THE WEALTH EFFECT OF NZX 2003 COMPULSORY COMPLIANCE: AN EVENT STUDY

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Abstract

In response to a global move towards more strictly regulated corporate governance, the NZX established the Code of Best Practice in 2003. In addition to several guidelines for good corporate governance, two compulsory compliance measures were imposed to enforce greater external monitoring: (1) firms must have a minimum number of independent directors and (2) firms must include an audit committee on their board. However, prior research suggests that boards are endogenously determined based on a firm's individual characteristics; thus, the imposition of compulsory compliance may force some firms to move away from an optimal board structure.

Using event study methodology, with both long-horizon and short-horizon approaches, I examine the cross-sectional variation in stock market returns around the announcement and passage of the new regulations. I find that firms with high benefits of control and low monitoring costs have significantly higher stock market returns around the event than firms with opposing characteristics. Small, growth firms that are operating in uncertain environments have significantly higher costs of monitoring and lower benefits of control. The imposition of the compulsory compliance measures has a significantly negative wealth effect for these firms. Results are robust to the capital asset pricing model (CAPM) and Fama-French (1993) risk adjustments. Analysis of the reaction around individual events related to the NZX Code shows that the bulk of the expected wealth effect of the NZX Code on firms was priced into the market at the first announcement of the new proposed rules (on May 6th). Overall, the findings suggest that a blanket "one-size fits all" regulation pertaining to best board practice is not optimal for the New Zealand market.

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Chapter 1: Introduction

This thesis conducts an event study analysis around the announcement and passage of the Corporate Governance Best Practice Code (NZX Code) of 2003. The analysis aims to ascertain whether or not there are significant cross-sectional differences in the impact of the NZX Code on the wealth of firms due to varying costs and benefits of adhering to the compulsory compliance measures. The purpose of this analysis is to determine whether or not the optimal board composition of New Zealand firms is endogenously determined by firm-specific characteristics, and if a blanket "one-size-fits-all" regulation for best board practice is appropriate in the New Zealand market. Overall, the results of the analysis show that firms with high monitoring costs and low benefits from additional monitoring benefited significantly less from the NZX Code regulations than firms with the opposite characteristics.

In response to a global move towards more strictly regulated corporate governance, led by the 2002 Sarbanes-Oxley Act (SOX) in the US, the New Zealand Stock Exchange (NZX) established the NZX Code in 2003. In addition to several guidelines for good corporate governance, the proposed NZX Code included two main compulsory compliance measures, which imposed additional monitoring by the board of directors: (1) firms must have a minimum number of independent directors and (2) firms must include an audit committee on their board that comprises a minimum number of independent directors and financial experts. However, the recent corporate failures in New Zealand call into question whether these "Best Practice" government regulations are indeed beneficial for New Zealand firms (Yahanpath and Cavanagh, 2011).

Several other countries, such as the UK, Australia and Canada, have adopted "comply and explain" regulations which are similar to the NZX Code. These more flexible regulations set out a code, which listed companies may either comply with, or contrarily explain why they do not comply. UK-based study, Arcot and Bruno (2007), documents a positive abnormal stock price reaction around the appointment of outside directors over a time period spanning the 1992 Cadbury Report. Conversely, in

Canada, Park and Shin (2004) found empirical evidence that the monitoring by outside directors was not more effective after the issuance of the 1994 Toronto Stock Exchange's Corporate Governance guidelines.

This study provides a unique contribution to the literature, as it is the first to analyse the cross-sectional differences in wealth effects of the NZX Code. Similar studies on the cross-sectional wealth effects of additional monitoring have largely been based in the US (E.g. Boone, et al., 2007; Wintoki, 2007). However, it is inappropriate to make direct inferences from these US-based studies to the New Zealand market. Generally, the New Zealand market is smaller, less liquid, and has a less developed equity market than the US (Hossain et al., 2001; Reddy et al., 2010). Ownership concentration in New Zealand is also significantly higher than the US (Gunasekarage and Reed, 2008; Hossain, et al., 2000). Thus, the difference between the external institutional environment of New Zealand and the US may result in a different response to additional board monitoring (Agrawal and Knoeber, 1996). Another difference is that, in New Zealand the CEO is rarely on the board of directors, while CEOs are always present on the board in US firms (Boyle and Roberts, 2013). Additionally, the NZX Code regulations are relatively less stringent than the US-based SOX (Teh, 2009). As a result, the wealth effect of the NZX Code regulations may differ from that of the SOX.

Board composition is considered an important mechanism in the mitigation of agency costs through the alignment of shareholder and manager interests. In fact, Fama and Jensen (1983) recognise the board as the most important control mechanism available, because it forms the apex of a firm's internal governance structure. Two theories lie behind the debate as to whether additional board monitoring improves firm performance. The global trend in corporate governance regulation towards additional monitoring by boards is evidently motivated by agency theory. This theory is based on the premise that managers act in their own interest, and thus must be disciplined or incentivised to make decisions that are optimal for shareholders (Jensen and Meckling, 1976). On the contrary, stewardship theory argues that managers are trustworthy individuals who work hard in the interests of shareholders (Donaldson and Davis, 1991). Empirical evidence on which of these two theories prevails is mixed at best. Some US- based studies around the overall market reaction to the SOX report a positive wealth effect (Jain and Rezaee, 2006; Li, et al., 2008), while others report a negative overall wealth effect (Zhang, 2007). Other studies on the impact of additional board monitoring look at the relationship between the percentage of outside directors on boards and board committees on firm performance. Again, evidence from these studies is contradictory: for example Rosenstein and Wyatt (1990) reports a positive relationship, while Kiel and Nicholson (2003) find a negative relationship.

The ambiguity of the empirical evidence around board composition and overall firm performance could be due to econometric issues associated with this analysis, such as challenges in modelling expected returns and dealing with endogeneity. Another explanation is that the impact of outside monitoring on firm performance is determined by the particular characteristics of the firm and the environment in which it is operating. US-based empirical studies (such as Boone, et al., 2007; Gillan and Starks, 2003; Wintoki, 2007) suggest that the benefit of outside directors on boards and committees is greater for firms with high complexity as they gain more from the expertise that outside directors bring. Additional monitoring on firms with high private benefits of control is also more beneficial as their agency problem is much greater. Conversely, empirical evidence suggests that small, high-growth firms operating in uncertain environments have higher monitoring costs and thus benefit less from the imposition of outside directors on the board (Wintoki, 2007). This study examines whether these three determinants of board composition, identified from US-based research, are also relevant in the New Zealand environment.

To date there has been minimal research on the impact of the NZX Code on firm performance and none on the cross-sectional differences in value of firms as a result of the code. Teh (2009) examines compliance with the Code in 2007 and documents a positive relationship between Code compliance and firm performance. Similarly, Reddy, et al. (2010) use ordinary least squares (OLS) and two stage least squares (2SLS) regression techniques and conclude that the passage of the NZX code had an overall positive influence on firm performance, as measured by Tobin's Q, return on assets (ROA), and market-to-book ratio (MTB). By contrast, Struthers (2012) finds conflicting evidence on the effectiveness of increased outside board representation associated with the passage of the NZX Code. While he documents a positive relationship between the proportion of outside directors and Tobin's Q from 1997-

2008, this relationship becomes negative over a subsample period from 2004 to 2008. Struthers (2012) concludes that these conflicting results indicate a firm performance board-representation relationship that is dynamic and evolves over time, which implies that a "one-size-fits-all" rule-based approach is likely to be counterproductive. This thesis aims to build upon the discussion started by Struthers (2012) by analysing whether the monitoring cost, private benefits of control, and complexity of New Zealand firms affects the market response to the NZX Code announcements.

A significant cross-sectional difference in wealth effects around the announcement and passage of the regulations will lend support to Struthers (2012) assertion that imposing standardised rules on board composition in New Zealand is not optimal for all firms.

I construct a composite index that measures the overall costs and benefits of monitoring for firms. I then rank the sample of firms in the study by the index score. The ranking is then used to classify firms into one of four quartiles. Quartile 1 firms have high monitoring costs and low expected benefits from monitoring (firms whose composite index value ranks in the first quartile), while Quartile 4 firms have the opposite characteristics (firms whose composite index value ranks in the fourth quartile). The abnormal returns over a long event horizon and a variety of short event horizons are calculated for all of the quartile portfolios. The significance of the difference in abnormal event returns between Quartile 1 and Quartile 4 are then calculated. Overall, the findings in the analysis lend strong support to my hypotheses, which state that firms with high monitoring costs, low private benefits of control, and a low complexity benefited relatively less from the additional monitoring requirements imposed by the NZX Code.

My contribution to the literature lies in the identification of this significant cross-sectional difference in wealth effects of the code. This is the first study to identify that the NZX Code was not mutually beneficial for all firms. In fact, for some firms the compliance requirements of the NZX Code resulted in negative wealth effects. The study also provides unique evidence to explain the determinants of the benefits of monitoring for firms in New Zealand. It is clear that the optimal amount monitoring by the board for New Zealand firms is higher for firms with high private benefits of control, low monitoring costs, and high firm complexity. This suggests that New Zealand firms endogenously choose their board composition based on these characteristics. Finally, there has been much debate over the years as to whether a "one-size-fits-all" approach to monitoring is appropriate (Arcot and Bruno, 2007; Coles, et al., 2008). This is the first study to provide evidence that "one-size-fits-all" regulations that impose minimal board monitoring are not optimal in the New Zealand market.

The remainder of this thesis is set out as follows. Chapter 2 provides a review of the relevant literature on board composition and the effect of governance regulations on firm value. Chapter 3 highlights what makes the New Zealand market unique, and thus an interesting environment in which to conduct this analysis. Chapter 4 develops the main hypotheses that are tested in the analysis. Chapter 5 provides detail on the data and empirical methodology. Chapter 6 reports the findings of the empirical analysis, including robustness checks. Chapter 7 concludes.

Chapter 2: Literature Review

This thesis examines the cross-sectional variation in stock returns around the announcement and passage of the NZX Code. These new proposed listing requirements consisted of a set of principle guidelines that firms were encouraged to follow, as well as set of compulsory compliance requirements. Listed firms were also required to include a statement in their annual report detailing whether and how their corporate governance policies differed from the NZX Code principles. The two main compulsory compliance measures in the code are the focus of the study, as all publicly listed New Zealand firms were required to adopt them. These measures require firms to have a minimum number of independent directors on the board, and to establish an audit committee with a majority of independent directors.[1]

The philosophy of the NZX Code compulsory compliance follows that of other international governance regulations, such as the SOX of 2002. It argues that additional monitoring on the board of directors, through more independent directors and an independent audit committee, will result in improved governance and thus improved firm performance. This is consistent with agency theory, which assumes managers act in their own interest, and thus must be disciplined or incentivised to make decisions that are optimal for shareholders (Jensen and Meckling, 1976). Additional monitoring by outsiders on the board, will serve to align the decisions of managers with shareholders (Fama and Jensen, 1983). By analysing the cross-sectional difference in market response of New Zealand firms to the NZX Code, I will shed light on whether the agency theory argument can be applied to the New Zealand environment, is only relevant for certain New Zealand firms, or is not relevant at all.

2.1 Opposing theories on corporate governance

The two main opposing theories concerning corporate governance are agency theory (Jensen and Meckling, 1976) and stewardship theory (Donaldson and Davis, 1991). As previously stated, agency theory assumes that managers do not always act in the interests of shareholders, which results in agency costs. Jensen and Meckling (1976)

[1] Details on the compulsory compliance measures are discussed more thoroughly in Section 3.1.

state that managers have an incentive to shirk responsibilities and to consume perks when they own less than 100% of the equity of the firm. Intensive monitoring by an independent board is an effective way to align management action with shareholder interest, and thus decrease agency costs. Fama and Jensen (1983) state that outside directors have strong reputational incentives to effectively monitor CEOs and management. Monitoring by audit committees is an additional board mechanism to combat agency problems. Pincus, et al. (1990) argue that audit committees are useful in situations where agency costs are high, as they improve the quality of information flows from the agent to the principal. A positive market reaction around the announcement and passage of the NZX code would support the view that additional monitoring imposed through compulsory compliance will benefit firm performance. This will provide evidence to support agency theory in the New Zealand context.

By contrast, stewardship theory states that managers are trustworthy individuals that work hard for the interests of shareholders (Donaldson and Davis, 1991). This theory directly competes with agency theory. Davis, et al. (1997) state that the theoretical limits of agency theory are highlighted by research into psychology and sociology (Hirsch, et al., 1987; Perrow, 1986). When given a choice between self-serving behaviour and pro-organisational behaviour, a steward will make decisions in the interest of his or her organisation. Stewards perceive that the greatest utility comes from cooperative behaviour and achieving the goals of organisation, rather than from self-interested behaviour, such as consuming perks (Davis, et al., 1997). In this case, having a majority of insiders on the board will produce superior corporate performance, as these insiders are stewards who are motivated to maximise company performance and thus shareholder value (Kiel and Nicholson, 2003). In fact, Argyris (1973) states that imposed control can be potentially counter-productive, as it undermines the pro-organisational behaviour of the steward by lowering his or her motivation. This point calls into question the efficacy of the NZX Code compulsory compliance. If stewardship theory is relevant in New Zealand, requiring additional monitoring on boards may hamper firm performance. Negative market reactions around the announcement and passage of the NZX Code will provide evidence to support stewardship theory. The NZX Code, the SOX, and most global governance regulations are clearly motivated by agency theory. However, there is evidence from empirical research to support both theories. Empirical findings related to the impact of increased monitoring on firm performance will be discussed below.

2.2 Positive relationship between increased monitoring and firm performance

There is a large amount of empirical evidence that increased monitoring contributes positively to firm performance (DeFond, et al., 2005; Jain and Rezaee, 2006; Rosenstein and Wyatt, 1990). This positive association argues in favour of agency theory, as is discussed in Section 2.1. This section will review the empirical evidence of the positive influence of outside directors (Subsection 2.2.1) and independent audit committees (Subsection 2.2.2) on firm value. Section 2.2.3 will present the empirical evidence in support of agency theory from the SOX.

2.2.1 Outside directors

Baysinger and Butler (1985) find evidence that firms with a high proportion of outside directors in 1970 had a mildly positive effect on industry-adjusted return on equity in 1980. The authors go to considerable lengths to determine director independence, and other salient attributes of individual directors, and account for the endogenous relationship with a lagged performance variable. However, Bhagat and Black (2002) criticise their use of a 10-year lagged period, stating that the effects of board composition are unlikely to persist over this period, and that other events over this period could confound the results. Rosenstein and Wyatt (1990) conduct an event study of the stock price reaction of US firms surrounding the addition of outside directors to their boards between 1981 and 1985. They find a significantly positive wealth effect for firms around these events. However, Hermalin and Weisbach (2001) argue that firms make decisions on board structure in order to improve their operations. Thus, any unexpected announcement change should cause some positive market reaction. Rosenstein and Wyatt (1997) quell these concerns. Their study conducts a similar analysis of stock market reaction around *inside* director appointments within the same sample period. They find that over the entire sample, the appointment of an inside director has no significant effect on a firm's stock price. In fact, such appointments have a significantly negative effect when inside directors own less than 5% of the common stock. Direct comparison of these two opposing event studies further cements the argument that outside directors positively contribute to firm performance. Nonetheless, an event study that does not centre around individual firm announcements, but rather around announcements that effect all firms (such as my study), avoids the concerns raised by Hermalin and Weisbach (2001).

Other empirical research examines the effect of internal governance structure on other variables, such as earnings management. A decrease in earnings management, as a result of a more independent board or a more independent and expert audit committee would suggest that the NZX Code compulsory compliance measures would have a positive effect on firms. However, it should be noted that the consensus in empirical literature is mixed as to whether earnings management has a direct effect on firm value. Peasnell, et al. (2005) use UK data to examine the effect of board independence on earnings management and find that a more independent board results in decreased earnings management.

2.2.2 Audit committee independence

DeFond, et al. (2005) examine the three-day cumulative abnormal returns (CARs) around the announcement of outside directors being assigned to audit committees during a period before implementation of the SOX. They find that the market reacts positively to outside directors that have *accounting* financial expertise, but has no reaction to the appointment of directors with *non-accounting* financial expertise. Accounting financial expertise is defined as directors with work experience in the accounting field, such as public accountants and auditors. Chan and Li (2008) examine the effect of expert-independent directors on the firm value of 500 Fortune 200 companies in the year 2000. They improve on the study of DeFond, et al. (2005) by distinguishing between *outside* expert directors and *independent* expert directors. They find that a majority of expert-independent directors results in positive firm value. A majority of expert-independence on the entire board has a similarly positive effect. Most interestingly, they find that expert-independent directors must have a majority control of the board to improve firm value; their mere presence has no significant effect. The results of these two studies raises one question: Is the NZX Code's requirement to have "at least one member with a financial or accounting background" stringent enough?

(Klein, 2002b) examines the relationship between audit committee independence and earnings management, using high positive or negative discretionary accruals as a proxy for earnings manipulation.[2] She finds a non-linear negative relationship between audit committee independence and earnings manipulation; however, this relationship only holds when the audit committee has less than a majority of independent directors. Additionally, the study finds that the more stringent requirement of 100% audit committee independence (as specified in the SOX) has no significant effect on earnings management. This provides support to the decision of the NZX to only require a majority of independent directors on the audit committee, rather than 100% independent directors. In an Australian study, Davidson, et al. (2005) expand on the Peasnell, et al. (2005) study by examining the role of both an independent board and an independent audit committee in constraining earnings management. Similarly to (Klein, 2002b), the study uses the cross-sectional version of the Jones (1991) model. The study finds that in the 2000 financial year, having a majority of non-executive directors on the board and on the audit committee is significantly associated with a lower likelihood of earnings management.

2.2.3 Evidence from the Sarbanes Oxley Act

Jain and Rezaee (2006) and Li, et al. (2008) use the imposition of the SOX as a method to examine the relationship between increased monitoring and firm performance. Jain and Rezaee (2006) identify several legislative events that either increased or decreased the likelihood of the Act being passed. Using event study methodology, they calculate the three-day CARs around these events and find a positive (negative) overall abnormal return around events that increased (decreased) the probability of the Act being implemented. Li, et al. (2008) use a similar method to examine the effect of the act on US stock returns, yet also examine some cross-sectional effects. They document significantly positive stock returns around events that resolved uncertainty about the SOX's final provisions or were informative about its enforcement. The cross-sectional analysis shows that a high extent of earnings management is positively associated with stock returns. Conversely, the proportion of

[2] Klein models non-discretionary accruals with a variant of the Jones (1991) non-discretionary accruals model.

non-audit committee members is negatively associated with stock returns. Unfortunately, it would be very difficult to conduct a study similar to these around the passage of the NZX Code, as the debate around the legislation was minimal. After the first proposal of the code was announced in May 2003, it was widely accepted that the code would be implemented.[3]

2.3 Negative relationship between increased monitoring and firm performance

Despite the general global trend towards imposing increased monitoring on boards, there are several empirical studies that call into question the efficacy of external monitoring on boards. Empirical evidence that shows increased monitoring decreases firm value supports the stewardship theory of Donaldson and Davis (1991).

2.3.1 Outside directors

Klein (1998) analyses the effect of outside directors on finance and investment committees. The results show a positive cross-sectional association between the percentage of inside directors on finance and investment committees and both accounting and market measures of firm performance. The author argues that these results stem from the fact that inside directors have greater specialist knowledge of the firm, and thus are more effective at assessing and valuing the firm's long term strategic goals. Fama and Jensen (1983) support this argument, stating that inside directors provide more valuable information about firms' investment decisions.

Kiel and Nicholson (2003) examine the effects of board size and proportion of outside directors on the performance of 348 of Australia's largest publicly listed firms. ROA and Tobin's Q are used to proxy for firm performance. The authors use three-year averages of the variables (1996-1998) to control for short-term fluctuations that could confound results. However, the OLS regressions fail to control for the endogenous relationship between board composition and firm performance; thus, their estimates could be biased. Bhagat and Black (2002) analyse whether a *majority-independent board* (a board with at least 50% independent directors) and a *supermajority-*

[3] A survey of financial, legal and news articles in New Zealand in 2003 confirms this statement.

independent board (a board with only one or two inside directors) have any effect on the overall firm performance. They state that the recent trend towards supermajority independent boards has ignored the conflicting evidence that suggests having a moderate number of inside directors on the board results in greater profitability. Their study finds that firms with more than 40% outside directors perform worse than other firms in the sample, and that supermajority boards drive this poor performance.

2.3.2 Evidence from the Sarbanes Oxley Act

In a SOX event study, Zhang (2007) reports evidence that directly contradicts the findings of Jain and Rezaee (2006) and Li, et al. (2008). The author argues that methodological issues, such as overlapping event windows, omitted events, omitted correlated variables, and inadequate expected return models, may have confounded the results of both of these studies. Zhang (2007) examines the cumulative abnormal stock returns around a much more comprehensive list of legislative events than those used by Jain and Rezaee (2006) and Li, et al. (2008). The study finds that the cumulative abnormal return around the legislative events leading to SOX is significantly negative; however, the abnormal returns around the events related to the implementation of SOX are largely insignificant. Overall, there is clear evidence that the SOX detrimentally affected US firms. This provides support towards stewardship theory and challenges the philosophy behind regulations such as the SOX and the NZX Code. One concern of the Zhang (2007) study is that the statistical tests all assume normality of abnormal returns; if the abnormal returns are skewed, the test statistics are likely biased.

