THE EFFECT OF NZX 2003 REGULATED CORPORATE GOVERNANCE

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Abstract:

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Abstract

We examine the cross-sectional variation in stock market returns around the imposition of two compulsory compliance measures designed to enforce greater external monitoring of the New Zealand Stock Exchange. Using long-horizon and short-horizon event study methodology we find that firms with high benefits of control and low monitoring costs have significantly higher stock market returns. Small, growth firms that are operating in uncertain environments have significantly higher costs of monitoring and lower benefits of control. Imposing compulsory compliance measures has a significantly negative wealth effect for these firms forcing them to move away from an optimal board structure. Our results suggest that a blanket "one-size fits all" regulation pertaining to best board practice is not optimal for the New Zealand market.

1. Introduction

This study examines the impact of changes in the New Zealand Stock Exchange (NZX) compulsory compliance measures introduced in 2003 through the establishment of the NZX Code. Prompted by a global move towards more strictly regulated corporate governance practice publicly listed firms are now mandated to meet several guidelines for good corporate governance together with two compulsory compliance measures. First, firms are required to have a minimum number of independent directors. Second, firms have to include an audit committee on their board. Our study examines the impact of this regulatory change on shareholder value. An analysis of the cross-sectional variation in stock market returns around the announcement and passage of the new regulations shows that firms with high benefits of control and low monitoring costs have significantly higher stock market returns. In contrast, the compulsory compliance leads to a significantly negative wealth effect for small, growth firms. Our results are robust to the capital asset pricing model (CAPM) and Fama-French (1993) risk adjustments.

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. Our study provides a unique contribution to the literature. It is the first to analyse the cross-sectional differences in wealth effects of the NZX Code. Cross-sectional wealth effects of additional monitoring have largely been based in the US (Boone, et al., 2007; Wintoki, 2007). Given the smaller size of the New Zealand market, the lower liquidity and a less developed equity market compared to the US (Hossain et al., 2001; Reddy et al., 2010) and a higher ownership concentration

(Gunasekarage and Reed, 2008; Hossain, et al., 2000) may lead to a different response to additional board monitoring. In addition Boyle and Ji (2013) find that for one third of the firms listed on the NZX the Chief Executive Officer (CEO) does not sit on the board of directors. This is in stark contrast to the US where a CEO is assumed to be a director (Leblanc and Gilles, 2005). The less stringent nature of the NZX Code compared to the US-based Sarbanes Oxley (SOX) also suggests that the wealth effect of the NZX Code regulations may differ from that of the SOX.

Two theories lie at the heart of the debate concerning firm performance and additional board monitoring. Agency theory motivates the global trend in corporate governance regulation towards additional monitoring. Jensen and Meckling (1979) base the theory on the premise that managers act in their own self interest, as thus must be disciplined or incentivised to make decisions that are optimal for shareholders. On the contrary, stewardship theory argues that managers are trustworthy individuals who work had in the interests of shareholders (Donaldson and Davis, 1991). Empirical evidence concerning which of these two theories prevails is mixed at best. Jain and Rezaee (2006); Li et al., (2008) report evidence of a positive wealth effect due to the overall market reaction to the SOX report. However, Zhang (2007) shows a negative overall wealth effect. The ambiguity of the empirical evidence concerning the impact of outside monitoring on firm performance may be explained by firm and environmental specific characteristics in which it is operating.

The existing literature has minimal research on the impact of the NZX Code on firm performance and no evidence on the cross-sectional differences in firm reactions. Teh (2009) examines the level of compliance to the Code in 2007 and reports a positive relationship between Code compliance and firm performance. Reddy et al. (2010) use ordinary least squares (OLS) and two stage least squares (2SLS) regression techniques and reports that the passage of the NZX Code had an overall positive influence on firm performance using Tobin's Q, return on assets (ROA) and market-to-book (MTB). However Struthers (2012) finds conflicting evidence on the effectiveness of increased outside board representation associated with the passage of the NZX Code. This study builds on the existing literature by analysing if the monitoring costs, private benefits of control, and level of complexity of NZ firms affects the response to the NZX Code announcements.

We construct a composite index to measure the overall costs and benefits of monitoring for firms. The firms are classified into quartiles based on the index score ranking. Quartile 1 firms have high monitoring costs and low expected benefits from monitoring. Quartile 4 firms have the opposite characteristics. Abnormal returns over short and long-horizons are calculated and used to measure significant differences between quartiles 1 and 4. We show that the NZX Code wasn't mutually beneficial for all firms. This is the first study to provide evidence that "one-size-fits-all" regulations that impose a minimum level of board monitoring are not optimal in the New Zealand market (Arcot and Bruno, 2007). New Zealand firms endogenously choose their board composition based upon private benefits of control, low monitoring costs, and level of firm complexity.

