange rate averaged for all sample companies in that country. *Relative Minimum Tick* is measured as the minimum tick size divided by price for each trade, averaged over the sample period and then over all the sample companies in that country. *German* is a dummy variable that equals 1 if a countries legal origin is German Civil Law and 0 otherwise. *French* is a dummy variable that equals 1 if a countries legal origin is French Civil Law and 0 otherwise. *Sanction* is a sub-index created by adding *Damages* and *Criminal*. *Damages* is a dummy variable that equals 1 if the potential financial penalties may be greater than the trading gain or loss avoided and 0 otherwise. *Criminal* is a dummy variable that equals 1 if criminal sanctions are available and 0 otherwise. *Prop* was regressed using a doubly censored Tobit model while *%Spread* and *Effective* were regressed with OLS. \*\*\* indicates significant at 1%, \*\* Indicates significant at 5%, \* indicates significant at 10.

The results for the enforcement measures are, in contrast to those for the scope and sanction variables, largely as predicted based on prior evidence. *Enforced*, a dummy measuring if a country has previously prosecuted an insider, indicates that prior enforcement does affect the trading costs. As shown, all the dependent variables have a significant negative relationship with the measure of prior enforcement. Its inclusion also results in a significant improvement in the log likelihood estimates for all the variables. Prior enforcement is required to convince the market that the laws are more than ornamental, as argued by Bhattachayra and Daouk (2002). A prior attempt to enforce the laws proves that the country possesses the political will to enforce insider trading.

The variable *Public* also exhibited similar characteristics as *Enforced*. This is a measure based on La Porta et al. (2005) that indicates the strength of the public enforcer based on their independence, focus and investigative abilities. In this case it was observed that countries with stronger regulators experienced a decrease in the cost of informed trading and in the overall cost of trading. By contrast, *Private* enforcement is not even uniformly in the correct direction. This finding regarding the respective merits of private and public enforcement supports Beny (2005), who also showed that public enforcement is important in the context of insider trading. The reason argued by Beny (2005), and in other papers, is that insider trading is realistically too complicated and costly for small investors to be able to enforce. Even the difficulties in establishing that insider trading has actually occurred are outside the ability of small investors to establish. For this reason in the USA most private prosecutions have been largely restricted to piggy-backing on public prosecutions by the SEC (Bainbridge, 2000). The experience of New Zealand with regards to a private only enforcement regime certainly supports the ineffective nature of this type of system for controlling insider trading. It is therefore of little surprise that private enforcement does virtually nothing to reduce the incidence of insider trading.

**Table 6.8: Regression Results for Enforcement Related Variables**

	Prop		% Spread		Effective		Prop		% Spread		Effective		Prop		% Spread		Effective	
Constant	0.6117	***	0.0603		1.2503		0.5636	***	0.0705	*	0.6040	*	0.5086	***	0.0696	*	0.1929	*
	(0.2115)		(0.0367)		(0.7908)		(0.1981)		(0.0348)		(0.8760)		(0.1960)		(0.0323)		(0.9575)	
Relative																		
Minimum Tick	0.7388		-0.2480		-12.5932		1.4148		-0.1942		-16.5782		-0.3846		-0.3974		-10.6984	
	(2.6448)		(0.4592)		(9.8884)		(2.8119)		(0.4946)		(12.4355)		(2.9002)		(0.4782)		(14.1682)	
Log Mkt Cap	-0.0277		-0.0087		-0.0364		-0.0106		-0.0092		-0.1845		-0.0259		-0.0105	*	-0.1186	*
	(0.0329)		(0.0057)		(0.1229)		(0.0339)		(0.0060)		(0.1501)		(0.0339)		(0.0056)		(0.1658)	
German	0.1300	**	0.0343	*	0.6782	*	0.0456		0.0334	*	0.0319	*	0.1487	*	0.0396	**	0.6019	**
	(0.0736)		(0.0128)		(0.2751)		(0.1064)		(0.0187)		(0.4704)		(0.0813)		(0.0134)		(0.3974)	
French	0.0773		0.0006		0.5027	*	0.0183		0.0024		0.0109		0.0831		0.0108		0.1534	
	(0.0751)		(0.0130)		(0.2808)		(0.0795)		(0.0140)		(0.3516)		(0.0875)		(0.0144)		(0.4273)	
Enforced	-0.1918	***	-0.0861	*	-0.9523	***												
	(0.0809)		(0.0441)		(0.3026)													
Public							-0.1729	**	-0.0274	**	-1.3214	*						
							(0.0778)		(0.0128)		(0.6978)							
Private													0.0108		0.0030		-0.0409	
													(0.0174)		(0.0029)		(0.0849)	
R <sup>2</sup>	0.2168		0.2806		0.4039		0.2132		0.2585		0.1621		0.1784		0.3196		-0.0677	
Log																		
Likelihood	14.77	**	1191.18	***	-551.80	***	13.73	**	1183.10	***	-643.09	***	10.04		1106.00		-708.07	