2.4 Insignificant relationship between increased monitoring and firm performance

The academic consensus on the impact of increased monitoring on overall firm performance is mixed, as is evident from the above discussion. In addition to the variety of papers that identify that monitoring on the board is either negatively or positively associated with firm value, there is another stream of literature which concludes that board composition has no significant effect on firm value at all.

Hermalin and Weisbach (1991) examine the effects of board composition on Tobin's Q using an OLS model. The study finds no significant relationship between firm value and board composition. The authors do note that these results could be attributed to a lack of test power; however, they state that even if a relationship does exist, it is most likely small and economically insignificant. Bhagat and Black (2002) analyse the correlation between several performance measures (such as market-adjusted stock prices, (ROA), and Tobin's Q) and board independence, between 1991 and 1993. While they find a negative relationship between Tobin's Q and board independence, the correlation between the other performance measures is found to be insignificant. Both of these studies use a simultaneous equations method to account for endogeneity.

Felo, et al. (2003) examine the relationship between the expertise, independence and size of the audit committee on the quality of financial reporting, using a sample of firms from the 1995-1996 Association for Investment Management (AIMR) database. They control for several variables that are hypothesised to affect financial reporting quality, such as firm size, board of director composition, and institutional ownership. Results show a positive relationship between the proportion of audit committee members with financial expertise and financial reporting quality. However, they find that audit committee independence has no significant effect on financial reporting quality.

In a survey of US empirical literature, Hermalin and Weisbach (2001) provide some good arguments as to why many studies report an insignificant relationship between firm value and board composition. The key problem identified is the difficulty in modelling the endogenous relationship between board composition and firm value. The endogeneity arises from the fact that while board composition may impact firm value, firm value may also impact board composition. Methodological methods to manage this endogenous relationship are discussed in Section 2.9. There is some empirical evidence to suggest that models need to adjust for endogeneity. Bhagat and Black (2002) conduct analysis using both OLS regressions and a simultaneous equations framework and find significant evidence that poor-performing firms respond by increasing board independence. Likewise, Hermalin and Weisbach (1988) find that, over an 11-year period (1972-1983), poorly performing US firms tended to remove insiders and add outsiders to the board. They hypothesise two reasons why this might be the case. Agency theory may motivate poorly performing firms to add outside managers to the board in order to increase monitoring, and thus improve firm performance. Alternatively, firms may choose to fire insiders who are contributing to the firm's poor performance. They may then be forced to hire outsiders if there are no appropriate insiders for the job. In this case, the appointment of the outside director may be sub-optimal for the firm, if they lack the expertise necessary for the job. Struthers (2012) notes that this could be a significant problem in New Zealand. The small size of our market and our geographic isolation mean that the pool of people with the relevant expertise to act as a director on a firm's board is limited relative to other markets.

Another explanation for the insignificant relationship in board composition could be the presence of strong external mechanisms, such as a market for corporate control and the managerial labour market. Agrawal and Knoeber (1996) identify a significant interdependence between seven mechanisms to control agency problems between managers and shareholders. They find that when they examine each mechanism separately, a cross-sectional relationship with firm performance is evident. When these mechanisms are examined together in a systemic framework, the majority become insignificant. They conclude that the optimal allocation of a firm's internal governance mechanisms is dependent on the strength of external governance mechanisms in the market. The optimal number of independent directors on the board and audit committee will therefore be determined by taking into account both the other internal governance mechanisms and the external mechanisms. Since firm-specific characteristics can vary considerably, it is likely that this optimal governance structure will differ between firms. Some firms may benefit from adding outside directors to the board and audit committee, while others may become suboptimal from the same action. It is possible then that empirical research that examines the overall effect on firms may find that these positive and negative effects, which are experienced by different firms in the sample, offset each other. Consequently, the overall findings could be insignificant, despite individual firm-effects being present within the sample. The following section will discuss the cross-sectional determinants of the impact of increased monitoring.

2.5 Cross-sectional determinants of impact of increased monitoring

The main aim of my empirical study is to identify whether there is significant cross-sectional variation in the stock returns around the announcement and passage of the NZX Code. This will identify whether the impact of increased monitoring is determined by certain firm-specific characteristics. There is a variety of empirical research that provides evidence to support this, yet very little research has been done using New Zealand data.

2.5.1 Outside directors:

Boone, et al. (2007) identify three main hypotheses to explain the determinants of board size and composition. The first is the *scope of operations hypothesis*. This hypothesis stems from Fama and Jensen (1983), who propose that the information and monitoring requirements of large, complex firms require larger boards. Firms operating in more complex environments are more likely to benefit from the expertise that outside directors bring. Lehn, et al. (2009) also assert that larger firms experience more agency problems due to their size, and thus demand more outside monitoring. The second hypothesis states that the specific monitoring costs for a firm will affect its board composition (*monitoring hypothesis*). When monitoring costs are high for firms, the relative benefit of outside directors will decrease. A typical high monitoring cost firm would be a high-growth firm, operating in a noisy environment, with high information asymmetry (Gillan, et al., 2004; Linck, et al., 2008). Lastly, the *negotiation hypothesis* argues that board structure is the outcome of a negotiation between the CEO and outside directors (Hermalin and Weisbach, 1991). This hypothesis assumes that highly influential CEOs will use their power to place more insiders and affiliated outsiders in board positions. By extending the idea of CEO influence to manager influence, one can hypothesise that board independence will be negatively affected by managerial influence and positively affected by the proportion of institutional shareholding (Kieschnick and Moussawi, 2004). Boone, et al. (2007) examine the relevance of these hypotheses in a series of multivariate regressions. They find significant evidence that board independence is positively related to a firm’s growth and diversification (*scope of operations hypothesis*). Similarly, they find evidence in support of the *negotiation hypothesis*. Board independence is found to be negatively associated with manager influence and positively associated with constraints on that influence. Evidence in support of the *monitoring hypothesis* is less strong. Results show that board independence is not affected by the firm-specific benefits and costs of monitoring for a firm.

There are many other empirical studies that provide evidence in support of all three of the hypotheses discussed above. Coles, et al. (2008) conduct a multivariate analysis to analyse the relationship between board structure and Tobin's Q, using lagged performance variables to account for endogeneity. They find that Tobin's Q is negatively related to the proportion of outside directors for R&D intensive firms. This is likely due to the fact that the firm-specific knowledge of insiders is relatively more valuable for these firms, and the costs of monitoring are much higher. This produces evidence towards the *monitoring hypothesis.* Using a panel data set of corporate governance mechanisms covering the period from 1997 to 2000, Gillan and Starks (2003) investigate the governance relationship. They find that governance structures vary with both industry and firm characteristics. Notably, they find that firms with high growth opportunities tend to have weaker boards (consistent with *monitoring hypothesis*) and older firms tend to have stronger boards (consistent with *scope of operations hypothesis)*. This result is consistent with the view that firm-specific characteristics will affect governance structure.

Lin, et al. (2003) conduct an event study around the appointment of outside board members for non-financial firms between 1993 and 1996. They find that, while the average market reaction is insignificant, there is clear evidence that the magnitude of a firm's agency problem affects the event return. For instance, they found that share prices respond more favourably to an outside director appointment announcement when board ownership is low, as the directors on the board are less likely to have interests aligned with shareholders. is the result consistent with the theoretical model of Raheja (2005), which proposes that firms with higher private benefits of control might have more benefit from outside monitoring.

2.5.2 Audit committees:

(Klein, 2002a) examines the economic determinants of audit committee independence. With an OLS regression over 1991 to 1993, she examines the relationship of the percentage of outsiders on an audit committee with several variables that she hypothesises will affect audit committee structure. Empirical results show that audit committee independence is positively related to board size and board independence. This suggests that firms with a higher supply of independent directors are more likely to have independent audit committees. More interestingly, audit committee independence is found to decrease with a firm's growth opportunities (proxied by three-year market-to-book value). This is consistent with the *monitoring hypothesis* of Boone, et al. (2007). Klein (2002a) also hypothesises that a firm's leverage ratio will be positively related to audit committee independence, as higher leverage will result in increased demands for monitoring the integrity of firms' financial reports by creditors (Jensen and Meckling, 1976). However, the OLS regression results show no significant relationship between debt and audit committee independence. This contrasts with findings in previous literature, which state that higher levels of gearing are associated with the formation of audit committees ((Collier, 1993; Collier and Gregory, 2000).

In an Australia-based study, Carson (2002) examines how a variety of firm-specific variables affect the formation of audit committees. Unlike Klein (2002a), this study fails to distinguish whether or not the audit committees are independent. The study uses a logit model due to the dichotomous nature of the dependent variable. The results show that board size and firm size are significantly related with formation of audit committees. Additionally, firms with strong links to the corporate community are also more likely to establish audit committees.

2.5.3 Evidence from the Sarbanes Oxley Act

Wintoki (2007) and Engel, et al. (2007) both use the passage of the SOX to examine determinants of the effect of increased monitoring on firm value. Engel, et al. (2007) investigate what firm-specific factors made firms more likely to go private in response to the passage of the SOX. They argue that firms that choose to go private following the announcement of the act do so because the costs of SOX-compliance are greater than the benefits. Their key finding is that smaller firms with high inside ownership are more likely to go private, and thus are assumed to have a net cost of complying with the SOX. Wintoki (2007) conducts an event study around the announcement and passage of the SOX. The author constructs a composite index to measure the relevant costs and benefits of additional monitoring. The variables used to construct this index are proxies for monitoring costs, private benefits of control, and firm complexity. Literature suggests these factors influence the costs and benefits of additional monitoring (Boone, et al., 2007). Using a portfolio approach, Wintoki (2007) measures cross-sectional variation in abnormal returns over a long event window that spans the announcement of the act to its implementation. Results show that firms with high costs and low benefits of outside monitoring experienced significantly negative abnormal returns over the period, while firms with opposing characteristics had a significantly positive market reaction. These results are robust over three different expected return models.[4]

Overall, there is significant empirical evidence that board monitoring is endogenously chosen by firms to optimise firm value and that it is dependent on a variety of industry and firm-specific variables. This calls into question the effectiveness of imposing mandatory "one-size-fits-all" corporate governance regulations, such as the SOX and the NZX Code. In this thesis, the cross-sectional analysis of the effects of the NZX Code compulsory compliance on New Zealand stock prices will contribute to this debate.

2.6 Theoretical models

A myriad of theoretical papers have been developed in order to explain the inconsistency in empirical evidence relating to board composition and firm performance. Both Raheja (2005) and Harris and Raviv (2008) model the strategic interaction between insiders and outsiders on the board of directors. Raheja (2005) constructs a theoretical model that examines the effect of board structure on the monitoring of projects and also CEO succession decisions. Inside directors hold more firm-specific expertise and are likely to be better equipped to assess the quality of projects proposed by the CEO. However, their project choices may also be distorted by private benefits. Conversely, outside directors are not as well informed about

[4] Market model, Fama-French 3-factor model and Carhart (1997) 4-factor model.

projects, yet their decisions will not be swayed by private benefits. They can also use their CEO succession votes to motivate insiders to reveal superior information, when insiders are incentivised away from optimal projects by private benefits. The model states that the composition of outsiders and insiders on the board will affect the probability that the board will reject an inferior project.

Harris and Raviv (2008) present a model to determine the optimal control of the corporate boards of directors, the optimal number of outsiders and the resulting profits. They state that while insiders provide inside information, outside directors can provide valuable outside information, as well as mitigate agency costs. Therefore, the optimal board composition and resulting profits are a function of the importance of insiders' and outsiders' information, the extent of agency problems, and some other factors.[5] They find that in many cases, shareholders can be better off with a majority-insider board. The authors note that this theory calls into question the relevance of the SOX, as imposing outside board control is likely to be value-reducing for firms where insider information is particularly important.

2.7 Evidence from international governance regulations

Along with the US and New Zealand, many countries have adopted similar governance regulations in order to improve corporate governance. Dahya and McConnell (2007) examine the connection between changes in board composition and corporate performance in the UK between 1989 and 1996. This period straddles the publication of the 1992 Cadbury Report, which used a mix of rule-based and principle-based approaches in the aim to improve corporate governance practice (as does the NZX Code of Best Practice). Similar to other studies (E.g. Rosenstein and Wyatt (1990)), the authors analyse the abnormal stock price reaction around the appointment of outside directors to the board. They compare this with abnormal returns around the announcement of inside directors. Interestingly, the results show that the difference between the abnormal returns associated with the appointment of outside directors and inside directors are significantly positive when the appointment increases the number of outside directors to three or more. This suggests that, while

[5] These factors include when the controlling party will delegate decision-making to the other part, and the extent of communication between the parties.

investors view all outside director appointments as good news, they believe that if there are less than three outside directors on the board, the improvement in governance by an additional outside director will not be significantly greater than an additional inside director.

Arcot and Bruno (2007) also examine the effects of corporate governance on UK companies that are operating in the flexible legal regime (due to the principle-based Combined Code (2004)). They find clear evidence that firms endogenously choose their board structure based on their unique circumstances. The authors examine compliance with the code and its effect on firm value. A corporate governance score is calculated in order to reflect compliance, while considering genuine explanations for not complying. Interestingly the study finds that companies departing from the regulations for genuine reasons have a significantly higher ROA than those that do not. This calls into question the effectiveness of more strict governance regimes, such as the SOX, which do not allow for this flexibility.

Following the Asian Financial Crisis, the Korean government instituted a series of corporate reform measures in order to improve corporate governance. One of these measures was the requirement for listed firms to have at least 25% of the board to be composed of outside directors. This 25% specification seems small in comparison to the majority requirement of the SOX and NZX code, however Choi, et al. (2007) note that outside directors were uncommon in Korea prior to 1997. Choi, et al. (2007) use this governance reform to examine the effect of board independence in Korea. The empirical results show a significant relationship between the percentage of outside directors on the board and firm performance (measured by Tobin's Q), while controlling for institutional and indigenous influence on performance. This relationship becomes even more significant when the outside directors are considered to be independent. Overall, the study concludes that an emerging market such as Korea, which is exposed to external shocks, relies critically on monitoring by independent directors.

Tariq and Abbas (2013) examine the effect of the Pakistani Code of Corporate Governance (2002) on firm performance and efficiency. The authors exhibit concern that the code is significantly influenced by those of Western economies (US and UK) despite the fact that the Pakistani corporate environment is very different. This is a similar concern in New Zealand, as the New Zealand corporate environment also differs greatly from the US and UK.[6] The results show that, between 2003 and 2010, firm compliance with the code was positively related to firm performance (measured by ROA, return on equity (ROE) and return on capital employed (ROCE)). This positive relationship holds after controlling for several determinant variables, such as firm size, growth, age and leverage. However, further analysis suggests that the relationship between compliance and firm performance is non-linear, and that highly compliant firms are less profitable than firms with an average or low compliance. The authors therefore conclude that mandatory compliance regulation may not be optimal in Pakistan.

2.8 New Zealand evidence related to increased monitoring and firm performance

Over recent years, New Zealand research around board composition and firm performance has increased. Nonetheless, there is still limited evidence about the effect of increased board monitoring on firm performance in New Zealand. New Zealand-based evidence on the cross-sectional determinants of board composition is even sparser. This thesis is the first study to 1) examine the market reaction around the announcement and passage of the NZX Code, and 2) look at cross-sectional variation in the effect of the code.

Two studies prior to the implementation of the code (Hossain, et al., 2000; Prevost, et al., 2002) document a positive association between the proportion of outside directors on a board and firm performance. Hossain, et al. (2000) conduct a study following the passage of the 1994 Companies Act. While this act did not impose any regulations on board composition, it created a strict definition of the duties of a board, and imposed strict penalties to those who did not fulfil those duties. As a result, the percentage of outside directors on New Zealand boards significantly increased. Through a series of multivariate OLS regressions, Hossain, et al. (2000) find that the proportion of outsiders on the board positively impacted firm performance. The authors acknowledge that the OLS method fails to account for endogeneity. Yet, this method

[6] These differences will be discussed in more detail in Section 3.

is preferred because corporate governance literature is unclear as to which variables are endogenous and which are exogenous (Whidbee, 1997). Prevost, et al. (2002) undertake a similar study to Hossain, et al. (2000). However, they use a three stage least squares approach in order to account for the endogenous relationship between firm performance and board composition. Even when controlling for endogeneity, Prevost, et al. (2002) find that the proportion of outside directors positively impacts firm performance. The authors also examine the relationship between the proportion of outsiders on the board and several firm-specific variables. Results show that the proportion of outside directors is positively related to board size, negatively related to future growth, and are not related to debt or inside ownership. Whilst these findings present some evidence of variables that determine the proportion of outside directors and how these firm-specific variables affect firm value, they fail to identify how these firm-specific variables will impact the incremental value of adding an outside director to the board.

Reddy, et al. (2010) examine the effect of the 2004 New Zealand Securities Commission (NZSC) requirements on the firm value of the top 50 NZX companies.[7] The 2004 NZSC principles align closely with those of the NZX Code; recommendations include establishing a subcommittee for audit and remuneration and having a majority of non-executive or independent directors on the board. However, contrary to the NZX Code, these recommendations are not requirements for firms. Using OLS and 2SLS regression techniques, the authors find that firm performance following the NZSC recommendations is better than the pre-recommendation performance. They use Tobin's Q, market-to-book value and ROA to proxy for firm performance. One should note that the findings, which suggest that additional external monitoring improved New Zealand firm performance overall, may in fact be skewed by the choice of sample. Literature on the cross-sectional determinants of the effect of monitoring on firm performance states that large firms are more likely to respond positively to such monitoring.[8] The Reddy, et al. (2010) study only examines the effect of the NZSC recommendations on the top 50 NZX companies.. The effect on firm performance of the NZSC requirements on firms more generally could differ substantially from the positive effect documented for the top 50 firms.

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[7] The NZSC was replaced on the 1st of May 2011 by the Financial Markets Authority (New Zealand).

[8] This literature is discussed in Section 2.5.

Similar to my research, Gunasekarage and Reed (2008) use event study methodology to examine the effect of outside directors on firm value in New Zealand. They follow the idea of Rosenstein and Wyatt (1990) by looking at the market reaction around the appointment of outside directors in New Zealand between 1990 and 2004. Three-day cumulative abnormal returns around the events indicate a positive yet insignificant market reaction to the appointment of outside directors. When the event window is lengthened to seven days, this positive relationship becomes significant. However, a longer event window is more likely to contain other events that confound results. This study is also subject to the concerns raised by Hermalin and Weisbach (2001), who argue that any unexpected announcement of changes to board structure is a signal to the market of an attempt to improve firm operations. If this is the case, a positive market response may not necessarily reflect the effect of outside directors on firm value.

Teh (2009) examines the relationship between full compliance with the NZX Code and firm value between 2003 and 2007. Using a sample of 89 companies (similar to my sample size), he finds that firms that fully comply with all of the NZX Code recommendations consistently outperform those that are only partially compliant. Following the passage of the 2003 NZX Code, it became possible to distinguish between independent directors and non-executive directors. Koerniadi and Tourani-Rad (2012) and Struthers (2012) extend the New Zealand literature by examining the effect of independent directors on firm value. Results from these studies conflict with previous research. Using OLS and 2SLS regressions, Koerniadi and Tourani-Rad (2012) find that the proportion of independent directors is significantly negatively related to four different performance measures.[9] These findings lend support to stewardship theory prevailing in New Zealand, and also challenge the efficacy of the NZX Code requirements. The authors conclude that following the global trend towards board independence may not be suitable in New Zealand, where managers are considered to be active partners along with other stakeholders in the company. Struthers (2012) examines the relationship between non-executive and independent

[9] Two market based measures are used (Tobin's Q ratio and EVA) and two accounting-based ratios are used (ROA and ROE).

directors and firm performance as measured by Tobin's Q of publicly listed New Zealand firms. Three stage least squares (3SLS) models are utilised in order to account for endogeneity. Over a period spanning the implementation of the NZX Code (1997 – 2008), the author finds that the NZX Code had a statistically positive impact on Tobin's Q. However, he also documents that the code reduced the sensitivity of outside directors to board performance. Contrary to these findings, a 3SLS regression over a post-code sub-sample period (2004-2008) provides evidence that the proportion of outside and independent directors is negatively related to Tobin's Q. The conflicting evidence of the impact of the NZX Code regulations on firm performance, documented by Struthers (2012), provides motivation for my study. I aim to shed light on the determinants of the effect of increased monitoring on a firm's performance in New Zealand through an analysis of the cross-sectional reactions to the code.