The NZX Code mandates that NZ publicly listed firms must have a minimum number of independent directors on the board and establish an audit committee with a majority of independent directors. The code is consistent with 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). Other evidence suggests that expert-independent directors only enhance first value when they have a majority control of the board (Chan and Li, 2008). Using Australian data Davidson et al. (2005) show that earnings management is reduced when there is a majority of non-executive directors on the board, and on the audit committee. Evidence from Zhang (2007) indicates that SOX detrimentally affected US firms. Studies by Felo (2003), Hermalin and Weisbach (2001) and Bhagat and Black (2002) discuss research where no significant relationship between firm value and board composition is identified. Boone et al., (2007) take a different approach to understanding the role of outside directors. They examine the determinants of board size and composition with regard to a firm's growth and diversification (scope of operations hypothesis), manager influence (negotiation hypothesis) and monitoring (monitoring hypothesis). They report that boards are more independent in larger more diversified firms where there is less manager influence however benefits and costs of monitoring do not affect board independence. These relationships are also examined in a range of studies that includes Coles et al. (2008), Gillan and Starks (2003) and Lin, et al. (2003). This literature finds evidence in support of all three factors increasing board independence.

Wintoki (2007) and Engel, et al. (2007) both study the passage of the SOX to examine determinants of the effect of increased monitoring on firm value. Engel. et al. (2007) find that smaller firms with high inside ownership are more likely to go private. Wintoki (2007) conducts an event study using a portfolio approach. He shows that firms with high costs and low benefits of outside monitoring experienced significantly negative abnormal returns over the period from announcement of SOX to its implementation. However, firms with opposing characteristics had a significantly positive market reaction. Overall the empirical evidence suggests that firms will endogenously choose the level of board monitoring to optimise firm value. The decision depends on industry and firm-specific factors. A mandatory "one-size-fits-all" corporate governance regulation such as the NZX Code seems to contradict the existing empirical evidence. Our study examines the cross-sectional wealth effects of the compulsory compliance introduced by the NZX Code.

The composition of insiders and outsiders on the board can affect firm value (Raheja, 2005; Harris and Raviv, 2008). In particular, as is the case for the NZX, mandating a minimum number of independent directors may be value-reducing for firms where insider information is important. Studies of corporate governance systems from around the world (for example, Dahya and McConnell, 2007; Arcot and Bruno, 2007; Choi et al, 2007; Tariq and Abbas, 2013) suggest that the mandatory compliance of code adoption from US and UK standards may not be optimal.

1.2 New Zealand Studies

Hossain et al. (2002) and Prevost et al. (2002) both document a positive association between the proportion of outside directors and firm performance. These both follow the implementation of the 1994 Companies Act which introduced strict definitions of director duties and associated penalties for failure to fulfil them. However the Act did not regulate board composition. The 2004 NZSC principles align closely with those of the NZX Code. [3] Using a sample of the op 50 NZX companies Reddy et al. (2012) find that Tobin's Q, market-to-book value and ROA all improve following the NZSC recommendations. Unfortunately their study ignores a lot of small New Zealand firms from their sample, introducing a potential bias to their results. Using event study methodology, Gunasekarage and Reed (2008) use the approach employed by Rosenstein and Wyatt (1990) and look at the market reaction around the appointment of outside directors in New Zealand between 1990 and 2004. While they report a positive significant response to the news of outside director appointments over a seven day window it could also be interpreted as a signal to the market of an attempt to improve firm operations. Teh (2009) reports 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

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

Struthers (2012) both challenge the efficacy of the NZX Code requirements. These studies find that increasing independent director representation reduces firm value. In a similar vein, Rainsbury et al. (2008) find that the voluntary establishment of "best practice" audit committees prior to the NZX code implementation may be detrimental for firms with small boards and few independent directors. These results suggest 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. The conflicting evidence around the impact of the NZX Code on firm performance provides the motivation for our study. By analysing the cross-sectional reactions to the code we seek to better understand the determinants of the effect of increased monitoring on New Zealand firm performance.

1.3 Hypotheses Development

We develop three main hypotheses. In order to examine the cross-sectional variation in market response to the NZX Code compulsory compliance, we must first hypothesise what firm-specific factors will affect a firm's reaction.