Note: Standard Errors are shown in parentheses. *Prop* is measured as  $\theta/(\theta + \phi)$  averaged over the sample companies for each country. *%Spread* is defined as cross-sectional average of the  $(\text{ask price} - \text{bid price})/((\text{ask} + \text{bid})/2)$  then averaged over all sample companies in that country. *Effective Spread* is measured as the cross-sectional average of  $200 * x_{it} * (p_{it} - \text{mid}_{it}) / \text{mid}_{it}$  then averaged over all sample companies in that country where  $\text{mid}_{it}$  is the midpoint and  $x_{it}$  is the trade direction. *Mkt Cap* (\$US) is the market capitalisation averaged over the sample period adjusted daily for the US\$ exchange rate averaged for all sample companies in that country. *Relative Minimum Tick* is measured as the minimum tick size divided by price for each trade, averaged over the sample period and then over all the sample companies in that country. *German* is a dummy variable that equals 1 if a countries legal origin is German Civil Law and 0 otherwise. *French* is a dummy variable that equals 1 if a countries legal origin is French Civil Law and 0 otherwise. *Enforced* is a dummy variable that equals 1 if insider trading had been prosecuted before 1998 and 0 otherwise. *Private* is the product of the right of private enforcement, a dummy that equals 1 where private prosecutions are allowed and 0 otherwise, and the law and order rating collected from International Country Risk Guide. *Public* is the mean of the supervisor attributes and investigative powers from La Porta et al. (2003). *Prop* was regressed using a doubly censored Tobit model while *%Spread* and *Effective* were regressed with OLS. \*\*\* indicates significant at 1%, \*\* Indicates significant at 5%, \* indicates significant at 10.

#### *6.3.4 Robustness Checks*

To ensure the robustness of the results a number of steps were undertaken. Several control variables were added and removed to ensure that the most significant factors were accounted for. In addition to the control variables included in the regressions, the average trades per day for each company was included to account for any liquidity effects. However, it was found that the log market capitalisation was a better measure of this, although the results were largely unchanged when trades per day was employed. A variable to control for dealer markets was also included and rejected, this effect seems to have been accounted for in the legal origin variables. Newey-West heteroskedasticity corrected t-statistics were also examined which resulted in no change to the significance of the relationships between the variables.

Given the small size of the sample with just 18 observations, the regressions were also run using all 1073 companies individually. While this does not effectively increase the number of observations it does increase the power of the tests and also allows for more rigorous robustness checking. The only significant changes due to the use of individual companies were that the significance for all the law variables with the exception of tippee and criminal was stronger. The general patterns were largely the same. Based on this sample the impact of potential outlier markets was examined by excluding them completely. In particular, the United Kingdom was excluded but also various combinations of Singapore, Hong Kong, Germany and Japan. Again no significant changes were found.

### **6.4 Conclusion**

Despite the vast majority of countries regulating insider trading, little research has been done on the specific elements required to create an insider trading regime that effectively reduces the level of insider trading and information asymmetry. The lack of research comes however in spite of findings both with regards to insider trading and financial market development generally that the nature and quality of the institutional settings within which markets operate has a significant impact. This study takes a further step towards providing some understanding of the specific elements that insider trading laws require to effectively limit information asymmetry.