Rainsbury, et al. (2008) investigate how several demand and supply characteristics are associated with voluntary establishment of audit committees meeting compulsory compliance regulations *prior* to the NZX Code implementation. The study hypothesises that firms with high levels of debt will be more likely to voluntarily establish independent audit committees with financial expertise in order to ensure their financial reporting complies with debt covenants. Market-to-book ratio, as a proxy for growth opportunities, is hypothesised to negatively affect the likelihood of a "best practice" audit committee. The authors reason that a major function of the audit committee is to increase the credibility of financial statements, and thus will be less useful for firms with higher assets in place. Other demand factors that are considered are insider ownership and block shareholdings. Supply factors include the number of independent directors and board size. Overall, results show that none of the demand factors have any effect on the voluntary formation of best practice audit committees. However firms with higher supply factors (more independent directors and larger boards) are more likely to form "best practice" audit committees. These findings suggest that compliance with the NZX Code audit committee regulations may have a detrimental effect on firms with small boards and a low number of independent directors. My study will help to contribute to the understanding of which firm-specific factors impact board composition choices for New Zealand firms.

2.9 Methodological considerations

One of the main challenges of any research into corporate governance is managing the endogenous relationship between board composition and firm performance. A simple OLS model will fail to model this endogeneity, and the direction of causation cannot be determined. As a result, OLS estimates will be biased and inconsistent. Methods to manage endogeneity have been mentioned in passing in previous sections of this chapter. This section will reiterate the most effective methods.

One method of determining the causative effect of board composition on firm performance is to use an event study. Examining the abnormal returns for stocks after an exogenous shift in board composition is a clean method to identify whether or not board composition impacts firm performance. Many studies examine the stock price reaction around the appointment of outside directors to the board (E.g. Gunasekarage and Reed, 2008; Rosenstein and Wyatt, 1990)). The issue with this method is that any unexpected announcement from a firm could trigger a positive stock market reaction that may be unrelated to the addition of an outside director (Hermalin and Weisbach, 2001). Another event study method is to examine the stock market reaction around announcements and passage of regulations that effect board composition (Jain and Rezaee, 2006; Wintoki, 2007; Zhang, 2007). This is the method adopted for this study. Regulatory event studies have the advantage of a large number of firms being affected, thus avoiding the "unexpected announcement" problem that Hermalin and Weisbach (2001) raise. However this method produces its own challenges. First, it is inherently difficult to identify the key dates of regulatory events, as well as when the new information reaches the market (Binder, 1998). Also, since the regulatory event occurs to all firms simultaneously, it can be difficult to model what the expected return would be on the market without the announcement (Wintoki, 2007). Schwert (1981) and Wintoki (2007) suggest that using a portfolio approach is a good way to manage this problem. This approach measures the common effect of the regulation by analysing the returns to a portfolio of affected assets.

There are several other methods that can be used to manage the endogenous relationship. Some empirical papers use one-year lagged performance of the firm (Hermalin and Weisbach, 1991; Klein, 1998). Agrawal and Knoeber (1996) conduct a system of equations and use a 2SLS approach to analyse the effect of seven different interdependent mechanisms to control agency costs on firm value. This method is much more effective at measuring the endogenous relationship between the interdependent mechanisms and firm performance. However, Whidbee (1997) raises concerns about the accuracy of this model, as 2SLS models are prone to specification error. Other studies use a 3SLS approach (Bhagat and Black, 2002; Struthers, 2012). This method estimates all parameters simultaneously, while 2SLS estimates the model parameters one equation at a time (Borensztein and Panizza, 2008). 3SLS produces consistent and more efficient estimates than those produced by the 2SLS model, and thus is more effective at modelling the endogenous relationship (Zellner and Theil, 1962).

Chapter 3: Board composition and corporate governance regulations: What makes New Zealand interesting?

The purpose of this chapter is to highlight the value of studying the cross-sectional market reaction to the announcement and passage of the NZX Best Practice Code. Most of the study around board composition and the effects of governance regulation has been based in large Western economies – most notably in the US around the 2002 SOX. While the SOX was the motivation for the implementation of the NZX Code, the principle-based approach taken in New Zealand is much more flexible than the rule-based approach of the SOX in the US. The effect of this flexible approach on publicly listed NZX firms may vary greatly from the effect of the US's strict rule-based regulation. These regulatory differences will be discussed in Section 3.1. Additionally, the New Zealand institutional environment differs greatly from the large Western economies (such as the US and the UK) where most of the board composition research is focused. There are notable differences in the market for corporate control, board and ownership characteristics, firm size, market size and other firm-specific characteristics. Hence the nature of the New Zealand market may lead to different reactions from firms to the new regulations. The uniqueness of the New Zealand institutional environment will be further discussed in Section 3.2.

3.1 Regulatory Environment

The late 1990s and early 2000s were plagued by a myriad of significant corporate failures, including the infamous Enron and WorldCom bankruptcies. These high profile scandals prompted a global movement towards greater corporate accountability and transparency through increased corporate governance regulation. On 6th May 2003, the NZX announced its proposed Corporate Governance Best Practice Code. The proposition of this new regulation closely followed the implementation of the Accounting Industry Reform Act in the US, which was approved by the NYSE on 1st August 2002 (Wintoki, 2007). This act is more commonly known as the SOX.

Despite the development of the NZX Code being motivated by the SOX, the two regulations differ substantially. The SOX uses a strict, rule-based regulatory approach that imposes strict penalties for failing to comply. It comprises a variety of legally mandated provisions whose purpose is to ensure alignment of incentives of corporate insiders with those of investors, and to reduce the likelihood of corporate misconduct and fraud (Chhaochharia and Grinstein, 2007). This mandatory approach has the advantage of reducing information asymmetry between management and shareholders, as all companies' governance practices must adhere to the set of rules required by the regime. As a result, the cost of being informed is decreased (Anand, 2006). However, many argue that this "one size fits all" rule based approach is sub-optimal, as it imposes additional compliance requirements on all firms, regardless of firm size, culture or other firm-specific factors (Anand, 2006; Arcot and Bruno, 2007; Wintoki, 2007). Since the firms' board structures are endogenously determined, an imposition of standardised regulations may cause many firms to depart from their optimal governance position.

By contrast, the NZX Code follows a flexible principle-based approach, using a mix of prescriptive and disclosure based rules (Gilbertson and Gibson, 2003). The code mainly consists of suggested principles that firms are encouraged to adopt, yet not required to instigate.[10] This approach is similar to those adopted by the UK, Australia and Canada (Teh, 2009). This more flexible approach overcomes some of the disadvantages of the rule-based approach, as it allows for firm heterogeneity. Compliance costs are minimised as firms can choose which principles to adopt. However, Teh (2009) points out that governance codes with these optional provisions may lack the "teeth" to enforce the improvements to corporate governance that they strive for.

The NZX Code does include some mandatory standards around audit committees and outside directors. These are the standards that this study focuses on, as all publicly listed New Zealand firms must adopt them. Gilbertson and Gibson (2003) provide a good overview of the mandatory standards, which were enforced through amendments to Section 3.3 of the Listing rule on 29th October 2003. They are as follows:

1. Issuers must include in their Annual Report a statement on whether and how their Corporate Governance policies, practices and processes, adopted or

[10] Refer to Gilbertson and Gibson (2003) for full details on these discretionary principles.

followed, materially differ from the NZX Corporate Governance Best Practice Code.

2. The Board must have at least two Independent Directors, or if there are eight or more Directors, at least three or one-third (rounded down) of the Board must be Independent Directors.
3. A Director may not simultaneously hold the positions of Chief Executive of an Issuer and Chairman of the Board of the same Issuer.
4. Every Issuer must establish an Audit Committee.
5. The Audit Committee can only comprise Directors of the Issuer, have a minimum of three members, and a majority of these must be Independent Directors.
6. At least one member of the Audit committee must have an accounting or financial background.
7. The Audit Committee must ensure that the external auditor, or lead audit partner is changed every five years.

Through a survey of 89 New Zealand company 2007 annual reports, Teh (2009) documents that an independent director is defined as "one who is not an executive of the company and has no disqualifying relationship with the company". He defines a "disqualifying relationship" as one that could reasonably and materially influence the directors' independent judgment. Unfortunately, before the implementation of the NZX Code, there was no distinction between an independent director and a non-executive director. This produces challenges when trying to conduct studies using pre-code board data, such as mine. I use non-executive directors as a proxy for independent directors, following Reddy, et al. (2010) and Wintoki (2007). However these directors could in fact be affiliated with the firm, thus compromising their independence. This is even more likely in an environment like New Zealand, which is very small. As a result, the likelihood of an outside director having an affiliation with the firm is much higher. The limitation of using outside directors as a proxy for independence is highlighted by Struthers (2012). In a sample of New Zealand firms from 2004 to 2008, the mean proportion of non-executive directors is found to be 82%; the mean proportion of independent directors is significantly lower, at 59%.

This thesis is the first study that empirically examines the cross-sectional effect of the mandatory component of the NZX Code upon its announcement and implementation. Full compliance with the NZX Code, including compliance to all of the optional best practice principles, is in fact very low. The percentage of NZX firms complying with all of the best practice guidelines was only 22.5% in 2007, rising from 5.6% in 2003 (Teh, 2009). To the best of my knowledge, there has since been no evidence on levels of full compliance to the NZX Code in the literature. This low compliance cements my choice to study only the effects of the mandatory code requirements, as it is clear that the majority of firms did not choose to follow the best practice guidelines. The evidence of low New Zealand compliance also can contribute to the debate between rule-based and principle based regulation. On the one hand, the low compliance suggests that a principle-based governance approach does indeed lack the "teeth" to enforce "good" governance, as Teh (2009) suggests. However, seeing that the literature documents that the implementation of the NZX Code had a positive overall effect on firm performance (Reddy, et al., 2010), firms may be choosing to not be fully compliant, as it is not optimal. This produces a strong argument towards having a flexible principle-based approach, so that firms can find their own optimal compliance. Further research into the cross-sectional differences in firm performance, based on their compliance with the code, could produce evidence to corroborate these arguments.

Rainsbury, et al. (2008) provide evidence of voluntary compliance in 2001 to "best practice principles" for audit committees that became compulsory compliance regulations with the implementation of the NZX Code. They document that, of the 56 companies examined in 2001, 52% of the boards have a majority of independent directors. Additionally, 67.9% of boards have an accounting expert on the audit committee, and 51.8% have a majority of independent directors on the audit committee. However, only 39.3% of the firms meet both of these requirements, and only 33.9% meet all of the best practice guidelines for audit committees. The study also notes that the percentage of firms with independent audit committees is significantly lower than the US, but similar to Australia. Klein (2002a) reports that 86.7% of US firms have an independent audit committee in 1993, while Cotter and Silvester (2003) document that 64.2% of Australian firms have independent audit committees in 1997. Rainsbury, et al. (2008) also examine what firm-specific factors determine voluntary adoption of a best practice audit committee, hypothesizing that firms with high compliance costs will choose not to comply. They find that firms with larger and more independent boards are more likely to voluntarily form best practice audit committees prior to the NZX Code implementation.

The imposition of the NZX Code was a significant regulatory event and provides a valuable tool for academics to study board composition in New Zealand. Despite this fact, there has been very little empirical evidence to date regarding the impact of the NZX Code on firm performance, and there has been even less research on the cross-sectional differences and their effects with regard to the code. Reddy, et al. (2010) document that firms that complied with the New Zealand Securities Commission (NZSC) governance requirements outperformed from 2003-2007 relative to 1997-2003. They concluded that the regulations had a positive influence on firm performance measured by Tobin's Q, MTB and ROA. Teh (2009) conducts a similar analysis on the relationship between NZX Code compliance and firm performance. He finds weak evidence that there is a positive relationship between Code compliance and firm performance. However neither of these studies considers the potential endogeneity of firm performance and board composition. Struthers (2012) accounts for this endogenous relationship by using a three stage least squares model, and finds contradictory evidence. Over a sub-sample period following the NZX Code implementation (2004-2008), he finds that the proportion of both outside and independent directors is inversely related to Tobin's Q, consistent with the stewardship argument. The contradictory evidence of the effects of the NZX Code on firm value *overall* provides motivation for my study. Examining the cross-sectional differences in firm reaction around the code may shed some light as to why these results differ. Further literature about board composition in New Zealand was discussed in Section 2.8.

3.2 Institutional Environment

Institutional differences between countries (including financial and legal systems, product-factor markets and internal control systems) have been recognised as important factors affecting agency costs arising from the separation of ownership from control (Fama and Jensen, 1983). The majority of the literature on board composition and its effect on firm performance has been focused on large, Western economies. However, the internal and external governance mechanisms of New Zealand are vastly different to that of countries such as the US and UK. Internal mechanisms refer to insider ownership, debt and dividend policy, management compensation, and board structure. External mechanisms relate to the legal system, the market for corporate control, institutional shareholdings and the market for managerial labour (Agrawal and Knoeber, 1996; Ang and Zhang, 2004). Agrawal and Knoeber (1996), examine the use of seven mechanisms to control agency problems between managers and shareholders, and document a significant interdependence between them. Thus, the relative effect of additional external monitoring to mitigate agency issues will depend on whether the other mechanisms in the firms' institutional environment act as substitutes or complements. Therefore, although the philosophy of the NZX Code regulations are in line with other Western economies (E.g. the US and UK), the response of New Zealand firms may differ greatly to that which is documented in US and UK based studies.

Aggarwal, et al. (2010) argue that because the US is recognised to have extremely high financial and economic development, one would expect that the internal governance for firms in the US is "as close as possible to what the optimal internal governance of a firm would be in a foreign country if it were not constrained by weaker institutions and lower development than in the United States". Prevost, et al. (2002) reason that the most powerful internal governance mechanism is the board of directors, as it has power over all decisions relating to capital structure, management compensation, and executive share ownership. As a result, the relative effect of the NZX Code compulsory compliance (which imposes additional monitoring on the board of directors) will depend on the strength of external governance mechanisms in New Zealand.

The external governance mechanisms in New Zealand's institutional environment are significantly different to that of the UK and US. In addition to strong economic and financial development, characteristics of the US institutional environment include strong investment protection through regulation, litigation and property rights (Aggarwal, et al., 2010). New Zealand, on the other hand, has a less stringent regulatory environment and lower financial and economic development (Hossain, et al., 2000). Additionally, the US and UK corporate legal system relies on dispersed ownership of shares and sophisticated equity markets (Ahmed, et al., 2006), whilst the New Zealand corporate governance system relies on concentrated equity ownership and relatively narrow and small equity markets (Hossain, et al., 2000; Reddy, et al., 2010). Holderness (2009) details that 96% of publicly listed US firms have blockholders who own 39% of the common stock on average. Publicly listed New Zealand firms exhibit much more concentrated ownership. Between 1991 and 1997, the mean proportion of stock in New Zealand held by the largest 20 shareholders was 73% (Hossain, et al., 2000); between 1999 and 2004 the mean shareholding of the top 10 blockholders was found to be 64% (Gunasekarage and Reed, 2008). Concentrated ownership encourages monitoring activities by large investors (Admati, et al., 1994). Conversely, dispersed ownership structures of large companies, found in the US and UK can hinder direct managerial supervision by shareholders (Grossman and Hart, 1980). Additionally, it could be argued that there is less potential for shareholder activism in the US and UK than in New Zealand, as firms with dispersed ownership often prefer strategies of exit rather than voice to monitor management (Eisenhardt, 1989). However, in reality this is not the case, as New Zealand investors are generally apathetic about such activities (Bharbra, 2007). The additional external monitoring as a result of the highly concentrated ownership in New Zealand, may serve to decrease the effectiveness of the additional monitoring imposed by the NZX Code compulsory compliance. The large number of small-scale firms in New Zealand may also hamper the effectiveness of the NZX Code. Many studies document that small firms generally benefit from having a higher number of inside directors on the board, and are adversely affected by the imposition of external monitoring regulations (Chhaochharia and Grinstein, 2007; Hermalin and Weisbach, 1991; Wintoki, 2007). My study will contribute to this evidence, by analysing if small firms are adversely affected by the imposition of the code.

There is also considerable evidence that the New Zealand market will achieve greater benefits from additional external monitoring regulations compared to other economies. First, Bharbra (2007) notes that foreign institutions dominate the concentration of institutional shareholdings in New Zealand. As they are situated in various geographic locations, the monitoring ability of these firms may be hindered (Struthers, 2012). New Zealand institutional shareholders may also not provide adequate monitoring, as they are often criticised for their apathy towards such activities (Bhabra, 2007). Second, the corporate takeover market in New Zealand is significantly weaker than that of the UK and US (Reddy et al., 2010). The market for corporate control is an important external governance mechanism. A highly active market for corporate control, raises threat of displacement, and can thus create a powerful discipline on poorly performing managers (Agrawal and Knoeber, 1996). The relative lack of takeover activity in New Zealand increases the likelihood of managerial entrenchment which, in turn, could increase the effectiveness of external monitoring imposed by the NZX Code. Third, New Zealand firms offer considerably less remuneration relative to the large Western economies, which results in less competition within the managerial labour market (Struthers, 2012). Overall, the findings of my study will provide evidence on whether New Zealand's unique institutional environment causes the market response to governance regulation to differ from that in the large Western economies.

Chapter 4: Hypothesis Development

Using evidence from the literature review (2.5), as well as information on the New Zealand regulatory and institutional environment, I develop three main hypotheses, which are tested in my analysis. In order to examine the cross-sectional variation in market response to the NZX Code compulsory compliance, I must first hypothesise what firm-specific factors will affect a firm's reaction. The hypotheses resemble those of a similar SOX study by Wintoki (2007). They are as follows:

The NZX code compulsory compliance imposes high levels of external monitoring an all publicly listed New Zealand firms. It therefore stands to reason that firms with high incremental costs of increased monitoring will benefit less from the NZX Code compulsory compliance than those with low monitoring costs, as the cost of compliance for these firms will be relatively higher. Wintoki (2007) finds evidence that firms with high monitoring costs are adversely affected by the additional external monitoring imposed by the SOX. In addition, Gillan, et al. (2004), Boone, et al. (2007) and Linck, et al. (2008) find evidence that firms with high monitoring costs have a smaller proportion of outsiders on their board. In these studies, high monitoring costs are proxied by standard deviation of returns, high market-to-book ratio and high R&D expenditure. These proxies are based on evidence from prior literature, which suggests that firms operating in uncertain environments have high monitoring costs. Demsetz and Lehn (1985) show that, for firms operating in uncertain environments, board monitoring by independent directors is relatively inefficient. Additionally, in these uncertain environments, where information is more asymmetric, the option to fire management is less valuable (Hermalin and Weisbach, 1988).

H1: The wealth effect of the NZX Code compulsory compliance is negatively related to the firm's monitoring costs

In contrast to H1, H2 hypothesises that, around the announcement and passage of the NZX Code compulsory compliance, the reaction of firms with high private benefits of control will be relatively more positive than firms with low private benefits of control. Raheja (2005) develops a theoretical model that proposes that firms with higher benefits of control for managers may have higher benefits from outside monitoring. Private benefits of control can include managerial perks, human capital concerns, and effort aversion. Firms with high private benefits of control are more likely to suffer from agency problems, and thus would benefit more from the additional monitoring imposed by the NZX Code. Wintoki (2007) and Linck, et al. (2008) empirically support this point. Wintoki (2007) notes that firm age can be used as a proxy, as older firms are more likely to provide benefits of control to managers. As high levels of debt result in additional external monitoring, one assumes that firms with more debt have lower agency costs (Agrawal and Knoeber, 1996; Jensen, 1986). Conversely, Linck, et al. (2008) state that firms with high levels of debt are more complex and thus benefit more from the advisory that outside directors bring. This is empirically supported by Linck, et al. (2008), who find that firms with more debt have a more independent board. Likewise, Wintoki (2007) shows that firms with high debt reacted more positively to the SOX. High debt is thus used to proxy for firm complexity rather than private benefits.

H2: The wealth effect of the NZX Code compulsory compliance is positively related to the firm's private benefits of control.

The third hypothesis (H3) follows the reasoning that highly complex firms will benefit more from the expertise that outside directors bring (Wintoki, 2007). If this is the case, we would expect that highly complex firms would react more positively to the implementation of the NZX Code, as it enforces a high representation of outside directors on the board and audit committee. Larger, older firms that operate in multiple business segments are likely to be more complex (Boone, et al., 2007; Coles, et al., 2008; Wintoki, 2007).

H3: The wealth effect of the NZX Code compulsory compliance is positively related to firm complexity.

The proxy variables used in this study for these three hypotheses (monitoring costs, private benefits of control, and firm complexity) are specified in Section 5.1.1.

Chapter 5: Data and Methodology

5.1 Data

The event study analysis is conducted on a sample of 99 publicly listed New Zealand firms. Firms must meet the following conditions to be included in the sample:

1) Each firm's 2002 annual report must be accessible and include all of the relevant firm-specific variable information.
2) Firm share market returns must be available between 29/04/2003 and 05/11/2003. Returns must be available between these dates to ensure that all of the event windows contain a full sample of returns.