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

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 (Gillan, 2004; Boone et al., 2007; Wintoki, 2007) .

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

We hypothesise 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; Wintoki, 2007; Linck, 2008).

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

The third hypothesis (H3) follows the reasoning that firms with a high level of complexity 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 level of outside directors on the board and audit committee.

2. Data and Methodology

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.

Firm-specific data was collected for the year 2002 from the companies' annual reports, sourced from the NZX Company Research database. Table 1 summarises all firm-specific variables collected. Table 2 defines all the acronyms used in the regression models.

<u>Proxies for private benefits of control and firm complexity</u>

We use firm age (AGE) and proportion of debt (LEVERAGE) to proxy for private benefits of control. 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 6th 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. We use the size, the age and the number of business segments (SEGMENTS) of the firm to proxy for firm complexity.[4] Firm size (MVE) is defined as the firm's market value of equity on the 2002 balance data.

Proxies for monitoring costs

We also use standard deviation of returns (RETSTD) and market-to-book (MTB) ratio to proxy for monitoring costs. 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. The MTB ratio 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

I specify two control variables: proportion of outside directors (OD) on the board, and the proportion of outside director ownership (DIROWN). DIROWN is defined as the sum of ordinary shareholdings for outside directors divided by the total number of company shares. OD is calculated as the total number of non-executive directors on the board divided by the total board size.

One of the compulsory compliance measures for the NZX code is an independent audit committee. Additionally the NZX code proposes a remuneration and nomination committee as a best practice measure. We collect data on the presence of audit committees, nomination committees and remuneration committees for the 99 sample firms.[5] In addition, we specify the dummy variable ACENTIRE; this indicates when an audit committee is present on the board, yet comprises the entire board. It 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.

2.1 Regression Data

[4] The number of business segments is obtained from the notes to the financial statements, under the section "segment reporting".

[5] Since the costs and benefits of additional monitoring by outside directors and additional committee monitoring are highly correlated, an audit committee variable is not included in the composite index. This is consistent with Wintoki (2007), and is later qualified by the summary statistics results.

Daily adjusted company price data is obtained from the NZX Company Research Database.[6] Daily returns are calculated as $ln\left(\frac{P_t}{P_{t-1}}\right)$. There is a high number of thinly traded stocks in the sample. To deal with this issue, we 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).[7] As a proxy for the risk rate, we use the New Zealand three-month Treasury bill rate, acquired from *Datastream.*[8]

2.2 Calculating the Composite Index

We construct a composite index that captures the relative trade-offs between the costs and benefits of outside directors on the firm's board (Wintoki, 2007; 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 (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 and given a ranking from 0 to 9. 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. Gillan et al. (2003) state that high firm level 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 used to test H1 are ranked as follows:

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[6] Adjusted share price data includes adjustments for splits etc. as well as dividends.

[7] 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).

[8] *Datastream* provides and annualised figure. Daily risk free rate is calculated as $(1+\text{annual rate})^{1/360}$.

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

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 a high level of debt 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.*

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 (Wintoki, 2007). Similarly, it may well be the case that firms where boards already have a high level 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*

A composite index score for each firm is calculated 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**

Firms are then allocated to a quartile based on their composite index (CIX) score. 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).

Since the regulatory events occur to all firms simultaneously, statistical inference can be biased because returns are contemporaneously correlated (Schwert, 1981). We 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.[9] We measure expected returns for the quartile portfolios using the CAPM model and the Fama-French 3-Factor model (Wintoki, 2007).[10] We proxy the expected return on the market with an equally weighted benchmark of daily sample stock returns to overcome problems associated with small illiquid stock that trade on the NZX. Equation 1 illustrates how the daily EWI is calculated.[11]

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

2.3 Calculating the Fama-French Factors

The Fama-French factors (SMB and HML) are calculated using the methodology specified on the Kenneth R French Data Library website.[12] The six portfolios are: Small Value (S/H),

[9] This use of a portfolio approach for regulatory event studies is endorsed by Schwert (1981).
[10] 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.
[11] 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.
[12] Found at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

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 as given in Equations 2 and 3.

$$SMB_t = {}^{1}/_{3}\left(S/H_t + S/M_t + S/L_t\right) - {}^{1}/_{3}\left(B/H_t + B/M_t + B/L_t\right) \qquad (2)$$

$$HML_t = {}^{1}/_{2}\left(S/H_t + B/H_t\right) - {}^{1}/_{2}\left(S/L_t + B/L_t\right) \qquad (3)$$

2.4 Regression: Long-Event Window Methodology

By surveying news announcements and literature around the time of the NZX Code development, we are able to 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.