Three proxies for transaction costs were examined for a sample of companies from 18 countries and related those to a number of variables measuring the scope of the

laws, sanctions the laws could impose and the enforcement strength within the country. After controlling for other factors that impact transaction costs it was found that stronger legal regimes are associated with lower transaction costs and in particular a lower proportion cost contribution from information asymmetry. In particular it was found that formal rules against insiders passing on material non-public information, so called tipping, and financial damages are most effective in controlling insider trading. *Damages* in particular were a surprise given the small percentage of the sample countries that used this type of sanction compared to criminal damages. It was also found that past enforcement was important as was the strength of public enforcement while private enforcement played little role. The results allow some early conclusions about the direction that regulators should be headed in controlling insider trading, although significantly more research with better proxies is required. In particular regimes need to concentrate on laws that limit insiders from exploiting their information advantage, including passing on information for others, while ensuring that the laws are both enforceable, with strong regulators to ensure they are enforced, and with significant financial penalties. This seems to be the most effective combination of laws in limiting information asymmetry in the market, whether this is the most efficient combination in terms of allowing for better informed markets requires further research.



## **Chapter 7**

### **Conclusion**

The purpose of this thesis was to examine the role of regulation on insider trading, providing the experiences of a market that has recently moved from a weak and largely ineffective regime to a much stronger and more effective one. Despite the vast majority of markets having regulated insider trading, studies into the effectiveness of regulations and their ability to control insiders and improve the market have been scarce. Only recently, in the wake of literature on the effect on the market as a whole of effective investor protection, has this topic become the subject of increased attention and concern. As a result our understanding of regulations and their impact on insiders is lacking in many areas and still somewhat confused. Addressing this gap in the academic literature should be of considerable importance to smaller developing markets where considerable damage to the development of the market can occur from either the absence, or the presence of poorly designed laws. In this respect the experience of New Zealand, which is similar to many developing markets in terms of size and liquidity, in moving from a poorly structured and ineffective regime to a stricter and more enforceable law should allow some examination of the potential benefits for other markets where enforcement, for a variety of reasons, has proven illusive.

In Chapter 3 the effect that the stricter laws had on the behaviour and profitability of insiders was examined. This was accomplished by collecting a sample of directors disclosed transactions both before and after the change in regulation. The abnormal returns earned by insiders was estimated based on the Fama and French three factor model, and it was found that the change in laws resulted in a significant decline in insider profitability. In fact, following the introduction of the new laws, insiders appear unable to earn significant abnormal returns, a somewhat surprising finding given the proven profitability in overseas studies, even when unable to trade on material information. The source of the decrease in profitability appears to be due to a change in the information used by insiders. Pre-change, insiders appear to have relied on knowledge of upcoming announcements with their profit largely driven by trades followed by news in the right direction, for example, purchases before good news. This relationship was reinforced when the specific categories of news announcements was examined. Post-change, a marked decrease in the percentage of trades followed by news in the right direction was observed, and insiders no longer relied on these trades to earn

their abnormal returns. Rather there is limited support for the hypothesis that post-change insiders are relying on short-run market mispricing to profit. The results suggest that the new law was effective in promoting a change in the informational basis of insider trading.

Chapter 4 examined the effect that the law change, with its resulting reduction in insider profitability and change in the informational basis of trades, had on the market. Four particular aspects of the market that had been theoretically linked to insider trading; liquidity, bid-ask spreads, return volatility and the cost of equity, were examined. Employing a sample of companies that survived over the total sample period the mean level of each variable year-by-year between 1996 and 2001 and for December 2002 to March 2004 was observed. The variables were also regressed against a post-change dummy variable and other control variables. The results showed significant decreases in the cost of equity (proxied by dividend yield), bid-ask spreads and return volatility, and a significant increase in liquidity. This was confirmed by the regression results, while visual inspection of rolling regressions over the sample period showed the changes were both marked and started almost immediately following the introduction of the SMAA. It appears therefore that the new law, and its effect on insiders, has resulted in a more efficient market with greater depth, lower risk premiums and lower transactions costs.