These conditions originally produced a sample of 100 firms. One firm [11] is subsequently removed as it reported negative equity figures, and this created problems with the calculation of the Fama-French factors. This sample comprises firms from all sectors of the economy as classified by the NZX. This includes primary, energy, goods, property service, and investments.

The 99 firm sample size is notably smaller than the 1526 firms in the sample used by Wintoki (2007). This small sample size produces concerns about the test power of the regressions, especially for the long event window method (MacKinlay, 1997). Ways to address this problem are discussed later in this section.

5.1.1 Firm-specific data

Firm-specific data was collected for the year 2002 from the companies' annual reports, sourced from the NZX Company Research (formally NZX Deep Archive) database. The firm-specific data was collected by hand then carefully entered into an Excel spreadsheet. 2002 firm data is used so that the variables reflect the firm state *prior* to the announcement of the NZX Code in May 2003. Following Wintoki (2007), the firm-specific variables measure determinants of board composition: proxies for private benefits of control and firm complexity, and proxies for monitoring cost. These proxies are used to construct the composite index. Some additional firm-

[11] Blue Chip Financial Solutions Ltd. (formally Newcall Group Ltd.). This firm delisted from the NZX on 28/09/2006.

specific variables are also collected for use in summary statistics analysis, and as control variables. Table 1 summarises all firm-specific variables collected.

Proxies for private benefits of control and firm complexity

Older firms are more likely to provide benefits of control to managers (Wintoki, 2007). Thus, to proxy for private benefits of control, I use firm age (AGE). Firm age (AGE) is defined as the number of years since the firm's price data first appeared on *Datastream*, at the time of the first announcement of the NZX Code (on May 6^{th} 2003). Proportion of debt (LEVERAGE) is calculated by dividing the total debt of the firm (long term debt plus short term debt) by the firm's total assets.

High firm complexity is associated with high private benefits of control (Wintoki, 2007). Prior literature suggests that the size and the age of the firm are good proxies for firm complexity. Firm size (MVE) is defined as the firm's market value of equity on the 2002 balance data. This is extracted from the NZX Company Research Database. Proportion of debt (LEVERAGE) is also used as a proxy for firm complexity, as Linck, et al., (2008) state that firms with a high proportion of debt are more complex. Additionally, I use the number of business segments (SEGMENTS), as a proxy for the complexity of the firm. This figure is obtained from the notes to the financial statements, under the section "segment reporting".

Proxies for monitoring costs

Wintoki (2007) uses standard deviation of returns, market-to-book ratio and R&D expenditure to proxy for a firm's monitoring costs. I also use standard deviation of returns and market-to-book ratio for this purpose. Data for R&D expenditure is not readily available in New Zealand, so the intangible assets ratio is used instead (following Balsam, et al., 2011)). The standard deviation of stock returns (RETSTD) is defined as the standard deviation of monthly returns for the firm in 2002. The monthly returns are calculated using price data extracted from the NZX Company Research Database. Market-to-book ratio (MTB) is defined as the market value of equity on the balance date divided by the book value of equity on the balance date. The intangible assets ratio (IARATIO) is defined as the value of intangible assets divided by total assets.

Control variables

Following Wintoki (2007), I specify two control variables: proportion of outside directors (OD) on the board, and the proportion of outside director ownership (DIROWN). Higher outside director ownership serves to reduce the need for outside monitoring, by constraining the management from consuming private benefits. It also may serve to reduce the payoff of having more outsiders on the board (Wintoki, 2007). Likewise, firms with a high proportion of outside directors may already be compliant with the NZX Code compulsory compliance regulations. Thus, the benefit of the new regulations for these firms may be negligible.

DIROWN is defined as the sum of ordinary shareholdings for outside directors divided by the total number of company shares. Ordinary shareholdings for outside directors are extracted from the "Disclosures" section of the annual reports, under the subsection "Disclosure of director interests". The total number of company shares is obtained from the "Shareholding and exchange disclosures" section of the annual report. OD is calculated as the total number of non-executive directors on the board divided by the total board size. These measures are obtained from the "Governance" section of the annual report under "Board membership".

Committee variables

One of the compulsory compliance measures for the NZX code is the requirement of an independent audit committee. Additionally the NZX code proposes a remuneration and nomination committee as a best practice measure. Therefore, I also collect data on the presence of audit committees, nomination committees and remuneration committees for the 99 sample firms. These variables are only in the summary statistics analysis, and not in the regression analysis. Since the costs and benefits of additional monitoring by outside directors and additional committee monitoring are highly correlated, I believed inclusion of an audit committee variable in the composite index would be unnecessary. This is consistent with Wintoki (2007), and is later qualified by the summary statistics results.

I create three dummy variables to represent the presence of an audit, remuneration and nomination committee in a firm (AC, RC and NC respectively). These dummy variables take the value of 1 if the committee is present and 0 if it is not. All of this data is sourced from the "Governance" section of the annual report. Additionally, I specify the dummy variable ACENTIRE; this indicates when an audit committee is present on the board, yet comprises the entire board. I theorise that audit committees comprising entire boards would not be as effective, as there are no specific board members assigned with the responsibility of this function. Therefore the members of the audit committee are less likely to be optimally chosen. On the other hand, an audit committee comprising the entire board may be more transparent than a smaller board, and thus more effective. The ACENTIRE variable takes the value of 1 when the number of directors on the audit committee is the same as that on the entire board, and 0 otherwise.

5.1.2 Regression Data

Daily adjusted company price data is obtained from the NZX Company Research Deep Archive.[12] Daily returns are calculated as $\ln(price_t) / \ln(price_{t-1})$. There is a high number of thinly traded stocks in the sample. To deal with this issue, I replace all zero-return figures with the corresponding return for the average of the bid-ask price (Newnham, 2011). To proxy for market return, I calculate an equally weighted index of the 99 sample firm daily returns (EWI).[13] As a proxy for the risk rate, I use the New Zealand three-month Treasury bill rate, acquired from *Datastream.*[14] Daily market value of equity is also sourced for the calculation of the Fama-French factors (HML and SMB). Further explanation on how these factors are calculated is provided in Section 5.3.2.

5.2 Calculating the composite index

In order to measure the cross-sectional variation of wealth effects, I construct a composite index that captures the relative trade-offs between the costs and benefits of outside directors on the firm's board. The method of calculating this index closely follows that of Wintoki (2007). A similar methodology is also used by Chhaochharia and Grinstein (2007). Firms are sorted into deciles across nine dimensions: Size (MVE), Market-to-Book ratio (MTB), Intangible Assets ratio (IARATIO), Firm Age

[12] Adjusted share price data includes adjustments for splits etc. as well as dividends.
[13] The NZX All Gross Index is originally used in the regressions. However due to the high amount of illiquid stocks in our sample, regressions using the NZX All value weighted index as market return gave very poorly fitting models with coefficients that cannot be interpreted. The equally weighted index provides a much better fit to small illiquid stocks (Newnham, 2011).
[14] *Datastream* provides and annualised figure. Daily risk free rate is calculated as $(1+\text{annual rate})^{1/360}$.

(AGE), Firm Risk (RETSTD), Proportion of Debt (LEVERAGE), Number of business segments (SEGMENT), Proportion of Outside Directors (OD) and Outside Director Ownership (DIROWN). These variables are all hypothesised to affect the costs/benefits of adopting the NZX Code.

The firms are ranked into deciles eight separate times, using each of the dimensions listed above. Each firm is assigned a number between 0 and 9 based according to the decile it falls into when ranked on each dimension, respectively. The lowest decile (0) will consist of firms predicted to have the highest cost/lowest benefit of compliance to the NZX code; the highest decile (9) will have the opposite. Each dimension is ranked according to the three main hypotheses that I have developed as explained below.
Following my first hypothesis (H1) that "the wealth effect of the NZX Code compulsory compliance is *negatively* related to the firm's monitoring costs", monitoring cost proxies are ranked from *low* monitoring cost to *high* monitoring cost.
Gillan et al. (2003) state that high firm risk corresponds with high monitoring costs. A high market-to-book ratio and high intangible assets ratio reflects high growth opportunities and thus a high monitoring cost (Boone et al, 2008; Balsam et al 2008). Therefore, the monitoring cost proxies are ranked as follows:

- RETSTD: *highest to lowest.*
- MTB: *highest to lowest.*
- IARATIO: *highest to lowest.*

My second and third hypotheses (H2 and H3) state that "the wealth effect of the NZX Code compulsory compliance is *positively* related to the firm's private benefits" and "the wealth effect of the NZX Code compulsory compliance is *positively* related to firm complexity". Therefore, proxies for private benefits of control and firm complexity are ranked *low* to *high.*
As firms grow older, become bigger and develop more business segments, they are likely to benefit more from the expertise of outside directors on the board and audit committee (Boone, et al., 2007; Lehn, et al., 2009). Additionally, Linck, et al. (2008) surmise that firms with high debt levels benefit relatively more from increased monitoring as the advisory benefits from outside monitors are greater. Hence, the private benefits of control and firm complexity proxies are ranked as follows:

- AGE: *youngest to oldest.*
- LEVERAGE: *lowest to highest.*
- MVE: *smallest to biggest.*
- SEGMENT: *least to most.*

The control variables of outside director ownership and proportion of outside directors are also included in the composite index. Wintoki (2007) states that higher outside director ownership serves as a constraint on the CEO's tendency to want to consume private benefits and thus may reduce the payoff from having more outsiders on the board. Similarly, it may well be the case that firms where boards already have a high representation of outside directors may react less positively to the NZX Code implementation, because their outside monitoring levels are already high. Taking this consideration into account, the control variables are ranked as follows:

- OD: *highest to lowest*
- DIROWN: *highest to lowest*

Once all of the firms have been ranked according to the nine dimensions above, and assigned decile scores (between 0 and 9), I calculate a composite index score for each firm. This is done by summing up the 9 assigned decile scores. Table A illustrates this calculation of the composite index scores (CIX).

Table A: Calculating composite index scores

	Decile score									
	RETSTD	MTB	IARATIO	AGE	LEVERAGE	MVE	SEGMENT	OD	DIROWN	**CIX**
Firm A	3	1	0	4	0	3	1	2	1	**15**
Firm B	9	6	6	9	7	5	7	9	4	**62**

Quartiles are then formed based on the firms' composite index (CIX) scores. Quartile 1 consists of firms with the lowest CIX scores (the lowest benefits/highest costs of NZX code compliance. Quartile 4 contains firms with the highest CIX scores (the highest benefits/lowest costs of NZX code compliance).

5.3 Modelling expected returns

Modelling the costs and benefits of regulatory change is notoriously difficult. One of the key challenges is identifying a model to explain the expected performance for the overall market, without the regulations (Mulherin, 2007). Since the regulatory events occur to all firms simultaneously, statistical inference can be biased because returns are contemporaneously correlated (Schwert, 1981). This difficulty may explain the inconsistent results of prior event studies examining the overall effect of similar regulatory codes.[15] I overcome this problem by constructing portfolios across the quartiles based on the expected costs and benefits from the code, and measuring the cross-sectional difference in these portfolios' returns.[16] Following Wintoki (2007), I measure expected returns for the quartile portfolios using the market model and the Fama-French 3-Factor model.[17]

5.3.1 Expected market return

Initially the regression analysis was carried out using the NZX All index daily return to measure the expected market return. However, there are a large number of small, illiquid stocks in the sample, which meant that a value-weighted index as a market return proxy was not optimal. The thinly traded stocks meant that the value-weighted index produced very poorly fitting models with coefficients that could not be interpreted. This was especially true for quartile 1 portfolio regressions, which is concentrated with small, illiquid stocks. Newnham (2011) reports that an equally weighted index of stock returns is a much more effective proxy for expected returns of small, illiquid stocks in New Zealand. Taking this into consideration, I proxy the expected return on the market with an equally weighted benchmark of daily sample stock returns. Equation 1 illustrates how the daily EWI is calculated.

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[15] For instance, Jain and Rezaee (2006) report an overall positive effect of SOX, while Zhang (2007) document that SOX had an overall negative effect.

[16] This use of a portfolio approach for regulatory event studies is endorsed by Schwert (1981).

[17] The Carhart (1997) 4-factor model was also used to model expected returns. However the Carhart momentum factor did not provide any explanatory power; thus, these regressions are not reported.

$$EWI_t = \frac{(r_{t,firm\,1} + r_{t,firm\,2} + \cdots + r_{t,firm\,99})}{99} \qquad (1)$$

5.3.2 Calculating Fama-French factors

The Fama-French factors (SMB and HML) are calculated by closely following the methodology specified on the Kenneth R French Data Library website.[18] Stocks are first sorted in June 2003 by size (market value of equity) and categorised as either big or small, with an equal number of stocks in each category. Stocks are then sorted into three book-to-market categories, based on the bottom 30% (low), middle 40% (medium) and top 30% (high).[19] This results in six portfolios: Small Value (S/H), Small Neutral (S/M), Small Growth (S/L), Big Value (B/H), Big Neutral (B/M) and Big Growth (B/L).

The SMB (Small Minus Big) and HML (High Minus Low) factors are then calculated using the daily value-weighted returns for each of the six portfolios. Equations 2 and 3 show the calculation of these daily factors, using these value-weighted portfolio returns.

$$SMB_t = {}^1\!/_3\,(S/H_t + S/M_t + S/L_t) - {}^1\!/_3\,(B/H_t + B/M_t + B/L_t) \qquad (2)$$

$$HML_t = {}^1\!/_2\,(S/H_t + B/H_t) - {}^1\!/_2\,(S/L_t + B/L_t) \qquad (3)$$

5.4 Regression: Long event window methodology

Wintoki (2007) states that an important component of regulatory event studies is identifying the key dates associated with the development of the regulation. Additionally, Binder (1985) states that these event studies can be further complicated by the uncertainty of when relevant information is incorporated into prices. These challenges can be overcome by using a long event window that spans the key event dates of the NZX code (Wintoki, 2007).

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[18] Found at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[19] Book-to-market is defined as book value of shareholder equity/market capitalization.

By surveying news announcements and literature around the time of the NZX Code development, one can discern three main event dates:

1) 6th May 2003: NZX announces the new proposed corporate governance framework for its listed companies.
2) 14th August 2003: NZX releases the final version of proposed listing rule changes on corporate governance.
3) 29th October 2003: NZX corporate governance framework for listed companies comes into effect.

The long-horizon event window thus spans from 06/05/2003 to 29/10/2003. I run eight separate regressions over this time period. The dependent variable is the excess daily return (R_{pt} – R_{ft}) of each of the four CIX quartile portfolios. Each quartile portfolio excess return is regressed against two models: the Market model and the Fama-French 3-factor model.[20] The parameter of interest in these regressions is the intercept term denoted by $\boldsymbol{\alpha_p}$**.** This signifies the abnormal return for the quartile portfolio over the event horizon.

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + \varepsilon_t} \quad \text{(Model 1A)}$$

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m\left(EWI_{mt} - R_{ft}\right) + B_s SMB_t + B_H HML + \varepsilon_t} \quad \text{(Model 1B)}$$

Once the $\boldsymbol{\alpha_p}$ parameters are obtained, I conduct the following hypothesis test:

H_O: $\alpha_{p,quartile1} = \alpha_{p,quartile4}$

H_A: $\alpha_{p,quartile1} < \alpha_{p,quartile4}$

To obtain t-statistics for the difference in $\alpha_{p,quartile1}$ and $\alpha_{p,quartile4}$, I estimate the regression models using the sub-sample of quartile 1 and quartile 4 firms. As an example, Equation 4 shows the regression equation used to conduct the hypothesis test for Model 1A. I use both an intercept $[D_{Q4}]$ and slope $[D_{Q4}(EWI_{mt} - R_{ft})]$ to differentiate the two sample quartiles. D_{Q4} denotes the difference between $\alpha_{p,quartile4}$ and $\alpha_{p,quartile1}$. A significantly positive t-statistic means that the abnormal return

[20] The market return is proxied by the EWI, as discussed in subsection 5.3.1.

over the event period for quartile 4 is statistically greater than that of quartile 1. In this case, the null hypothesis is rejected.

$$R_{pt} - R_{ft} = \alpha_p + D_{Q4} + B_m(EWI_{mt} - R_{ft}) + D_{Q4}B_{mQ4}(EWI_{mt} - R_{ft}) + \varepsilon_t \quad (4)$$

Although the adoption of a long event window addresses the problem concerning the identification of the key event dates, it also introduces its own problems. Unless the number of event firms in the study is very large, all testing procedures quickly suffer substantial loss of power as the event horizon increases (Ang and Zhang, 2004). It is therefore important to consider some additional tests to increase the test power. MacKinlay (1997) states that there are two main ways to increase test power: increasing sample size, or decreasing event window length. My present sample, which includes all New Zealand listed firms with complete data, comprises only 99 firms. The sample size cannot be increased. The only way to do the analysis and control for the power of the test is to decrease the event window.

5.5 Regression: Short event window methodology

Following the concerns about test power for the long window methodology, I also undertake a short event window approach. In this method, abnormal market reaction is examined around the three main event dates (identified in section 5.4), as opposed to over one long event period. As there is uncertainty of when relevant information is incorporated into prices (Binder, 1998), I use a variety of event window lengths and observe how this impacts the results. The event windows used are (-1,0), (-1,1), (3,3) and (-5,5). These regressions are run over a slightly longer time window (29/04/2003 – 5/11/2003) in order to incorporate all of the dates for the longer event windows.

The abnormal reaction around the event dates is measured using the covariance analysis model (Mitchell and Mulherin, 1988; Schipper and Thompson, 1985; Wintoki, 2007). This model is particularly suitable to a regulatory event that includes multiple event dates (Wintoki, 2007). The covariance analysis model is a modified version of the market model and Fama-French 3-factor model that is used in the long-horizon approach. It includes event dummy variables that take on the value of 1 during the event window, and 0 otherwise. Two versions of this model are used. The first (Model 2) includes *one* aggregate event dummy variable ($\boldsymbol{D_{MAO}}$), and the second (Model 3) includes *three* individual event dummy variables ($\boldsymbol{D_M}$, $\boldsymbol{D_A}$ and $\boldsymbol{D_O}$). The aggregate event dummy model has the advantage of allowing us to measure the average abnormal return over all of the event windows. However, with this method we cannot see the market reactions around each of the individual events; this could confound results. For example, it is possible that one event could have a statistically significant market reaction while the other events have an insignificant reaction. In this case, the aggregate event dummy parameter may be statistically insignificant, despite one of the event windows exhibiting significant abnormal returns. The method used in Model 3 allows us to see the market reaction around each of the three individual events, and thus overcomes these concerns.

Model 2 is specified as follows:

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t} \qquad \text{(Model 2A)}$$

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_sSMB_t + B_HHML + D_{MAO}\vartheta_p + \varepsilon_t} \qquad \text{(Model 2B)}$$

Where $\boldsymbol{D_{MAO}}$ = 1 during the May, August and October event windows, and 0 otherwise. $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio *p* over the entire long-horizon event window (29/04/2003 – 5/11/2003. $\boldsymbol{\vartheta_p}$ is a shift parameter that signifies the aggregate abnormal return for portfolio *p* (in excess of $\boldsymbol{\alpha_p}$) around the three specific event dates.

Model 3 is specified as follows:

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t} \qquad \text{(Model 3A)}$$

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_sSMB_t + B_HHML + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t} \qquad \text{(Model 3B)}$$

Where $\boldsymbol{D_M}$ = 1 during the May 6th event window, and 0 otherwise; $\boldsymbol{D_A}$ = 1 during the August 14th event window, and 0 otherwise; and $\boldsymbol{D_O}$ = 1 during the October 29th event window, and 0 otherwise. $\boldsymbol{\gamma_p}$, $\boldsymbol{\delta_p}$ and $\boldsymbol{\theta_p}$ are shift parameters that signify the average abnormal returns for portfolio *p* (in excess of $\boldsymbol{\alpha_p}$) for the May, August and October event windows, respectively.

The excess return of each quartile portfolio is run against each of the four models specified above, across each of the four short event windows, in order to obtain parameter estimates. The following hypothesis tests are then conducted:

<u>Model 2 hypothesis test</u>

H_O: $\vartheta_{p,quartile1} = \vartheta_{p,quartile4}$

H_A: $\vartheta_{p,quartile1} < \vartheta_{p,quartile4}$

<u>Model 3 hypothesis tests</u>

H_O: $\gamma_{p,quartile1} = \gamma_{p,quartile4}$

H_A: $\gamma_{p,quartile1} < \gamma_{p,quartile4}$

H_O: $\delta_{p,quartile1} = \delta_{p,quartile4}$

H_A: $\delta_{p,quartile1} < \delta_{p,quartile4}$

H_O: $\theta_{p,quartile1} = \theta_{p,quartile4}$

H_A: $\theta_{p,quartile1} < \theta_{p,quartile4}$

The method for obtaining t-statistics for the differences in the parameter estimates is the same as that used in the long event window methodology (shown in Equation 4). For instance, to conduct the Model 3 hypothesis tests for the market model (3A), I run the following regression with a joint quartile 1 and quartile 4 sample:

$$\boldsymbol{R_{pt} - R_{ft} =}$$
$$\boldsymbol{\alpha_p + D_{Q4} + B_m(EWI_{mt} - R_{ft}) + D_{Q4}B_{Q4m}(EWI_{mt} - R_{ft}) + D_M\gamma_p +}$$
$$\boldsymbol{+ D_{Q4}D_M\gamma_{Q4p} + D_A\delta_p + D_{Q4}D_A\delta_{Q4p} + D_O\theta_p + D_{Q4}D_O\theta_{Q4p} + \varepsilon_t} \quad (5)$$

Where $\boldsymbol{\gamma_{Q4p}}$, $\boldsymbol{\delta_{Q4p}}$ and $\boldsymbol{\theta_{Q4p}}$ measure the difference between the quartile 4 and quartile 1 parameters for the May 6th, August 14th and October 29th events, respectively. A significantly positive t-statistic for the parameter indicates that the quartile 4 abnormal returns were significantly greater than the quartile 1 abnormal returns in the relevant event window.