We use a long-horizon event window spanning the period 06/05/2003 to 29/10/2003. We estimate 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. The parameter of interest in these regressions is the intercept term denoted by α_p. This measures the abnormal return for the quartile portfolio over the event horizon.

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

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

We then test:

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

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

2.5 Regression: Short-Event Window Methodology

Using a long event window with a relatively small sample leads to tests that are less powerful. To overcome this problem we also test our models over a short-event window. The abnormal market reaction is examined around the three main event dates (identified in section 2.3). Due to uncertainty concerning when the relevant information is incorporated into prices (Binder, 1998), we 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). It includes event dummy variables that take the value 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 $\boldsymbol{D_O}$). Model 2 measures the average abnormal return over all the event windows. Model 3 measures the market reaction around each of the three individual events separately.

individual events, and thus overcomes these concerns.

Model 2 is specified as follows:

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

$$\boldsymbol{R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML + D_{MAO}\vartheta_p + \varepsilon_t}$$

(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:

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

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

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:

Model 2 hypothesis test

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

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

Model 3 hypothesis tests

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

3. Results

Table 3 reports the 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. Summary statistics of the monitoring costs proxies (MTB, LEVERAGE and RETSTD) suggest that monitoring in the New Zealand environment is more expensive than in the US. The median MTB ratio is 1.370 which is similar to the US (Wintoki, 2007 reports a median of 1.387). The median RETSTD is 0.074. The higher standard deviation of returns compared to the US market median of 0.01 median (Wintoki, 2007) suggests that the operating environment in New Zealand is more uncertain, leading to higher outside monitoring costs (Gillan and Starks, 2003). The median values for business segments, firm age and firm size (SEGMENT, AGE and MVE) are 1, 9.1 years and $88.18 m respectively. Median outside director ownership (DIROWN) is 0.033 compared to 0.015 for the US (Wintoki, 2007). 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. Overall New Zealand firms have higher monitoring costs, lower private benefits of control and firm complexity, and a higher median proportion of outside directors compared to US firms (Wintoki, 2007). Considering these statistics individually implies that New Zealand firms will respond less favourably to additional monitoring.

3.1 Summary Statistics for the Composite Index Sorted Portfolios

Table 4 reports the summary statistics for the composite index sorted portfolios, and tests of significance 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. Quartile portfolios are referred to as Q1, Q2, Q3, and Q4. 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 proxies for monitoring costs, RETSTD, MTB and IARATIO are reported in Panel A. The tests of significant difference between the mean and median values of RETSTD, MTB and IARATIO show that overall Q1 has higher monitoring costs than Q4. Therefore, considering H1, Q1 firms will react less favourably to the imposition of increased monitoring as a result of the NZX Code. The difference in both the portfolio means and the portfolio medians for all the firm complexity and private benefits of control variables (MVE, SEGMENT, AGE, LEVERAGE) are all significant at the 1% level. These tests show that, on average, Q4 firms operate at higher levels of complexity and have greater private benefits of control than Q1 firms. Based on hypotheses H2 and H3, Q4 firms are expected to benefit more from the increased monitoring required from the NZX Code than Q1 firms. Two control variables, outside director ownership (DIROWN) and the number of outside directors are reported in Panel B of Table 4. DIROWN is significantly higher for Q1 firms compared to Q4 firms (0.061 versus 0.002) however there is no significant cross-sectional variation in outside directors between the quartiles. It appears that the level of private benefits, firm complexity and monitoring costs did not affect the proportion of outside directors endogenously chosen prior to the code implementation. The composite index quartiles are constructed from the rankings of the firm-specific and board variables. We also analyse the independence and expertise requirements imposed on audit committees by the NZX Code. Fewer Q1 firms have an audit committee compared to the other three quartiles. Audit committee compliance costs for these firms will be greater after the introduction of the NZX Code.

Table 5 reports the correlation between the proxy variables that are used to construct the composite index. The results confirm Wintoki's (2007) 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. There is a significant positive correlation between MVE and SEGMENT and MVE and BOARD. Board size and firm age are also positively correlated. LEVERAGE is correlated with MVE, SEGMENT and MTB. IARATIO is negatively correlated with LEVERAGE. Consistent with Wintoki (2007), all of the monitoring cost proxies (MTB, IARATIO and RETSTD) are negatively correlated with OD. Firms with high monitoring costs have less outside directors on the board in 2002.