When the bid-ask spreads were examined in more depth in Chapter 5, the reason for the decrease in spreads appeared to be due to a reduction in the level of information asymmetry in the market, an indication that insider trading has decreased in either frequency or harm. Bid-ask spreads are made up of three costs faced by a provider of liquidity; order processing costs, inventory holding costs (not relevant in a limit order book market) and the cost of information asymmetry. The latter represents the risk of dealing with a better informed trader, a group that includes most notably insiders. If the laws have been effective in reducing the harm from insider trading by increasing its cost, then the amount of informed trading in the market should have reduced and the cost of information asymmetry along with it. This is largely what was found, the cost of informed trading had reduced significantly as had the proportion of the spread comprised of information asymmetry. It was also concluded that those firms most prone to insider trading, illiquid and high pre-change information asymmetry firms, were those that saw the greatest reduction. Lastly, it was observed that the contribution of information asymmetry to price volatility also decreased along with total volatility, again driven by those companies most prone to insider trading. The break point appears

to occur at the same time as the new law was introduced, indicating that again the regulation change has been positive with a marked improvement in the cost of equity.

Having established that the law reform in New Zealand was positive this thesis sought to examine whether the SMAA created the most effective insider trading regime. This was achieved by examining the elements of the insider trading law in a variety of countries and compared this to the cost of informed trading and the transaction costs within a sample of up to 70 randomly selected companies in 18 countries. Variables describing the legal structure of each country and control variables were regressed against the proportion of the cost of information asymmetry in the total spread, the percentage spread and the percentage effective spread to find those variables that reduced the cost of trading. It was found that there were a number of specific aspects that should be included in an effective insider trading regime. In particular it was observed that stronger insider trading regimes resulted in lower costs of informed trading and lower trading costs in general. It was further observed that insider trading laws should prevent insiders from passing on confidential information, but that prohibiting those that receive the information has little impact on the costs of trading. This is possibly a reaction to the difficulties in prosecuting individuals without a direct relationship with the company. In terms of sanctions, surprisingly financial damages in excess of the loss were most effective while criminal sanctions were ineffective, again likely due to the difficulty of getting a successful prosecution. Past enforcement was also found to be important, while in terms of ongoing enforcement strength, public prosecution was more effective than private enforcement regimes which had an insignificant effect. The results indicate some aspects of an effective insider trading regime and provide support for the reforms undertaken in New Zealand which for the most part have introduced or retained many of the elements identified as important.

The results in this thesis are strongly supportive of the role of regulations in terms of controlling insider trading. This thesis has shown that the changes in relation to New Zealand and the introduction of the Securities Markets Amendment Act 2002 have resulted in a greatly reduced threat to outsiders from insider trading, with flow-on improvements in numerous aspects of the market including liquidity, cost of equity and transaction costs. The changes also appear to have not only patched the most obvious weaknesses of the previous legal regime, but also brought New Zealand closer to what would appear to be the best structure for legislation in relation to reducing the cost of information asymmetry within the market. The current regime should therefore represent a significant improvement.

While the results of this thesis suggest that the changes made in the Securities Market Amendment Act 2002 were both positive and necessary, they are not so supportive of further changes proposed in the Securities Legislation Bill 2004 that is currently in the process of being enacted. This Bill was touted as a significant and fundamental review of the policy basis, structure and penalties of the insider trading regime in New Zealand along with several other areas of securities law. In relation to insider trading the major changes proposed include a dramatic change in the definition of inside information that removes the fiduciary relationship aspect emphasising instead the possession of inside information. This move was argued as changing the policy basis of insider trading regulations to emphasise the harm of insider trading to the market (Kavanagh, 2006). This move brings New Zealand into line with Australia, but has resulted in concerns regarding the ability of investors to engage in legitimate information gathering (New Zealand Business Roundtable, 2005). While the reason for this change has been the difficulty in applying the existing law, it is hard to accept this reasoning given the first insider trading cases of the new regime are only just going through the courts at present. Further, given the USA has not seen the need to remove the fiduciary relationship requirement, the basis for this change is somewhat questionable and arguably based on too little information to be warranted. In terms of efficacy, the results in Chapter 6 indicate that broadening laws to apply to people whose liability will be difficult to establish is ineffective. It is therefore hard to see this change as likely to improve the market significantly, and if the concerns regarding catching unintended actions bear true it may harm the market.