Chapter 6: Empirical Results

6.1 Descriptive statistics

This section discusses the descriptive statistics used in the study. I draw on comparisons with the work done by Wintoki (2007) throughout this section to highlight differences between the US-based and New Zealand-based findings. I will also draw comparisons with an earlier study by Prevost, et al. (2002) in order to determine if New Zealand firm and board composition characteristics have changed over time. Prevost, et al. (2002) use a sample of New Zealand firms spanning from 1991 to 1997, while my study looks at firms in 2002. Tables 1 and 2 provide definitions of the variables that will be referred to throughout the discussion.

Table 3 displays summary statistics of the independent variables used to calculate the composite index, over the whole sample. The mean and median MVE are $402.19m and $88.18m, respectively. The mean is clearly highly skewed by a few large observations; therefore the median is a more informative measure for this variable. Both the median and mean figures are significantly lower than that reported by Wintoki (2007), who reports a sample mean of $3982.3m and a sample median of $340.3m. This is consistent with expectations, as the US market is much bigger than the New Zealand market. Given the small size of this sample, the likelihood of a small number of outliers skewing mean figures is much higher. I will therefore focus on the median figures for the majority of this discussion. Summary statistics of the monitoring costs proxies (MTB, LEVERAGE and RETSTD) suggest that monitoring in the New Zealand environment is slightly higher than that of the US. MTB figures for New Zealand and the US are comparable (the New Zealand sample median is 1.370; the US sample median is 1.387). However, the standard deviation of returns is significantly higher in New Zealand than in the US. The median RETSTD in the New Zealand sample is 0.074 – much higher than the 0.01 median reported by Wintoki (2007). This suggests that the operating environment in New Zealand is more uncertain, and thus that the costs of outside monitoring are higher (Gillan and Starks, 2003). As a result, New Zealand firms may experience less benefit from the imposition of outside monitoring. The proxies for private benefits of control (such as

SEGMENT, AGE and MVE) also differ from Wintoki (2007). The mean number of business segments for US firms is 2.6, in comparison to 1.6 in New Zealand. Likewise, mean firm age and firm size is significantly higher in the US (14.2 years and $3982.3m respectively), in comparison to New Zealand (8.9 years and $402.19m respectively). However, it appears that the mean values in the US are skewed by a small number of large, older firms. This is not surprising, as the US market is much more established than New Zealand. Median figures for business segments and firm age in the US are much more comparable to New Zealand. The median for business segments is 1 for both the US and the New Zealand. The median US firm age is 9.0 years, in comparison to 9.1 years in New Zealand. Overall, I conclude that there is some evidence that US firms, on average, have higher benefits of control and are more complex. Considering my second and third hypotheses (H2 and H3), this suggests that US firms may require more outside monitoring than New Zealand. Outside director ownership (DIROWN) is also higher in New Zealand than in the US (0.033 compared to 0.015). Outside director ownership serves to reduce the need for monitoring by constraining management from consuming private benefits (Wintoki, 2007). Again, the higher value of outside director ownership in New Zealand suggests that there would be less benefit from imposed monitoring here than in the US.

Drawing the conclusions from all the summary statistics together, there is a clear suggestion that New Zealand firms would respond less favourably to additional monitoring than the US. To reiterate, the summary statistics suggest that in New Zealand monitoring costs are higher than in the US and the private benefits of control and firm complexity are lower than in the US. It is interesting to note that the average and median proportion of outside directors (OD) on the board in New Zealand is higher than in the US. The median OD for the New Zealand sample is 0.833, in comparison to 0.715 in the Wintoki (2007) US sample.

6.2 Summary statistics for composite index sorted portfolios

Table 4 reports the summary statistics for the composite index sorted portfolios, as well as the significance of differences between the quartile 1 and quartile 4 portfolio mean and median figures. Panel A reports the quartile portfolios' firm-specific characteristics and Panel B reports the board characteristics. Throughout the discussion quartile portfolios 1, 2, 3, and 4 will be referred to as Q1, Q2, Q3, and Q4. The number of firms within each of these portfolios are 28, 22, 24, and 25 respectively. All references to variables will refer to their *mean* portfolio value, unless otherwise specified. By construction, the Q1 portfolio is expected to have the smallest MVE, largest MTB, largest IARATIO, smallest SEGMENT, lowest LEVERAGE, youngest AGE, highest RETSTD, lowest OD, and highest DIROWN. The Q1 portfolio is expected to have the highest monitoring costs, and thus the highest cost of complying with the NZX Code. The characteristics of Q4 are expected to be the opposite of this. The subsequent regression analysis, which examines the impact of the NZX code on firm performance, is only meaningful if there is a significant cross-sectional difference between the mean and median of the Q1 and Q4 variables. This will signify that the private benefits of control, firm complexity, and monitoring costs are significantly different between these two quartiles. Pooled standard errors are used to calculate t-statistics for all variables other than LEVERAGE and AGE, as the sample variances for these variables were significantly different. Sattherwaite standard errors were used as an alternative (Satterthwaite, 1946). To calculate the significance of the difference in sample medians, a Mann-Whitney U Test is conducted (Mann and Whitney, 1947).

The proxies for monitoring costs are RETSTD, MTB and IARATIO (found in Panel A). The Q1 RETSTD is significantly greater than the Q4 RETSTD (0.128 and 0.079 respectively) at the 1% level. The Q1 MTB is also significantly greater at the 5% level, compared to the Q4 MTB (3.106 and 1.361 respectively). The cross-sectional difference in IARATIO is slightly less significant. While the difference between the Q1 and Q4 mean is significant at the 5% level, the Q1 mean is highly skewed by a small number of stocks with a high proportion of intangible assets. When the median IARATIO is used as a measure, the difference between Q1 and Q4 becomes insignificant. As a high RETSTD, MTB and IARATIO are considered to be a proxy for high monitoring costs (Boone, et al., 2007; Gillan, et al., 2004) then one can conclude that Q1 has significantly higher monitoring costs than Q4. Therefore, following H1, it is expected that Q1 will have a less positive reaction to the imposition of increased monitoring as a result of the NZX Code.

As is discussed in the development of H2 and H3 (Chapter 4), a high MVE, high number of business segments (SEGMENT), old firm age (AGE), and high debt (LEVERAGE) are indicators of high firm complexity and private benefits of control. The difference in both the portfolio means and the portfolio medians for all of these variables are all significant at the 1% level. Thus, it is clear that complexity and private benefits of Q4 firms are, on average, significantly higher than Q1 firms. Following the hypotheses H2 and H3, Q4 is therefore expected to benefit more from the increased monitoring required from the NZX Code than Q1 firms.

The two control variables used for this analysis are outside director ownership (DIROWN) and the number of outside directors. These are reported in Panel B of Table 4. Outside director ownership constrains CEOs' tendencies to consume private benefits, and thus firms with high DIROWN are expected to benefit less from increased monitoring. Likewise, firms with a high OD evidently already have a high degree of monitoring and are therefore less likely to react positively to the code. Q1 firms have a significantly higher amount of director ownership than Q4 firms (0.061 versus 0.002). This is significant at the 1% level. By contrast, and very interestingly, there appears to be no significant cross-sectional variation of OD between the quartiles, neither for the mean nor the median figures. This differs from the US-based Wintoki (2007) study, which finds that Q1 firms had significantly less outside directors than Q4 firms, prior to the adoption of the SOX (0.6309 and 0.7718 respectively). It appears that, in New Zealand, private benefits, firm complexity and monitoring costs as a whole did not affect the proportion of outside directors endogenously chosen prior to the code implementation. It may be that the benefit of *independent* directors is impacted by these factors though. Unfortunately, it is not possible to identify the independent director proportion prior to the code's implementation. Also, some of these variables may be individually correlated with the representation of outside directors present before the code. Further correlation analysis (in Section 6.3) will identify if this is the case.

The composite index quartiles are constructed from the rankings of the firm-specific and board variables discussed above. It is therefore expected that there will be a stepwise movement of the portfolio mean and median variable values from Q1 to Q4. This is largely the case, yet not always. For instance, the median and mean RETSTD for Q3 are smaller than Q4. Considering this variable alone, Q3 would be considered to have a lower cost of monitoring than Q4, and thus benefit more from additional monitoring. If this specific variable is more important than others, Q3 may experience higher abnormal returns in reaction to the NZX Code events. That is one limitation of using the composite index. However, since the variables are not perfectly correlated, focussing on individual determinants may attenuate the cross-sectional variation of the NZX Code's wealth effects (Wintoki, 2007). Hence, the use of the CIX constructed portfolios is considered to be the best approach to conduct this analysis.

Since the NZX Code imposes independence and expertise requirements on audit committees, as well as suggestions for nomination and remuneration committees, I also analyse these variables in the summary statistics. While the amount of monitoring by outside directors appears not to be affected by monitoring costs, benefits of control and firm complexity, committee monitoring is impacted. The percentage of firms with an audit committee (AC) in Q1 is significantly lower than that of all the other three quartiles (at the 1% level). This suggests that firms with the characteristics of Q1 are more likely to endogenously choose not to have audit committee monitoring, as the absence of such monitoring may be optimal for the firm. Additionally, because all boards will have to have an audit committee following the implementation of the NZX Code compulsory compliance requirements, the imposed cost from compliance will be much higher for those firms that will have newly established an audit committee. The ACENTIRE column signifies the percentage of firms in the quartile of which the audit committee comprises the entire board. There is a significantly higher percentage of firms with an all-board audit committee in Q1 than Q4 (at the 5% level). The most likely reason for this is that the board size (BOARD) of Q1 firms is significantly smaller than Q4 firms. As a result, they have fewer resources for a separate audit committee and the committee is the entire board. The effectiveness of monitoring from an audit committee comprising the entire board is ambiguous; it may have either a negative or positive influence on board effectiveness.[21] However, in my opinion, entire-audit committee firms are less likely to have optimally chosen members (with the appropriate expertise, etc.), as its members are not actually "chosen" to be appointed on that particular committee. The percentage of firms with a remuneration committee (RC) is also significantly greater

[21] This ambiguity is discussed in Section 5.1.1 under "Committee variables".

for Q4 than Q1 (at the 1% level). Very few New Zealand firms have a nomination committee, and this cross-sectional difference between the quartiles for this variable is insignificant. However, the presence of a remuneration committee (RC) and nomination committee (NC) is not as important as an audit committee (AC), as firms will only be *encouraged* to appoint a remuneration committee and nomination committee. If the firm decides that neither a remuneration nor a nomination committee are optimal for the board composition, they will not be required to form one.

6.3 Pairwise correlation analysis

Table 5 reports the correlation between the proxy variables that are used to construct the composite index. One of the motivations behind constructing the composite index was the fact that, while there may be some correlation between the different determinants of the cost and benefit of monitoring, the correlation is unlikely to be perfect. Thus, sorting firms based on only one determinant could attenuate the cross-sectional variation in wealth effects of the NZX Code (Wintoki, 2007). The results of this pairwise analysis confirm Wintoki's assertion that using a composite index approach to capture the relative costs and benefits of having outside directors is much more effective than analysing single variables.

As expected, there is a significant amount of correlation between the determinants used in the analysis. However, the findings differ quite substantially to those of Wintoki (2007). There is a highly significant positive correlation between MVE and BOARD (significant at the 1% level) and between MVE and SEGMENT (significant at the 5% level). This is consistent with the expectation that larger firms have a greater number of directors on the board. The age of a firm is also positively correlated with board size (at the 5 % level), yet it shows no significant correlation with any other independent variables. Contrary to my results, Wintoki (2007) finds a strongly significant negative correlation between firm age and outside director ownership. Wintoki (2007) also documents that outside director ownership is negatively correlated with MTB and MVE (significant at the 5% and 10% level respectively) and positively correlated with the percentage of insiders on the board (at the 10% level). By contrast, DIROWN only presents significant correlation with

RETSTD (positively significant at the 10% level) in my sample. Consistent with capital structure literature, firm leverage (LEVERAGE) is positively correlated with firm size (MVE) and number of business segments (SEGMENT) at the 10% level (Barclay and Smith, 1995; Jensen, 1986). MTB is positively correlated with LEVERAGE at the 10% level. Conversely, IARATIO correlates negatively with LEVERAGE at the 5% level. The proxies for costs of monitoring (MTB, IARATIO and RETSTD) exhibit some correlation between themselves. RETSTD is positively correlated with both MTB and IARATIO at the 1% level, yet there is no significant correlation between IARATIO and MTB. It makes sense to construct an index using these variables because they are not all correlated.

The Pearson correlation matrix emphasises the correlation between the percentage of outside directors on the board (OD) and the proxies for the costs and benefits of monitoring. Consistent with the findings in Wintoki (2007), all of the monitoring cost proxies (MTB, IARATIO and RETSTD) are negatively correlated with OD at the 5% level. Wintoki (2007) also finds that firm age is positively correlated with the percentage of outside directors; however, this is not the case for my sample. Interestingly, there is no significant correlation between OD and any of the proxies for firm complexity and private benefits of control. These results suggest that monitoring costs influence the endogenous determination of firms' board compositions in New Zealand the most. Firms with high monitoring costs clearly have less outside directors on the board in 2002. By contrast, firms with high complexity and/or high private benefits of control did not have a significantly greater amount of outside directors. These results suggest that, in New Zealand, firms do not endogenously choose the proportion of outside directors on their board based on their firm complexity or their private benefits of control.

6.4 Model 1: Long event window regressions

Table 4 reports the results for the long window regression methodology (Model 1). The abnormal returns for the four quartile portfolios ($\boldsymbol{\alpha_p}$) are measured over a period beginning with the first proposal of the NZX Code (6^{th} May 2003) to the implementation of the code (29^{th} October 2003). Panel A shows the abnormal return for the quartile portfolios as measured by the market model (Model 1A), and Panel B shows the abnormal returns calculated with the Fama-French 3-factor model (Model 1B). An equally-weighted index of the total sample of stock returns (EWI) is used to proxy for the expected return on the market (Newnham, 2011). Regressions were first estimated with a value-weighted index proxy (NZXAll index daily returns). However, this model fitted very poorly and the coefficients were not interpretable. Adjusted R^2 figures show that the EWI index fits the quartile 1 portfolio well (R^2 equals .69 in the market model). This aligns with the assertion of Newnham (2011) that an equally-weighted index is an effective proxy for the expected return of small, illiquid stocks in New Zealand. The R^2 figures of the other three portfolio regressions, for the market model (Model 1A), are not as high (0.30, 0.12, and 0.09). Yet the explanatory power of these models was still significantly better than the alternative, value-weighted specification. The R^2 values for Model 1B are moderately higher than Model 1A, for quartiles 2, 3 and 4 (0.35, 0.19, and 0.13 respectively). This suggests that the Fama-French factors (SMB and HML) provide some information to explain stock returns in New Zealand. However, the quartile 1 portfolio R^2 of Model 1B is essentially the same as Model 1A (0.70 compared to 0.69). I therefore conclude that the Fama-French factors do not provide any significant explanatory power for small, illiquid stocks. T-statistics for the EWI variable were significant at the 1% level for all four portfolios, in both Model 1A and Model 1B. The high t-statistic figures and low R^2 figures raised concerns of multicollinearity. Thus, the variance inflation factor (VIF) was calculated to ascertain whether multicollinearity was a problem in these regressions. This factor provides an index that indicates how much the variance of the regression coefficient has been increased because of collinearity in the model (Mansfield and Helms, 1982). A VIF greater than 10 indicates that multicollinearity is significant (Kutner, et al., 2004). Across all of my regression models (Models 1A, 1B, 2A, 2B, 3A, and 3B) no VIF figure is greater than 1.36. Therefore, one can conclude that multicollinearity is not a problem in these models. Overall, I conclude that the models for all four quartile portfolios have a good enough fit to make inferences about the cross-sectional differences in stock returns surrounding the NZX Code. The R^2 values for the four quartile portfolios are largely consistent across the other four models (Models 2A, 2B, 3A, and 3B) as well. Therefore, the goodness of fit of Models 2A, 2B, 3A, and 3B will not be discussed in Sections 6.5 and 6.6, in order to avoid repetition.

According to the three hypotheses examined in this study, the impact of the NZX code on firms with high private benefits of control, high firm complexity, and low monitoring costs (Q4 firms) is expected to be significantly more positive than on firms with the opposite characteristics (Q1 firms). The results are consistent with this hypothesis. The Q1 portfolio exhibits a negative $\boldsymbol{\alpha_p}$, in both Panel A and Panel B, which is significant at the 5% level. This suggests that the NZX Code had a detrimental effect on these firms, as the cost of compliance to the code's compulsory compliance requirements was greater than the associated benefits. Conversely, Q4 exhibits a positive abnormal return over the NZX Code event period, in both Panel A and Panel B. However, this figure is only significant in Panel A (at the 10% level). When the SMB and HML factors are included in the model (Panel B), the positive abnormal return becomes insignificant. Nonetheless, there appears to be a significant cross-sectional difference in reactions to the code between Q1 and Q4. The difference between the Q4 and Q1 portfolios' abnormal event returns (0.003) is significant at the 1% level. The t-statistics for the difference in abnormal returns is calculated by running a joint regression of the two quartile samples and differentiation between them with dummy variables (as exemplified in Equation 4). One should note that caution should be taken when interpreting the $\boldsymbol{\alpha_p}$ figures for the individual portfolios. As the regulations affected the entire market, the expected returns model does not explain how the market would have performed without the regulations (Schwert, 1981). Therefore, one cannot make inferences about the absolute value of any one portfolio's individual returns (Wintoki, 2007). However, inferences about the cross-sectional variation between the portfolio abnormal returns can be made relatively confidently. This is thus the main focus of my study.

The results presented in Table 5 are largely consistent with those found by Wintoki (2007), in that both studies identify a significant cross-sectional variation in abnormal returns over the long event windows, with Q1 portfolios experiencing significantly lower abnormal returns than Q4 portfolios. Both studies find that this difference is significant at the 1% level for the market model (Model 1A) and the 3-factor model (Model 1B). The significant cross-sectional difference of market reaction around the NZX Code suggests that the standardised requirements for independent director monitoring and audit committee independence is not appropriate for all New Zealand firms. Most notably, the cost of compliance to the NZX Code requirements for Q1 firms (which by construction are small, young, less complex firms that are operating in an uncertain environment) appears to outweigh any benefits of the additional monitoring. This lends support to the argument that firms endogenously choose their board composition as a function of the costs and benefits of monitoring for their firm.

Whilst the overall findings of Table 6 are similar to Wintoki (2007), there are some small differences. Firstly, the significance of the abnormal returns for Wintoki's study is much higher. Looking at the 3-factor model, Wintoki (2007) finds a negative abnormal return for Q1 that is significant at the 1% level. By contrast, the corresponding Q1 abnormal return for this study is only significant at the 5% level. Wintoki (2007) also reports positive abnormal returns, which are significant at the 1% level for both Q3 and Q4. In this study, Q3 has a positive $\boldsymbol{\alpha_p}$ that is significant at the 10% level, and the positive $\boldsymbol{\alpha_p}$ of Q4 is deemed insignificant. This suggests that the effect of the NZX Code on New Zealand firms was not as strong as the effect of the SOX on US firms. It seems that Q1 firms in New Zealand were less detrimentally affected than Q1 firms in the US. Conversely, Q3 and Q4 firms were more positively affected by the code in the US than similar firms were in New Zealand. This may be due to the fact that the NZX Code monitoring regulations were much less stringent than the SOX. Another difference to note is that this study does not present the same monotonic increase in abnormal stock returns moving up through the portfolios (Q1 to Q4). For instance, the $\boldsymbol{\alpha_p}$ of the 3-factor model in Wintoki (2007) is significantly negative for Q1 (-0.156), insignificantly negative for Q2 (-0.014), significantly positive for Q3 (0.074), and significantly positive for Q4 (0.087). The same stepwise effect is evident in the lower quartiles of my study (Q1 $\boldsymbol{\alpha_p}$ is significantly negative (-0.0023); Q2 is insignificantly positive (0.0007)). However, Q3 shows a greater positive abnormal return than Q4 (0.0011 and 0.0008 respectively). In my opinion, this is due to the fact that there is not much cross-sectional variation in firm-specific characteristics between firms in Q3 and Q4 (as discussed in Section 6.2). As a result, it is not clear that Q4 firms have significantly higher private benefits of control and lower costs of monitoring than Q3 firms.