3.2 Model 1: Long Event Window Regressions

Table 6 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 (6th May 2003) to the implementation of the code (29th 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). The Q1 portfolio exhibits a significant, negative $\boldsymbol{\alpha_p}$, in both Panel A and Panel B, confirming the unfavourable effect the NZX Code had 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. The results show that the difference between the Q4 and Q1 portfolios' abnormal event returns (0.003) is significant at the 1% level. Consistent with Wintoki (2007) we 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. The significant cross-sectional difference in 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 their costs and benefits of monitoring. The results from the long window event study reported in Table 6 support our hypotheses that firms with high private benefits of control (H2) and firm complexity (H3) and low monitoring costs (H1) benefit more from the additional monitoring imposed by the NZX Code. However these results are based on tests that have low power because they use a long event window and have a small sample size. We repeat our analysis using a short event window to increase the power of the test (MacKinlay, 1997).

3.3 Model 2: Short Event Window Regressions

Tables 7, 8, 9, and 10 show the results of the aggregate event dummy regressions. 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 event windows for Tables 7, 8, 9, and 10 are (-1,0), (-1,1), (-3,3), and (-5,5) respectively.[13] Model 2B is generally a better model for the expected returns. It is the primary model referred to in our discussion of the findings. Table 7 shows the results for the shortest event window (-1,0). In this table, the $\boldsymbol{\vartheta_p}$ signifies the abnormal return (in

[13] A variety of event windows are used, as there is uncertainty about when the market will react.

excess of $\boldsymbol{\alpha_p}$) on the day before and on the three event dates. The Q4 $\boldsymbol{\alpha_p}$ is significantly greater than the Q1 $\boldsymbol{\alpha_p}$. The results in Table 7 do not support the findings from the long event window analysis – that Q1 firms benefited significantly less from the NZX Code than Q4 firms. Several extensions of these event windows are fitted to take into account any lagged market reaction that may change the results. The results are reported in Tables 8, 9 and 10 report the results for models 2A and 2B fitting using events windows from (-1,1), (-3,3) and (-5,5), respectively. Tables 8, 9 and 10 all show that $\boldsymbol{\vartheta_p}$ increases stepwise from Q1 to Q4, and the cross-sectional difference in $\boldsymbol{\vartheta_p}$ between Q4 and Q1 is significant. Finally, Models 3A and 3B perform the regression analysis with three individual dummy variables. 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. The results for these models are not materially different to the results for Tables 7 to 10 and they are reported for completeness in the Appendix (See Tables 11, 12, 13 and 14 in the Appendix).[14]

4. 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. Many US-based studies provide evidence that this “one-size-fits-all” regulation approach can be detrimental to some firms. However, the New Zealand market is very different to the US, which makes direct inferences from the US literature inappropriate.

[14] Robustness tests for the results reported in Tables 7 to 14 were carried to confirm that 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. The regression analysis is redone using quartiles based solely on size. We show that size does not explain all of the cross-sectional effects of the code.

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. We construct a composite index to measure the relative costs and benefits of additional monitoring for the sample firms (Wintoki, 2007). 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. We 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. A short-horizon event analysis around the main NZX Code announcements is also carried out to address concerns about test power.

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 a low level of 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 allowed 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 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 6^{th}) was the most important event. Around this date, firms with high costs of monitoring, low private benefits of control and a low level of firm complexity (Q1 firms) experienced significantly negative abnormal returns, suggesting that the market expected the NZX Code requirements to reduce firm value. In contrast, our 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 paper 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 a low level of 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 level 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

Our findings 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 a low level of 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

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

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	
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.

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				
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$				
	α_p [t-statistics]		ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0023		-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			
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + B_s SMB_t + B_H HML_t + D_{MAO}\vartheta_p + \varepsilon_t$			
	α_p [t-statistics]	ϑ_p [t-statistics]		Adjusted R^2 (N)
1	-0.0016	-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]	**	

Appendix

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								
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$								
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]		Adjusted R^2(N)
1	-0.0022		-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

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

	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]	Adjusted $R^2(N)$
1	-0.0021		-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								
	$R_{pt} - R_{ft} = \alpha_p + B_m(EWI_{mt} - R_{ft}) + D_M\gamma_p + D_A\delta_p + D_O\theta_p + \varepsilon_t$								
	α_p [t-statistics]		γ_p [t-statistics]		δ_p [t-statistics]		θ_p[t-statistics]		Adjusted R^2(N)
1	-0.0019		-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]	