The other significant changes are an increase in the powers of the Securities Commission to protect the market from actions such as insider trading and the introduction of criminal damages. The former is a positive move given the findings of Chapter 6, which show stronger regulators are more effective. The introduction of criminal penalties however is not. Under the new laws, breaches of insider trading rules may be punished by up to 5 years imprisonment and a \$300,000 fine for an individual and \$1,000,000 for a body corporate. This represents a significant weakening of the laws in two respects. First, as shown in Chapter 6 criminal damages are ineffective, largely due to the higher burden of proof and the fact that insider trading is largely an inferential crime. Second, under the old law insiders were liable for much larger pecuniary penalties, three times the value of the gain or loss avoided or the value of the securities traded, whichever was greater. Given financial penalties are more effective,

and in this instance the former damages are likely to be larger<sup>19</sup> the reduced financial damages are likely to reduce the disincentive to insider trading. In effect the proposed law, despite being heralded as a significant step forward, are likely to result in a weaker regime than is currently in place.

The situation in New Zealand also demonstrates the need for further research to continue on the role of regulation in relation to insider trading. The experiences of other markets that have undergone similar changes in regulation would help to provide a more complete and accurate picture of the effect of regulation, especially where inconsistencies exist. As much of the literature is currently focused on the USA, a market that is widely regarded as being effectively regulated, it may be that the mixed evidence can be resolved by observing a more diverse range of markets. More work also needs to be done in determining the best regulatory regime. While this thesis has attempted to examine the impact on trading costs of different aspects of the legislation, evidence on the effect of different legal features on the price efficiency of the market and the speed with which insider trading signals are incorporated is needed to ensure any policy suggestions can consider features that both limit the harm, and maximize the benefit of insider trading. More refined measures of the structure of laws are needed. At present the dummy variables being employed are a relatively blunt tool whereas measures like number of successful past enforcements, average penalty, maximum financial penalty and better measures of the breadth of the laws would provide greater policy advice and give a more complete understanding. Finally, it would be interesting, within the context of Chapters 5 and 6, to examine other microstructure models such as the Probability of Informed Trading model (PIN) and establish whether they can be used as an indicator of insider trading.

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<sup>19</sup> Total damages, both compensatory and pecuniary penalties, sought in the Trans Rail insider trading case were \$258 million from six parties (O'Sullivan and Panckhurst, 2004)

# Appendices

## Appendix 3.A: Classification Table

### *Good News Events*

Increase of at least 5% over last years EPS (if semi-annually over the same period)  
Increase of at least 3% in dividends  
Company awarded a contract  
Prediction of record income (even if below 5% increase per share)  
Strike ended, negotiations spurred hope of settlement, settlement with union  
Reopening of plant  
Rehiring  
Litigation settled in favour of company  
Announcement of extra dividends  
Production, development or marketing of a new product; discovery of new oil etc  
Received or purchases a license, right or patent for new products etc  
Expansion of business or plant; joint market venture  
Acquisition or plans to acquire other companies; approval of a merger etc  
Merger if target company  
Announcement of a stock dividend or stock split  
Action against competitors  
Initial public offering  
Dividend initiations  
New exchange listings  
Share repurchases  
Spin-off  
Acquisition of large block by an investor  
Other

### *Bad News Events*

Decrease in earnings compared to last year (same quarter)  
Decrease in dividends  
Contract cancelled  
Prediction of sales or income decrease  
Strike started, negotiations broken off, conflict with union, strike continues  
Plant closing  
Layoffs  
Litigation settled against the company  
Unfavourable action by a government agency  
Downward revision of planned sales or production  
Announcement of sales decline  
Seasoned equity offering  
Dividend omission  
Asset/investment sales  
Other

### *Announcement Categories*

- 1 Actual earnings announcements by management
- 2 Forecasts of earnings by management
- 3 Analyst recommendations and information regarding credit ratings
- 4 Capital structure related information
- 5 Restructuring related information
- 6 General business related information
- 7 Miscellaneous

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