The results in Table 6 provide evidence in support of my hypotheses that firms with high private benefits of control (H2) and firm complexity (H3) and low monitoring costs (H1) would benefit more highly from the additional monitoring imposed by the NZX Code. Wintoki (2007) states that the long-window, portfolio approach methodology is an effective way to measure the effects of regulation. However, test power dramatically decreases with a long event window and small sample size. This is a problem, as experiments with low power have a higher probability of incorrectly accepting the null hypothesis. Wintoki (2007) has the benefit of a large sample size (1526 firms), and thus the test power for his long-window event analysis will still be reasonably high. By contrast, the sample size of this study is only 99 firms. Therefore, in an attempt to increase test power, I choose to conduct some short-window event study analysis. Shortening the event window will increase the power of the test (MacKinlay, 1997).

6.5 Model 2: Short event window regressions using aggregate event dummy

Tables 7, 8, 9, and 10 show the results of the aggregate event dummy regressions. Both tables have two panels: Panel A shows the results of the market model (Model 2A) and Panel B shows the results of the 3-factor model (Model 2B). The period over which the regressions are run (the long-horizon window) is slightly longer for these models, as well as Models 3A and 3B. This is so that potential anticipatory and lagged market reactions can be examined. A variety of event windows are used, as there is uncertainty about when the market will react. The event windows for Tables 7, 8, 9, and 10 are (-1,0), (-1,1), (-3,3), and (-5,5) respectively. Given that Model 2B is generally a better model for the expected returns, this model will be primarily referred to in my discussion of the findings. Model 2A will only be referred to if the results are significantly different from the alternative model.

Table 7 shows the results for the shortest event window (-1,0). In this table, the $\boldsymbol{\vartheta_p}$ signifies the abnormal return (in excess of $\boldsymbol{\alpha_p}$) on the day before and on the three event dates. Looking at this table alone suggests that Q1, Q2 and Q4 had no significant reaction to the events of the NZX Code. By contrast, the Q4 $\boldsymbol{\alpha_p}$ is significantly greater than that of Q1, at the 5% level. $\boldsymbol{\alpha_p}$ indicates the abnormal return over the long event horizon excluding the short-horizon event windows. Intriguingly, Q3 displays a significantly positive $\boldsymbol{\vartheta_p}$. This could signify that Q3 responded more positively to the code than Q4, which is against expectations. Alternatively, the estimate may be skewed by an outlier return in the quartile. Further analysis with longer event windows will identify whether or not this is the case. Overall, the results of Table 7 cast doubt on the conclusion based on the long window analysis – that Q1 firms benefited significantly less from the NZX Code than Q4 firms. However, this event window may be too short to identify the market reaction to the code. Extension of these event windows to take into account any lagged market reaction may change the results. The following three tables do this.

Table 8 shows the results for Model 2A and 2B, using a (-1,1) event window. Including the extra day after the event window drastically changes the results compared to Table 7. The market reaction to the NZX Code events was clearly lagged by one day. The $\boldsymbol{\vartheta_p}$ estimates are much more consistent with underlying expectations of the analysis. The abnormal returns around the event move up in a stepwise manner through the quartiles. Q1 has a significantly negative aggregate event abnormal return ($\boldsymbol{\vartheta_p}$= 0.0077) at the 10% level. The corresponding estimate for Q2 is insignificantly negative (-.0014), Q3 is significantly positive at the 10% level (0.0048), and Q4 is significantly positive at the 1% level. Most importantly, the cross-sectional difference in $\boldsymbol{\vartheta_p}$ between Q4 and Q1 is significant at the 1% level. Whilst this is the case, the cross-sectional difference in abnormal return between these two quartiles over the long-horizon period is not wholly explained by the three key NZX Code events. This is evident from the 4-1 $\boldsymbol{\alpha_p}$ estimate, which shows that the difference between the abnormal returns over the long-horizon period, *excluding* the key NZX Code events, is still significant at the 5% level.

Table 9 expands the event window to (-3,3). Results in this table remain consistent with the findings in Table 8. The aggregate event return ($\boldsymbol{\vartheta_p}$) of Q4 is significantly higher than that of Q1, at the 1% level. The only difference in results between Table 8 is a slight change in the significance of estimates. The most notable of these is decreased significance of the difference in Q4 and Q1 $\boldsymbol{\alpha_p}$**.** The significance of this figure drops from the 5% to the 10% level. This suggests that more of the cross-sectional difference in abnormal return is explained by the NZX Code events.

Again, Table 10 conducts the same analysis with an expanded event window (-5,5). Over this event window, the significance of the aggregate event abnormal returns, as well as the cross-sectional difference in returns, decreases. This suggests that the market reaction to this event may have dissipated over this longer window. However, overall the results are still consistent with those of Tables 8 and 9. The $\boldsymbol{\vartheta_p}$ increases stepwise from Q1 to Q4, and the difference between the Q4 and Q1 $\boldsymbol{\vartheta_p}$ is significant at the 5% level. Most notably, the difference in Q1 and Q4 $\boldsymbol{\alpha_p}$ is statistically insignificant. This suggests that the entire cross-sectional variation of abnormal returns identified in the long-horizon analysis (Table 6) is entirely explained by the three NZX Code events.

The advantage of using the aggregate event dummy ($\boldsymbol{D_{MAO}}$) is that one can analyse the overall effect of the NZX Code, considering all events related to the code together. However, in comparison to the SOX, from the time the NZX Code was announced (on May 6th) there was not much debate or change to the initial announcement before it was implemented (on 29th October). Therefore, it is possible that the market reaction to the second and third events (14th August and 29th October) was less significant than the initial announcement event. If the entire market response to the NZX Code was enacted on the first event, including the other two event dates in the event dummy will dilute the abnormal event return. To address this concern, I also conduct a regression analysis with three individual dummy variables (Models 3A and 3B). If the entire abnormal market reaction to the NZX Code event is centred on only one of the key event dates, the individual dummy variable models will identify this.

6.6 Model 3: Short event window regressions using three individual event dummies

Tables 11, 12, 13, and 14 report the results of the regressions that use three individual event dummies. That is to say that each separate event date related to the NZX Code (6th May, 14th August, 29th October) is represented by a different dummy variable.

This overcomes the possible problem with dilution of the abnormal returns, which was discussed in Section 6.5. Results for Model 3A (the market model) are shown in Panel A, and those for Model 3B (the 3-factor model) are shown in Panel B. $\boldsymbol{\gamma_p}$ shows the shift in abnormal return for portfolio p around the May 6th event, $\boldsymbol{\delta_p}$ for the August 14th event, and $\boldsymbol{\theta_p}$ for the 29th October event. Equation 5 (Section 5.5) provides an example of how the t-statistics are calculated for the difference in the estimates for Q4 and Q1.

Table 11 shows the results of the individual dummy regressions, using the short event window of (-1,0). The results are consistent with the aggregate dummy analysis over the same event window (Table 7). It is clear that the significant abnormal return over the NZX Code event for Q3 is entirely centred around the May event ($\boldsymbol{\gamma_p}$=0.0204, significant at the 1% level). However, as discussed previously, this could be due to an outlier return in the sample and may dissipate when the event window is decreased. The cross-sectional difference of Q1 and Q4 abnormal returns around the May event is mildly significant (at the 10% level) for this short event window. Interestingly, there is no significant market reaction at all around the August and October events (as signified by $\boldsymbol{\delta_p}$ and $\boldsymbol{\theta_p}$) for any of the quartiles. There is also no significance in the difference of these estimates for Q4 and Q1.

The results for the (-1,1) event window are shown in Table 12. These results confirm my concern that the use of the aggregate event dummy results in dilution of the event returns. Around the May event, Q1 had a significantly negative market reaction (at the 5% level) and Q3 and Q4 had a significantly positive reaction (at the 1% level). The abnormal May event return ($\boldsymbol{\gamma_p}$) for Q4 is significantly greater than Q1 (at the 1% level). This indicates that, when the first information of the NZX Code was released, the expectation of the effect that this code would have on a firm differed significantly depending on its characteristics. As hypothesised, firms with high complexity, high levels of private benefits, and low monitoring costs (Q4 firms) were expected to benefit significantly more from the new monitoring requirements than firms with the opposite characteristics (Q1 firms). However, it appears that the cross-sectional difference in reaction around the August and October event was insignificant. The $\boldsymbol{\delta_p}$ and $\boldsymbol{\theta_p}$ for most quartiles are all statistically insignificant, as is the difference in estimates between Q1 and Q4. This could signify that the market does not expect the NZX Code to have a significant effect on firm value, nor that this effect will be a function of firm-specific factors. However, given the significant market reaction around the May event, it is unlikely that this is the case. It is more likely that the market absorbed all of the NZX Code information during the May event. An interesting result in this table is the positive abnormal return (at the 10% level) for Q2 firms around the August event ($\boldsymbol{\delta_p}$). This abnormal reaction also persists across the longer (-3,3) event window. Q2 firms, by the construction of the composite index, are expected to have moderately higher monitoring costs and moderately lower private benefits of control and firm complexity compared to the Q3 and Q4 firms. As a result, the NZX Code is expected to benefit Q2 firms less than Q3 and Q4 firms. All of the previous analysis has suggested that this is the case, with Q2 firms having no significant reaction to the NZX Code event. This implies the market expected the relative cost of compliance under the new regime to neutralise any benefit from the extra monitoring for firms with Q2 characteristics. The August event (14th August 2003) represents when the final version of the proposed listing rules were released. It seems that finalisation of the code was viewed by these firms as having a moderately positive effect in terms of its eventual implementation.

Table 13 reports the results for the Model 3A and 3B regressions, which are run with a (-3,3) short-horizon event window for the individual event dummy variables. As with the aggregate event model with the same short-horizon window (Table 9), The positive abnormal return for the Q3 May event ($\boldsymbol{\gamma_p}$) becomes insignificant. There is a significant cross-sectional difference abnormal return between Q4 and Q1 for both the May and August event. Q1 has a significantly negative abnormal return (at the 10% level) for both the May and August event. Contrary to findings in other tables, this suggests that, on average, Q1 firms did react negatively to the announcement of the final proposed changes to the listing rules (on 14th August). These significantly negative abnormal returns at two NZX Code announcement events provides further support towards the argument that small, high growth firms that are operating in uncertain environments were detrimentally affected by the NZX Code compulsory compliance requirements. Q4 has a significantly positive abnormal return (at the 1% level) for the May event ($\boldsymbol{\gamma_p}$), yet the positive abnormal return is not significant for the August event ($\boldsymbol{\delta_p}$). The cross-sectional difference between Q4 and Q1 is significant at the 1% level on the May event and at the 5% level for the August event. These results provide further evidence to support my hypotheses that the benefits of the NZX Code for firms will be determined by their complexity, private benefits of control, and monitoring costs. In Table 13, the $\boldsymbol{\alpha_p}$ for all of the quartiles becomes insignificant. This suggests that the entire long-horizon event return is explained by either the May event, or both the May and August events. There is however still a moderately significant cross-sectional difference between the Q4 and Q1 $\boldsymbol{\alpha_p}$ (at the 10% level).Therefore, the cross-sectional difference in abnormal returns over the long-event horizon is not entirely explained by the May and August events when a (-3,3) event window is used.

Table 14 is the final table of this analysis. It includes the Model 3A and 3B regression results, using a (-5,5) window. This extension of the short-horizon from (-3,3) to (-5,5) causes the dissipation in significance of abnormal returns for all of the quartiles in the August event window. Contrarily, the May event window abnormal returns maintain their significance. As in Table 12, Q1 has a significantly negative abnormal May event return, Q2 and Q3 have no significant abnormal returns, and Q4 has a significantly positive abnormal return. The May event abnormal return ($\boldsymbol{\gamma_p}$) for Q4 is significantly greater than that of Q1 at the 1% level. Furthermore, the cross-sectional difference in $\boldsymbol{\alpha_p}$ for these quartiles is insignificant. This strongly suggests that the NZX Code explains the entire cross-sectional difference in abnormal returns between the Q1 and Q4 portfolios that is identified in the long-horizon regressions (Table 6).

Consistently, across all of the tables, the October event, which is the implementation date of the NZX Code, had no effect on any quartile portfolio returns. Clearly, the majority of the market reaction to the new requirements of the NZX Code occurred on the first announcement (6^{th} May), with a much smaller reaction at the time of the final proposal (14^{th} August).

6.7 Summary of findings

The purpose of this study was to identify whether the effect of the NZX Code on New Zealand firms was determined by firm-specific variables. To reiterate, my hypotheses were as follows: [22]

H1: The wealth effect of the NZX Code compulsory compliance is negatively related to the firm's monitoring costs.

H2: The wealth effect of the NZX Code compulsory compliance is positively related to the firm's private benefits of control.

H3: The wealth effect of the NZX Code compulsory compliance is positively related to firm complexity.

Considering these hypotheses, I predicted that Q1 firms would experience significantly negative abnormal returns over the announcement and passage of the NZX Code. On the other hand, Q4 returns were expected to react positively to the NZX Code announcement and implementation. If the three hypotheses were valid, the cross-sectional difference in abnormal returns between these two quartiles would be significant. Consistently, throughout my analysis I found that this was the case. The long-event window regressions (Table 6) provided clear evidence that the NZX Code implementation had a significantly more positive wealth effect for Q4 firms than for Q1 firms. To increase the power of this test shorter event windows were used. The aggregate event dummy regressions (Tables 7, 8, 9, and 10) showed that, over the (-1,1), (-3,3) and (-5,5) event windows, the cross-sectional difference in abnormal returns between Q1 and Q4 were significant. When the longest short-horizon event window (-5,5) was utilised, the entire long-horizon abnormal return was explained by the aggregate NZX Code event. Further analysis split the one aggregate event dummy (which comprised the three main NZX Code events) into three individual event dummies. These individual event dummy regressions (Tables 11, 12, 13, and 14) further reiterated that the cross-sectional difference in market effects were significant. These cross-sectional differences in response were in line with the hypothesis that firms with high levels of private benefits, high firm complexity, and low monitoring costs benefited more from the outside monitoring of the code. It was clear that the most significant market reaction was in response to the initial announcement of the

[22] Details on hypothesis development are in Chapter 4.

proposed NZX Code provisions (6th May). The finalisation of the proposed regulations had some market effect, yet this effect was not constant across all event windows.

Overall, the results of this analysis call into question the merit of implementing standardised requirements of board composition, such as a minimum number of independent directors and audit committee members. The market announcement around the passage of the code suggests that small, high growth firms that operate in uncertain environments expected to be detrimentally affected by the new NZX listing requirements. The cost of complying with the compulsory compliance regulations clearly outweighed any benefits received from extra monitoring. This finding suggests that stewardship theory may be more relevant than agency theory for firms with these characteristics in New Zealand. This contradicts many of the empirical findings that suggest that outside monitoring through independent or non-executive directors is beneficial overall for New Zealand firms (Prevost, et al., 2002; Reddy, et al., 2010). Whilst the large, complex firms are likely to benefit from the additional monitoring, smaller firms must move to a suboptimal board structure, as well as suffer costs, in order to comply, which results in a negative wealth effect. Overall, the findings challenge the merit of a “one-size-fits-all” regulation on board composition in New Zealand.

6.8 Robustness

6.8.1 – Size-quartile portfolio regressions

Wintoki (2007) notes that, because firms with high monitoring costs and low private benefits of control (Q1 firms) are generally smaller firms, the cross-sectional difference in market reaction may not be due to the firm-specific determinants of board structure that the three hypotheses (H1, H2, and H3) specify. It may instead be explained by the “fixed” costs of compliance falling disproportionately on small firms. “Fixed” costs of compliance could include additional fees to auditors or the costs of recruiting and educating new outside directors on business processes. As smaller firms have lower revenue than larger firms, these “fixed” costs of compliance will weigh much more heavily on their financial resources. I conduct a robustness test to examine whether the cross-sectional differences in wealth effects are caused by the relative costs and benefits of additional monitoring, rather than simply as a result of the firm size. I divide the sample of 99 firms into quartiles based solely on size. Size-quartile 1 has the smallest firms and size-quartile 4 has the largest firms. I then conduct the same regression analysis, as above, using the size-quartile rather than the CIX quartiles. Tables 6R1 through 14R1 show the results of these size-quartile regressions. The table numbering for these results corresponds to the numbering used for the equivalent regression using the original analysis (e.g. Table 6 is the long event window analysis using the CIX-quartile portfolios, and Table 6R1 is the long event window analysis using the size-quartile portfolios). The results from the robustness analysis show that the cross-sectional effect identified in the original regression analysis is partly explained by the size effect. Many tables identify a significant cross-sectional difference between the Q1 and Q4 estimates. However, size does not explain all of the cross-sectional effects of the code. This is apparent from the absence of the monotonic increase in the abnormal returns for the portfolios reported in the original regression tables (Tables 1 to 14). For example, in Table 13R1 the difference in the abnormal return of Q1 and Q4 around the May event ($\boldsymbol{\gamma_p}$) is significant at the 5% level. Similarly, the difference in the $\boldsymbol{\gamma_p}$ of Q1 and Q4 is also significant (at the 1% level). However, the progression of $\boldsymbol{\gamma_p}$ from the CIX-Q1 portfolio through to the CIX-Q4 portfolio (in Table 13) moves in a stepwise manner. This suggests strongly that the higher the costs of monitoring and the lower the private benefits of control of a firm, the less benefit they will get from the additional monitoring imposed by the NZX Code. By contrast, there is no consistent stepwise movement of $\boldsymbol{\gamma_p}$ across the size-quartile portfolios. In fact, the movement appears to be somewhat random. I therefore conclude that the costs of monitoring and benefits of control are a significant determinant of the wealth effect of the NZX Code on New Zealand firms.

6.8.2 – Combined quartile portfolio regressions

A second robustness test examines whether results remain consistent when the two highest and two lowest quartile portfolios are combined. I re-run the regression analysis using two combined quartile portfolios, (Q1+Q2) and (Q3+Q4). I have only presented the regression results for the (-3,3) short window methodology, as the results are consistent across all event windows. Tables 9R2 and 13R2 present the results for these combined quartile regressions. Overall, this robustness check shows that, while there is still a significant difference in abnormal returns between the highest and lowest combined portfolios over the event dates, the original regression results are more significant. For instance, in Table 9R2 $\boldsymbol{\vartheta_p}$ for portfolio (Q1+Q2) is negative but insignificant. Conversely, in Table 9 $\boldsymbol{\vartheta_p}$ for quartile 1 is negative and significant at the 5% level. The difference between $\boldsymbol{\vartheta_p}$ of the highest and lowest portfolios in Table 9 and Table 9R2 are positive and significant at the 1% and 5% level respectively. Comparison of Tables 13 and 13R2 show that the difference in abnormal return of the high and low portfolios are equally significant (at the 1% level) for the May announcement ($\boldsymbol{\gamma_p}$). However, the significant difference of abnormal return for the August event in the original regression analysis (5% significance) does not remain in the combined quartile analysis. Chapter 7: Conclusion

A global trend towards more strictly regulated corporate governance and increased monitoring on boards resulted in the creation of the NZX Code in 2003. The compulsory compliance measures (a minimum number of independent directors, and an independent and expert audit committee) imposed a change in the standard of monitoring for all New Zealand firms and their boards. However, many US-based studies provide evidence that this "one-size-fits-all" regulation approach can be detrimental to some firms. In addition, the New Zealand market is very different to the US, which makes direct inferences from the US literature inappropriate. This study examines the impact of the change in the mandatory requirements concerning board and audit committee structure on New Zealand publicly listed firms. It also investigates if the evidence from the US empirical literature is relevant in the New Zealand context.

The announcement and passage of the NZX Code in 2003 provided a unique event to analyse the cross-sectional differences in the wealth effects of additional monitoring in New Zealand. Following the methodology of Wintoki (2007), I construct a composite index to measure the relative costs and benefits of additional monitoring for the sample firms. Quartiles are created based on the composite index rankings and the abnormal return over the NZX Code event is measured for each of these quartiles. I analyse whether there is a significant cross-sectional difference in abnormal returns between Q1 and Q4, over the event. A long-horizon event window is initially applied to the data (Models 1A and 1B). A short-horizon event analysis around the main NZX Code announcements is also carried out to address concerns about test power (Models 2A, 2B, 3A and 3B).

The results of my analysis provide strong evidence that the NZX Code was not mutually beneficial for all firms. Pairwise correlation analysis shows that firms with high monitoring costs endogenously chose a lower proportion of outside directors, prior to the enactment of the NZX Code. The long-horizon event methodology identifies that firms with high monitoring costs, low private benefits of control, and low firm complexity (Q1 firms) experienced significantly lower abnormal returns over the announcement and passage of the NZX Code than firms with the opposite characteristics (Q4 firms). However, in comparison to the US (Wintoki, 2007), these cross-sectional differences are relatively less significant. This may indicate that the firm-specific determinants of board structure are less important in New Zealand than in the US. However, it is more likely that the cross-sectional difference in wealth effects were less significant in New Zealand because of the relatively less stringent monitoring requirements of the NZX Code. In comparison to the SOX, the NZX Code is more similar to the "comply or explain" governance regulations of other western nations (UK, Canada and Australia), as it allows firms more autonomy in determining their board composition.

Short-horizon event window analysis provides confirmation of the long-horizon event window findings. The aggregate event dummy regressions (Models 2A and 2B) show that the average abnormal return over the three NZX Code events is significantly lower for firms with high monitoring costs and low benefits from monitoring, compared to firms with the opposite characteristics. These results are consistent over all event windows that account for a lagged market reaction. When the longest short-horizon event window (-5,5) is used, the cross-sectional variation in wealth effects across the long-horizon period is explained entirely by the NZX Code events. Analysis of the individual events identifies that the first announcement of the NZX Code (on May 6th) was the most important event. Around this date, firms with high costs of monitoring, low private benefits of control and low firm complexity (Q1 firms) experienced significantly negative abnormal returns, suggesting that the market expected the NZX Code requirements to reduce firm value. In contrast, my results find that the market expected Q4 firms to benefit from the new monitoring requirements. The subsequent NZX Code events, (14^{th} August and 29^{th} October) did not show the same significant cross-sectional difference in abnormal returns. This suggests that the New Zealand market accepted the implementation of the new rules during the first announcement, and priced in the expected wealth effects around this date (May 6^{th}).

The relative effect of additional external monitoring to mitigate agency issues depends on whether the other mechanisms in the firms' institutional environment act as substitutes or complements (Agrawal and Knoeber, 1996). Therefore, although the philosophy of the NZX Code regulations are in line with other Western economies (E.g. the US and UK), the response of New Zealand firms could differ greatly to that which is documented in US and UK based studies. Overall, the findings in this study suggest that the cross-sectional reaction in New Zealand was generally consistent with how firms reacted to the SOX regulations in the US (Wintoki, 2007). In both jurisdictions, small, growth firms that were operating in uncertain environments experienced a negative wealth effect as a result of the new regulations on additional monitoring. The consistency of these findings across two very different institutional and legal environments clearly suggests that the global trend towards stricter monitoring on boards for all firms, as motivated by agency theory, is not appropriate for all firms.

This thesis contributes to the literature in the following ways. First, it is the only study that analyses the market reaction around the announcement and passage of the NZX Code. It is also the first to test whether there is a cross-sectional difference in wealth effects as a result of the NZX Code implementation. Second, the findings provide strong evidence that, while some firms reacted positively to the NZX Code implementation, firms with high monitoring costs, low private benefits of control and low firm complexity were detrimentally affected by the new monitoring requirements. This contrasts with the studies of Reddy, et al. (2010) and Teh (2009), which conclude that the NZX Code had a positive effect on firm value overall. Third, the results provide clear evidence that the optimal amount of monitoring for boards is determined by firm-specific characteristics in New Zealand. This is consistent with the argument that stewardship theory may have relevance for small growth firms that operate in uncertain environments. The result challenges the global trend towards additional monitoring for all firms, which is motivated by agency theory. Overall, the identification of the significant cross-sectional difference in wealth effects due to the NZX Code indicates that a "one-size-fits-all" approach to corporate governance regulation is not optimal for the New Zealand market.

Opportunities for further research

The findings of this thesis provide some suggestions for further research. First, the market reaction around the NZX Code event identifies that the market expected the additional monitoring requirements to have a significantly negative wealth effect on firms with high monitoring costs, low private benefits of control, and low firm complexity. It would be interesting to examine whether the cross-sectional difference in abnormal returns is followed by the same cross-sectional difference in firm performance in the long term, after the regulations were implemented. Second, in this study the hypothesised firm-specific determinants are examined as a whole. US-based research suggests that monitoring costs, private benefits of control, and firm complexity affect the benefit of additional monitoring for a firm. Further studies may seek to investigate in more detail the benefits of monitoring and how these are determined and measured in a New Zealand context. It would be interesting to measure the individual significance of each of the composite index components. Third, the challenge of modelling small, illiquid stocks in the New Zealand market was highlighted in this research. Following Newnham (2011) an equally-weighted index of the sample stock returns has been used as an alternative proxy for the expected market return. However, the regression models were still not very strong. Therefore, further analysis into how to optimally model returns for these stocks would be useful.

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Tables - Analysis

Table 1: Definition of firm-specific variables

All firm-specific data is based on 2002 annual report figures
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Variable	Definition
AC	Dummy variable = 1 if firm has an audit committee, 0 otherwise
ACENTIRE	Dummy variable = 1 if firm's audit committee comprises the entire board, 0 otherwise
AGE	The number of years since the firm first appeared on *Datastream*
BOARD	Number of directors on the board
DIROWN	Proportion of firm's shares held by non-executive directors
IARATIO	Ratio of intangible assets to total assets
LEVERAGE	Proportion of long-term debt plus short term debt to total assets
MTB	Market to book ratio of equity
MVE	Market value of equity ($M) according to total market equity on balance date
NC	Dummy variable = 1 if firm has an nomination committee, 0 otherwise
OD	Proportion of outside non-executive directors on the board
RC	Dummy variable = 1 if firm has an remuneration committee, 0 otherwise
SEGMENT	Number of business segments
STDEV	Standard deviation of monthly stock returns for the year 2002

Table 2: Definition of regression variables

Variable	Definition
D_A	Dummy variable = 1 if date is within August event window, 0 otherwise
D_M	Dummy variable = 1 if date is within May event window, 0 otherwise
D_{MAO}	Dummy variable = 1 if date is within May, August and October event window, 0 otherwise
D_O	Dummy variable = 1 if date is within October event window, 0 otherwise
EWI	Equally weighted daily return for entire sample of firms; a proxy for market return
SMB	Fama-French SMB factor. Calculation is specified in Section 5.3.2
HML	Fama-French HML factor. Calculation is specified in Section 5.3.2
R_f	Daily 3-month New Zealand treasury bill rate
R_p	Equally weighted daily return for the composite index quartile portfolio

Table 3: Summary statistics for total sample

This table reports summary statistics for the full sample (99 firms). Panel A reports firm characteristics and Panel B reports board characteristics. For each variable, the mean, median, minimum, and maximum of the full sample are reported. Definitions of the firm variables and board variables are found in Table 1.

Variable	Mean	(Median)	Min	Max
Panel A - firm characteristics				
MVE	402.19	(88.18)	0.97	9237.92
MTB	2.412	(1.370)	0.142	23.167
IARATIO	0.081	(0.002)	0.000	0.989
SEGMENT	1.6	(1.0)	1.0	6.0
LEVERAGE	0.423	(0.400)	0.004	0.902
AGE	8.9	(9.1)	0.8	17.3
RETSTD	0.095	(0.074)	0.014	0.354
Panel B – board characteristics				
BOARD	6.1	(6)	3.0	14.0
OD	0.829	(0.833)	0.333	1
DIROWN	0.033	(0.002)	0	0.334
AC	83.84%[23]			
NC	4.04%			
RC	34.34%			
ACENTIRE	11.11%			

[23] Percentage figures for AC, NC, RC, and ACENTIRE variables reflect the percentage of firms in the sample which have a corresponding dummy variable of 1. Details of these dummy variables can be found in Table 1.

Table 4: Summary statistics of composite index sorted portfolios

This table reports the summary statistics for each quartile of the composite index portfolios. The composite index is constructed based on the following dimensions: MVE (lowest to highest), MTB (highest to lowest), IARATIO (highest to lowest), SEGMENT (lowest to highest), LEVERAGE (lowest to highest), AGE (youngest to oldest), RETSTD (lowest to highest), OD (highest to lowest) and DIROWN (highest to lowest). Panel A shows the mean and median of the firm specific characteristics for each quartile and Panel B shows the mean and median of the board characteristics for each quartile. Definitions of these variables are found in Table 1. N shows the number of firms per quartile portfolio. The significance of the difference of Q4 and Q1 means is based on a t-test of the difference in means. The Mann Whitney U Test is used to calculate the difference in Q4 and Q1 means. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Panel A - firm characteristics

Mean (Median)

Quartile	MVE		MTB		IARATIO		SEGMENT		LEVERAGE		AGE		RETSTD		N
1	56.42	(22.53)	3.106	(1.69)	0.186	(0.029)	1.2	(1.0)	0.296	(0.281)	6.9	(5.9)	0.128	(0.092)	28
2	107.51	(64.16)	2.977	(1.47)	0.038	(0.011)	1.3	(1.0)	0.480	(0.515)	8.7	(8.5)	0.098	(0.076)	22
3	813.49	(150.86)	2.18	(1.41)	0.032	(0.000)	1.4	(1.0)	0.443	(0.415)	9.4	(9.2)	0.069	(0.049)	24
4	653.94	(192.79)	1.361	(.95)	0.05	(0.004)	2.6	(2.0)	0.498	(0.469)	10.8	(11.0)	0.079	(0.056)	25
4-1	597.53	(170.26)	-1.745	-(.74)	-0.136	-(0.025)	1.4	(1.0)	0.202	(0.188)	3.9	(5.1)	-0.049	-(0.036)	
significance	***	***	**	**	**		***	***	***	***	***	***	***	***	

Panel B - board characteristics

	BOARD		OD		DIROWN		AC	NC	RC	AC ENTIRE
1	4.64	(4.50)	0.826	(0.817)	0.061	(0.023)	57.1%	0%	39.3%	21.4%
2	6.09	(6.00)	0.861	(0.938)	0.053	(0.004)	100%	0%	77.3%	4.6%
3	6.75	(7.00)	0.826	(0.857)	0.017	(0.002)	91.7%	12.5%	66.7%	16.7%
4	6.96	(6.00)	0.807	(0.833)	0.002	(0.000)	92.0%	4.0%	84.0%	0%
4-1	2.32	(1.50)	-0.019	(0.016)	-0.059	-(0.023)	34.9%	4.0%	44.7%	-21.4%
significance	***	***			***	***	***		***	**

Table 5: Pearson Correlation Matrix

This table reports the pairwise correlation between the independent variables that are used in the calculation of the composite index.

	MVE	MTB	IARATIO	SEG	LEV.	AGE	RETSTD	BOARD	OD	DIROWN
MVE	1									
MTB	0.0983	1								
IARATIO	0.0589	-0.0432	1							
SEGMENT	0.0879	-0.1460	-0.0510	1						
LEV.	0.1937 *	0.1723 *	-0.2191 **	0.1703 *	1					
AGE	-0.0314	-0.0797	0.0222	0.0422	-0.0563	1				
RETSTD	-0.1611	0.4033 ***	0.2621 ***	-0.0579	0.1294	0.0779	1			
BOARD	0.3094 ***	0.0266	-0.0850	0.2519 **	0.1617	0.2373 **	-0.1843 *	1		
OD	0.0252	-0.2091 **	-0.2376 **	-0.0240	0.0260	-0.0751	-0.2015 **	-0.0129	1	
DIROWN	-0.1136	0.0331	0.0430	-0.0504	-0.0163	-0.0003	0.1896 *	-0.1250	-0.1030	1

** Significance at the 10% level, ** Significance at the 5% level, *** Significance at the 1% level*

Table 6: Long-window regression results

This table presents the abnormal event returns calculated for the four quartile portfolios, using the long-window regression approach. Panel A reports the results of the market model regressions (Model 1A), and Panel B reports the results of the Fama-French 3-factor model regressions (Model 1B). α_p indicates the abnormal return over the event period for quartile portfolio p.

Quartile	Panel A			Panel B		
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + \varepsilon_t$			$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + \varepsilon_t$		
	α_p [t-statistics]		Adjusted R^2(*N*-observation)	α_p[t-statistics]		Adjusted R^2(*N*-observation)
1	-0.0024		0.69	-0.0023		0.70
	[-2.33]	**	(28)	[-2.16]	**	(28)
2	0.0007		0.30	0.0007		0.35
	[0.77]		(22)	[0.78]		(22)
3	0.0011		0.12	0.0011		0.19
	[1.84]	*	(24)	[1.73]	*	(24)
4	0.0008		0.09	0.0008		0.13
	[1.75]	*	(25)	[1.56]		(25)
4-1	0.0030			0.0030		
	[3.05]	***		[2.87]	***	

** Significance at the 10% level, ** Significance at the 5% level, *** Significance at the 1% level*

Description of Tables 7, 8, 9 and 10: Short regression window results with aggregate dummy variable

Tables 7 to 10 report the regression results for Models 2A and 2B. The regressions of all the tables are run over a period between 29/04/2003 and 5/11/2003, however the lengths of the short event windows differ. Table 7 uses a short event window length of (-1,0), where 0 equals the event date, and -1 equals the day before the event. Using this same notation, Tables 8, 9 and 10 have an short event window length of, (-1,1), (-3,3) and (-5,5), respectively. $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio *p* over the long horizon event window (29/04/2003-5/11/2003), excluding the short event windows. $\boldsymbol{\vartheta_p}$ is a shift parameter that signifies that aggregate abnormal return for portfolio *p* around the three short event windows (06/05/2003, 14/08/2003 and 29/10/2003), *in excess of* $\boldsymbol{\alpha_p}$**.** T-statistics are reported below the coefficients in brackets [ ]. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Table 7:

Event window: (-1,0)					
Quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0024		-0.0064		0.68
	[-2.17]	**	[-1.26]		(28)
2	0.0011		-0.0012		0.27
	[1.08]		[-0.27]		(22)
3	0.0009		0.0068		0.12
	[1.32]		[2.29]	**	(24)
4	0.0009		0.0018		0.12
	[1.68]	*	[0.72]		(25)
4-1	0.0033		0.0082		
	[2.52]	***	[1.07]		
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_sSMB_t + B_HHML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0023		-0.0059		0.68
	[-2.08]	**	[-1.16]		(28)
2	0.0011		-0.0012		0.31
	[1.18]		[-0.28]		(22)
3	0.0008		0.0066		0.16
	[1.22]		[2.26]	**	(24)
4	0.0008		0.0015		0.12
	[1.56]		[0.6]		(25)
4-1	0.0032		0.0073		
	[2.55]	**	[1.3]		

Table 8:

Event window: (-1,1)					
Quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0021		-0.0084		0.69
	[-1.91]	*	[-2.01]	**	(28)
2	0.0011		-0.0008		0.27
	[1.07]		[-0.22]		(22)
3	0.0008		0.0049		0.11
	[1.26]		[1.97]	*	(24)
4	0.0006		0.0054		0.12
	[1.16]		[2.72]	***	(25)
4-1	0.0028		0.0138		
	[2.22]	**	[2.99]	***	
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0021		-0.0077		0.69
	[-1.85]	*	[-1.83]	*	(28)
2	0.0012		-0.0014		0.31
	[1.2]		[-0.39]		(22)
3	0.0008		0.0048		0.16
	[1.15]		[1.98]	*	(24)
4	0.0005		0.0052		0.17
	[1.04]		[2.66]	***	(25)
4-1	0.0026		0.0129		
	[2.12]	**	[2.78]	***	

Table 9:

Event window: (-3,3)					
Quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0018		-0.0057		0.69
	[-1.57]		[-1.99]	**	(28)
2	0.0006		0.0023		0.28
	[0.62]		[0.93]		(22)
3	0.0010		0.0014		0.09
	[1.37]		[0.79]		(24)
4	0.0005		0.0029		0.10
	[0.96]		[2.1]	**	(25)
4-1	0.0024		0.0086		
	[1.83]	*	[2.71]	***	
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0018		-0.0054		0.69
	[-1.5]		[-1.88]	*	(28)
2	0.0008		0.0019		0.31
	[0.77]		[0.77]		(22)
3	0.0009		0.0015		0.13
	[1.23]		[0.86]		(24)
4	0.0004		0.0029		0.15
	[0.81]		[2.15]	**	(25)
4-1	0.0022		0.0084		
	[1.7]	*	[2.62]	***	

Table 10:

Event window: (-5,5)				
Quartile	Panel A			
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$			
	α_p [t-statistics]	ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0017	-0.0044		0.69
	[-1.36]	[-1.76]	*	(28)
2	0.0007	0.0012		0.31
	[0.66]	[0.55]		(22)
3	0.0008	0.0015		0.09
	[1.11]	[1.01]		(24)
4	0.0004	0.0024		0.09
	[0.73]	[1.96]	*	(25)
4-1	0.0021	0.0068		
	[1.54]	[2.44]	**	
	Panel B			
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_sSMB_t + B_HHML_t + D_{MAO}\vartheta_p + \varepsilon_t$			
	α_p [t-statistics]	ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0016	-0.0041		0.68
	[-1.32]	[-1.64]		(28)
2	0.0009	0.0009		0.31
	[0.82]	[0.41]		(22)
3	0.0007	0.0016		0.14
	[0.99]	[1.04]		(24)
4	0.0003	0.0024		0.15
	[0.6]	[1.96]	*	(25)
4-1	0.0020	0.0065		
	[1.45]	[2.32]	**	

Description of Tables 11, 12, 13 and 14: Short regression window results with three individual dummy variables

Tables 11 to 14 report the regression results for Models 3A and 3B. The regressions of all the tables are run over a period between 29/04/2003 and 5/11/2003, however the lengths of the short event windows differ. Short event window lengths are (-1,0), (-1,1), (-3,3) and (-5,5) for Tables 11, 12, 13, and 14, respectively. Contrary to Models 2A and 2B, the three identified events are analysed separately, with three different dummy variables. $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio *p* over the long horizon event window (29/04/2003-5/11/2003), excluding the short event windows. $\boldsymbol{\gamma_p}$, $\boldsymbol{\delta_p}$ and $\boldsymbol{\theta_p}$ are shift parameters that signify the average abnormal returns for portfolio *p* (in excess of $\boldsymbol{\alpha_p}$) for the May, August and October event windows, respectively. T-statistics are reported below the coefficients in brackets [ ]. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Table 11:

	Event window: (-1,0)							
Quartile	Panel A							
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$							
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$
1	-0.0024		-0.0142		-0.0063	0.0012	0.68
	[-2.16]	**	[-1.63]		[-0.72]	[0.14]	(28)
2	0.0010		-0.0048		0.0047	-0.0036	0.26
	[1.05]		[-0.63]		[0.62]	[-0.47]	(22)
3	0.0009		0.0200		0.0015	-0.0010	0.18
	[1.39]		[4.06]	***	[0.31]	[-0.2]	(24)
4	0.0009		0.0022		0.0008	0.0024	0.06
	[1.67]	*	[0.51]		[0.18]	[0.56]	(25)
4-1	0.0033		0.0163		0.0070	0.0012	
	[2.68]	***	[1.69]	*	[0.73]	[0.12]	

Panel B

$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted R^2(N)
1	-0.0023		-0.0153		-0.0039	0.0017	0.68
	[-2.08]	**	[-1.76]	*	[-0.44]	[0.2]	(28)
2	0.0011		-0.0042		0.0047	-0.0040	0.30
	[1.16]		[-0.57]		[0.63]	[-0.54]	(22)
3	0.0008		0.0204		0.0001	-0.0011	0.23
	[1.27]		[4.25]	***	[0.02]	[-0.23]	(24)
4	0.0008		0.0026		-0.0006	0.0023	0.11
	[1.55]		[0.63]		[-0.14]	[0.55]	(25)
4-1	0.0032		0.0179		0.0033	0.0005	
	[2.54]	**	[1.86]	*	[0.34]	[0.06]	

Table 12:

Event window: (-1,1)									
Quartile	Panel A								
	$R_{pt} - R_{ft} = \alpha_p + B_m\left(EWI_{mt} - R_{ft}\right) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$								
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]		Adjusted $R^2(N)$
1	-0.0022		-0.0172		-0.0115		0.0037		0.69
	[-1.98]	**	[-2.47]	**	[-1.66]	*	[0.53]		(28)
2	0.0011		-0.0048		0.0108		-0.0084		0.29
	[1.09]		[-0.78]		[1.77]	*	[-1.37]		(22)
3	0.0009		0.0140		0.0015		-0.0009		0.15
	[1.36]		[3.4]	***	[0.36]		[-0.21]		(24)
4	0.0006		0.0109		0.0017		0.0037		0.13
	[1.21]		[3.24]	***	[0.51]		[1.09]		(25)
4-1	0.0028		0.0281		0.0132		0.0000		
	[2.31]	**	[3.64]	***	[1.71]	*	[0]		

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m\left(EWI_{mt} - R_{ft}\right) + B_s SMB_t + B_H HML_t + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]	Adjusted $R^2(N)$
1	-0.0021		-0.0170		-0.0101		0.0039	0.69
	[-1.93]	*	[-2.43]	**	[-1.42]		[0.56]	(28)
2	0.0012		-0.0058		0.0107		-0.0086	0.33
	[1.24]		[-0.96]		[1.76]	*	[-1.43]	(22)
3	0.0008		0.0145		0.0008		-0.0009	0.20
	[1.25]		[3.61]	***	[0.21]		[-0.22]	(24)
4	0.0006		0.0112		0.0008		0.0036	0.19
	[1.09]		[3.42]	***	[0.24]		[1.09]	(25)
4-1	0.0027		0.0282		0.0109		-0.0003	
	[2.21]	**	[3.65]	***	[1.39]		[-0.04]	

Table 13:

Event window: (-3,3)									
Quartile	Panel A								
	$R_{pt} - R_{ft} = \alpha_p + B_m\left(EWI_{mt} - R_{ft}\right) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$								
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]		Adjusted $R^2(N)$
1	-0.0019		-0.0087		-0.0093		0.0008		0.69
	[-1.62]		[-1.85]	*	[-1.98]	**	[0.16]		(28)
2	0.0006		-0.0017		0.0080		0.0007		0.28
	[0.62]		[-0.42]		[1.95]	*	[0.18]		(22)
3	0.0010		0.0034		0.0011		-0.0003		0.08
	[1.39]		[1.19]		[0.38]		[-0.12]		(24)
4	0.0006		0.0081		0.0020		-0.0013		0.15
	[1.07]		[3.64]	***	[0.92]		[-0.58]		(25)
4-1	0.0025		0.0168		0.0113		-0.0021		
	[1.92]	*	[3.24]	***	[2.19]	**	[-0.4]		

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]	Adjusted R^2(N)
1	-0.0018		-0.0086		-0.0086		0.0008	0.69
	[-1.56]		[-1.83]	*	[-1.82]	*	[0.16]	(28)
2	0.0008		-0.0018		0.0076		0.0000	0.32
	[0.78]		[-0.45]		[1.88]	*	[0]	(22)
3	0.0009		0.0034		0.0009		0.0000	0.13
	[1.25]		[1.22]		[0.34]		[0.02]	(24)
4	0.0005		0.0081		0.0018		0.0010	0.20
	[0.92]		[3.74]	***	[0.81]		[-0.48]	(25)
4-1	0.0023		0.0167		0.0104		0.0003	
	[1.8]	*	[3.22]	***	[1.99]	**	[-0.35]	

Table 14:

Event window: (-5,5)								
Quartile	Panel A							
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$							
	α_p [t-statistics]	γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$		
1	-0.0017	-0.0075		-0.0051	0.0000	0.68		
	[-1.36]	[-1.78]	*	[-1.3]	[0.01]	(28)		
2	0.0007	-0.0015		0.0045	0.0001	0.27		
	[0.61]	[-0.4]		[1.33]	[0.03]	(22)		
3	0.0008	0.0029		0.0016	0.0002	0.08		
	[1.13]	[1.14]		[0.67]	[0.08]	(24)		
4	0.0005	0.0071		0.0008	-0.0002	0.14		
	[0.87]	[3.54]	***	[0.44]	[-0.1]	(25)		
4-1	0.0022	0.0146		0.0059	-0.0002			
	[1.63]	[3.13]	***	[1.53]	[-0.01]			

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$$

	α_p [t-statistics]	γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted R^2(N)
1	-0.0017	-0.0075		-0.0057	-0.0001	0.69
	[-1.39]	[-1.79]	*	[-1.48]	[-0.04]	(28)
2	0.0008	-0.0014		0.0041	-0.0005	0.31
	[0.78]	[-0.39]		[1.23]	[-0.13]	(22)
3	0.0007	0.0029		0.0015	0.0004	0.13
	[1.01]	[1.15]		[0.64]	[0.17]	(24)
4	0.0004	0.0071		0.0005	-0.0001	0.19
	[0.75]	[3.64]	***	[0.3]	[-0.06]	(25)
4-1	0.0021	0.0146		0.0063	0.0000	
	[1.55]	[3.14]	***	[1.31]	[-0.03]	

Tables – Robustness Checks

Robustness Check 1:

The same regression analysis is undertaken using size-quartiles sorted solely by firm size (MVE). Q1 includes all the smallest stocks and Q4 all the largest stocks.

Table 6R1: Long-window regression results, using size-quartiles

This table presents the abnormal event returns calculated for the four size-size-quartile portfolios, using the long-window regression approach. Panel A reports the results of the market model regressions (Model 1A), and Panel B reports the results of the Fama-French 3-factor model regressions (Model 1B). α_p indicates the abnormal return over the event period for size size-quartile portfolio *p*.

Size-quartile	Panel A			Panel B		
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + \varepsilon_t$			$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + \varepsilon_t$		
	α_p [t-statistics]		Adjusted R^2(*N*-observation)	α_p[t-statistics]		Adjusted R^2(*N*-observation)
1	-0.0043		0.7789	-0.0041		0.7913
	[-3.57]	***	(25)	[-3.43]	***	(24)
2	0.0013		0.0774	0.0013		0.3090
	[1.66]	*	(25)	[1.86]	*	(25)
3	0.0018		0.0483	0.0016		0.2006
	[3.25]	***	(25)	[3.11]	***	(25)
4	0.0010		0.0804	0.0011		0.13
	[2]	**	(25)	[2.05]	**	(25)
4-1	0.0053			0.0050		
	[4.06]	***		[3.94]	***	

** Significance at the 10% level, ** Significance at the 5% level, *** Significance at the 1% level*

Description of Tables 7R1, 8R1, 9R1 and 10R1: Short regression window results with aggregate dummy variable, using size-quartile portfolios

Tables 7R1 to 10R1 report the regression results for Models 2A and 2B, using the size-quartile portfolios. The regressions of all the tables are run over a period between 29/04/2003 and 5/11/2003, however the lengths of the short event windows differ. Table 7 uses a short event window length of (-1,0), where 0 equals the event date, and -1 equals the day before the event. Using this same notation, Tables 8, 9 and 10 have an short event window length of, (-1,1), (-3,3) and (-5,5), respectively. $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio *p* over the long horizon event window (29/04/2003-5/11/2003), excluding the short event windows. $\boldsymbol{\vartheta_p}$ is a shift parameter that signifies that aggregate abnormal return for portfolio *p* around the three short event windows (06/05/2003, 14/08/2003 and 29/10/2003), *in excess of* $\boldsymbol{\alpha_p}$**.** T-statistics are reported below the coefficients in brackets [ ]. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Table 7R1:

Event window: (-1,0)					
Size-quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0041		-0.0072		0.78
	[-3.28]	***	[-1.27]		(24)
2	0.0017		-0.0031		0.06
	[2.01]	**	[-0.82]		(25)
3	0.0016		0.0034		0.04
	[2.79]	***	[1.32]		(25)
4	0.0007		0.0067		0.11
	[1.43]		[3.01]	***	(25)
4-1	0.0048		0.0139		
	[3.58]	***	[2.28]	**	
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0040		-0.0064		0.78
	[-3.22]	***	[-1.13]		(24)
2	0.0017		-0.0033		0.18
	[2.23]	**	[0.3597]		(25)
3	0.0014		0.0026		0.16
	[2.69]	***	[1.09]		(25)
4	0.0007		0.0068		0.17
	[1.42]		[3.14]	***	(25)
4-1	0.0047		0.0132		
	[3.51]	***	[2.18]	**	

Table 8R1:

Event window: (-1,1)					
Size-quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0037		-0.0113		0.79
	[-2.93]	***	[-2.44]	**	(24)
2	0.0012		0.0049		0.07
	[1.42]		[1.59]		(25)
3	0.0016		0.0018		0.04
	[2.79]	***	[0.86]		(25)
4	0.0007		0.0041		0.08
	[1.43]		[2.18]	**	(25)
4-1	0.0044		0.0153		
	[3.26]	***	[3.08]	***	
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0036		-0.0098		0.79
	[-2.92]	***	[-2.12]	**	(24)
2	0.0013		0.0042		0.19
	[1.68]	*	[1.42]		(25)
3	0.0015		0.0007		0.16
	[2.78]	***	[0.35]		(25)
4	0.0007		0.0046		0.15
	[1.38]		[2.5]	**	(25)
4-1	0.0043		0.0144		
	[3.22]	***	[2.88]	***	

Table 9R1:

Event window: (-3,3)					
Size-quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0035		-0.0062		0.79
	[-2.65]	***	[-1.93]	*	(24)
2	0.0007		0.0052		0.10
	[0.84]		[2.48]	**	(25)
3	0.0017		0.0000		0.03
	[2.87]	***	[0]		(25)
4	0.0009		0.0007		0.05
	[1.67]	*	[0.54]		(25)
4-1	0.0044		0.0069		
	[3.08]	***	[1.99]	**	
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0034		-0.0055		0.79
	[-2.64]	***	[-1.71]	*	(24)
2	0.0009		0.0047		0.21
	[1.09]		[2.34]	**	(25)
3	0.0016		-0.0004		0.16
	[2.85]	***	[-0.28]		(25)
4	0.0008		0.0010		0.11
	[1.58]		[0.78]		(25)
4-1	0.0042		0.0065		
	[3.04]	***	[1.88]	*	

Table 10R1:

Event window: (-5,5)				
Size-quartile	Panel A			
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$			
	α_p [t-statistics]		ϑ_p [t-statistics]	Adjusted R^2 (N)
1	-0.0035		-0.0038	0.78
	[-2.54]	**	[-1.36]	(24)
2	0.0010		0.0022	0.07
	[1.1]		[1.16]	(25)
3	0.0016		0.0005	0.03
	[2.55]	**	[0.39]	(25)
4	0.0008		0.0010	0.05
	[1.36]		[0.89]	(25)
4-1	0.0043		0.0049	
	[2.87]	***	[1.59]	
	Panel B			
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$			
	α_p [t-statistics]		ϑ_p [t-statistics]	Adjusted R^2 (N)
1	-0.0035		-0.0031	0.78
	[-2.57]	**	[-1.11]	(24)
2	0.0012		0.0017	0.18
	[1.38]		[0.96]	(25)
3	0.0015		0.0001	0.16
	[2.58]	**	[0.06]	(25)
4	0.0007		0.0013	0.12
	[1.25]		[1.12]	(25)
4-1	0.0042		0.0044	
	[2.85]	***	[1.45]	

Description of Tables 11R1, 12R1, 13R1 and 14R1: Short regression window results with three individual dummy variables, using size quartile portfolios

Tables 11R1 to 14R1 report the regression results for Models 3A and 3B, run with size-quartile portfolios. The regressions of all the tables are run over a period between 29/04/2003 and 5/11/2003, however the lengths of the short event windows differ. Short event window lengths are (-1,0), (-1,1), (-3,3) and (-5,5) for Tables 11, 12, 13, and 14, respectively. Contrary to Models 2A and 2B, the three identified events are analysed separately, with three different dummy variables. $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio *p* over the long horizon event window (29/04/2003-5/11/2003), excluding the short event windows. $\boldsymbol{\gamma_p}$, $\boldsymbol{\delta_p}$ and $\boldsymbol{\theta_p}$ are shift parameters that signify the average abnormal returns for portfolio *p* (in excess of $\boldsymbol{\alpha_p}$) for the May, August and October event windows, respectively. T-statistics are reported below the coefficients in brackets [ ]. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Table 11R1:

	Event window: (-1,0)								
Size-quartile	Panel A								
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$								
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]		Adjusted $R^2(N)$
1	-0.0041		-0.0184		0.0023		-0.0057		0.78
	[-3.31]	***	[-1.9]	*	[0.24]		[-0.58]		(24)
2	0.0017		-0.0050		-0.0054		0.0011		0.05
	[2.01]	**	[-0.77]		[-0.83]		[0.16]		(25)
3	0.0016		0.0042		0.0031		0.0028		0.03
	[2.77]	***	[0.96]		[0.7]		[0.64]		(25)
4	0.0007		0.0184		0.0001		0.0016		0.20
	[1.55]	***	[5.11]	***	[0.03]		[0.43]		(25)
4-1	0.0048		0.0368		-0.0022		0.0072		
	[3.64]	***	[3.56]	***	[-0.21]		[0.7]		

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted R^2(N)
1	-0.0040		-0.0207		0.0064	-0.0044	0.79
	[-3.26]	***	[-2.16]	**	[0.66]	[-0.47]	(24)
2	0.0017		-0.0039		-0.0061	0.0003	0.17
	[2.23]	**	[-0.65]		[-1]	[0.05]	(25)
3	0.0014		0.0056		-0.0001	0.0022	0.16
	[2.69]	***	[1.37]		[-0.01]	[0.53]	(25)
4	0.0007		0.0181		0.0001	0.0018	0.25
	[1.5]	***	[5.2]	***	[0.02]	[0.52]	(25)
4-1	0.0047		0.0388		-0.0063	0.0062	
	[3.57]	***	[3.81]	***	[-0.61]	[0.62]	

Table 12R1:

Event window: (-1,1)								
Size-quartile	Panel A							
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$							
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]	Adjusted R^2(N)
1	-0.0037		-0.0206		-0.0061		-0.0071	0.79
	[-2.97]	***	[-2.63]	***	[-0.78]		[-0.91]	(24)
2	0.0012		0.0057		0.0043		0.0048	0.06
	[1.41]		[1.08]		[0.81]		[0.9]	(25)
3	0.0016		0.0024		0.0025		0.0005	0.02
	[2.78]	***	[0.66]		[0.7]		[0.14]	(25)
4	0.0008		0.0117		-0.0010		0.0015	0.13
	[1.54]	***	[3.79]	***	[-0.32]		[0.5]	(25)
4-1	0.0044		0.0323		0.0051		0.0087	
	[3.33]	***	[3.84]	***	[0.61]		[1.03]	

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$
1	-0.0037		-0.0196		-0.0031	-0.0066	0.79
	[-2.95]	***	[-2.52]	**	[-0.39]	[-0.84]	(24)
2	0.0013		0.0044		0.0036	0.0045	0.17
	[1.66]	*	[0.89]		[0.71]	[0.91]	(25)
3	0.0015		0.0021		-0.0001	0.0001	0.14
	[2.77]	***	[0.62]		[-0.02]	[0.02]	(25)
4	0.0007		0.0123		0.0005	0.0017	0.21
	[1.49]	***	[4.17]	***	[-0.18]	[0.57]	(25)
4-1	0.0043		0.0319		0.0036	0.0082	
	[3.29]	***	[3.83]	***	[0.31]	[0.99]	

Table 13R1:

Event window: (-3,3)								
Size-quartile	Panel A							
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$							
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]	Adjusted R^2(N)
1	-0.0035		-0.0113		-0.0068		-0.0007	0.78
	[-2.69]	***	[-2.14]	**	[-1.29]		[-0.13]	(24)
2	0.0008		0.0087		0.0049		0.0022	0.10
	[0.87]		[2.5]	**	[1.41]		[0.64]	(25)
3	0.0017		-0.0002		0.0015		-0.0013	0.02
	[2.87]	***	[-0.08]		[0.63]		[-0.54]	(25)
4	0.0009		0.0023		0.0001		-0.0003	0.04
	[1.69]	***	[1.08]		[0.05]		[-0.14]	(25)
4-1	0.0044		0.0136		0.0069		0.0004	
	[3.13]	***	[2.39]	**	[1.21]		[0.06]	

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$
1	-0.0035		-0.0111		-0.0053	-0.0002	0.79
	[-2.69]	***	[-2.12]	**	[-1]	[-0.03]	(24)
2	0.0009		0.0086		0.0041	0.0013	0.21
	[1.14]		[2.65]	***	[1.26]	[0.39]	(25)
3	0.0016		-0.0003		0.0005	-0.0013	0.14
	[2.84]	***	[-0.15]		[0.2]	[-0.56]	(25)
4	0.0008		0.0024		0.0005	0.0001	0.10
	[1.59]	***	[1.14]		[0.22]	[0.07]	(25)
4-1	0.0043		0.0135		0.0057	0.0003	
	[3.09]	***	[2.39]	**	[1.01]	[0.05]	

Table 14R1:

Event window: (-5,5)									
Size-quartile	Panel A								
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$								
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]		Adjusted $R^2(N)$
1	-0.0036		-0.0092		-0.0017		-0.0013		0.78
	[-2.6]	**	[-1.93]	*	[-0.38]		[-0.29]		(24)
2	0.0011		0.0066		-0.0009		0.0014		0.08
	[1.19]		[2.12]	**	[-0.3]		[0.47]		(25)
3	0.0016		-0.0007		0.0023		-0.0004		0.03
	[2.51]	**	[-0.34]		[1.16]		[-0.17]		(25)
4	0.0008		0.0029		0.0002		0.0002		0.05
	[1.41]	**	[1.5]		[0.09]		[0.12]		(25)
4-1	0.0044		0.0120		0.0018		0.0016		
	[2.94]	***	[2.35]	**	[0.39]		[0.32]		

Panel B

$$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$$

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$
1	-0.0036		-0.0092		0.0002	-0.0006	0.78
	[-2.65]	***	[-1.96]	*	[-0.05]	[-0.14]	(24)
2	0.0013		0.0067		-0.0017	0.0006	0.20
	[1.5]		[2.31]	**	[-0.62]	[0.22]	(25)
3	0.0015		-0.0008		0.0014	-0.0006	0.15
	[2.54]	**	[-0.38]		[0.74]	[-0.29]	(25)
4	0.0007		0.0028		0.0005	0.0006	0.11
	[1.3]	**	[1.53]		[0.28]	[0.32]	(25)
4-1	0.0043		0.0120		0.0003	0.0012	
	[2.94]	***	[2.38]	**	[0.15]	[0.25]	

Robustness Check 2:

The same regression analysis is undertaken using combined CIX quartiles (Q1+Q2) and (Q3+Q4). Only the (-3,3) event window regression results are displayed, as results are consistent across all regressions.

Table 9R2:

Tables 9R2 reports the regression results for Models 2A and 2B, using combined quartile portfolios of (Q1+Q2) and (Q3+Q4). The regressions of all the tables are run over a period between 29/04/2003 and 5/11/2003, with an event window of (-3,3). $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio *p* over the long horizon event window (29/04/2003-5/11/2003), excluding the short event windows. $\boldsymbol{\vartheta_p}$ is a shift parameter that signifies that aggregate abnormal return for portfolio *p* around the three short event windows (06/05/2003, 14/08/2003 and 29/10/2003), *in excess of* $\boldsymbol{\alpha_p}$. T-statistics are reported below the coefficients in brackets [ ]. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Event window: (-3,3)					
Quartile	Panel A				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
(1+2)	0.0026		-0.0026		0.73
	[2.93]	***	[-1.18]		(49)
(3+4)	0.0011		0.0027		0.18
	[2.02]	**	[2.06]	**	(50)
(3+4)-(1+2)	-0.0015		0.0053		
	[-1.46]		[2.08]	**	
	Panel B				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_sSMB_t + B_HHML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
(1+2)	0.0026		-0.0028		0.73
	[2.97]	***	[-1.24]		(49)
(3+4)	0.0011		0.0028		0.25
	[1.90]	*	[2.21]	**	(50)
(3+4)-(1+2)	-0.0017		0.0056		
	[-1.60]		[2.19]	**	

Table 13R2:

Tables 13R2 reports the regression results for Models 3A and 3B, run with two combined quartile portfolios. The regressions are run over a period between 29/04/2003 and 5/11/2003, with short event windows of (-3,3). Contrary to Models 2A and 2B, the three identified events are analysed separately, with three different dummy variables. $\boldsymbol{\alpha_p}$ signifies the abnormal return for portfolio p over the long horizon event window (29/04/2003-5/11/2003), excluding the short event windows. $\boldsymbol{\gamma_p}$, $\boldsymbol{\delta_p}$ and $\boldsymbol{\theta_p}$ are shift parameters that signify the average abnormal returns for portfolio p (in excess of $\boldsymbol{\alpha_p}$) for the May, August and October event windows, respectively. T-statistics are reported below the coefficients in T-statistics are reported below the coefficients in brackets [ ]. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

Event window: (-3,3)								
Quartile	Panel A							
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$							
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$
(1+2)	0.0026		-0.0064		-0.0039	0.0023	0.73
	[2.90]	***	[-1.77]	**	[-1.09]	[0.66]	(49)
(3+4)	0.0012		0.0087		0.0010	-0.0013	0.25
	[2.20]		[4.11]	***	[0.49]	[-0.65]	(50)
(3+4)-(1+2)	-0.0014		0.0151		0.0042	-0.0038	
	[-1.38]		[3.60]	***	[1.18]	[-0.90]	

Panel B

	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_M \gamma_p + D_A \delta_p + D_O \theta_p + \varepsilon_t$						
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]	θ_p[t-statistics]	Adjusted $R^2(N)$
(1+2)	0.0026		-.0064		-0.0041	0.0020	0.73
	[2.92]	***	[-1.77]	*	[-1.13]	[0.59]	(49)
(3+4)	0.0011		0.0087		0.0009	-0.0010	0.31
	[2.08]	**	[4.27]	***	[0.45]	[-0.50]	(50)
(3+4)-(1+2)	-0.0016		0.0151		0.0051	-0.0032	
	[-1.53]		[3.63]	***	[1.21]	[-0.76]	