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# Firm Size and the Pre-Holiday Effect in New Zealand

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**Abstract**

Using a sample spanning four decades, we document that the pre-holiday effect, one of the most common of the calendar effect anomalies, still exists in the New Zealand market. Contrary to international evidence, the effect appears to have increased over time. Moreover, we find that this effect is inversely related to firm size with the entire effect limited only to small firms, with no pre-holiday price patterns being observed for medium to large firms. The existence of this pre-holiday effect seems to be mainly driven by factors relevant to New Zealand. A search for possible reasons for the persistence of the effect points primarily towards the illiquidity of smaller stocks and the reluctance of small investors to buy prior to major market closures.

**Keywords:** Pre-holiday effect, stock return anomaly, firm size, New Zealand

## 1. Introduction

Anomalous seasonal patterns in stock return behaviour have been documented since the early 1900s in the United States and similar observations have recently been reported in several international markets.

One such empirical regularity, the pre-holiday effect, refers to the observed fact that share returns typically exhibit positive returns on days immediately preceding major public holidays. However, such a long-standing anomaly has not received adequate attention in the literature in relation to listed stocks in New Zealand (NZ). We, therefore, examine the informational efficiency of NZ equities by studying their return behaviour on days preceding market closures on major holidays. We also examine the existence and persistence of the pre-holiday effect both before and after the change in the headline index in 2003, whether the effect is a result of the well-documented small firm effect and, finally, whether the effect in New Zealand is driven by local or international factors.

Although such patterns cannot be rationalized with efficient market behaviour, their occurrence however, is widespread and persistent. For example, Lakonishok and Smidt (1988) document that the average pre-holiday return for US-equities is 23 times larger than the average daily return, and that holidays account for roughly 50 percent of the increase in the Dow Jones Industrial Average (DJIA). Similarly, Ariel (1990) reports that the average pre-holiday returns in the US, over the period 1963-1982, are 10 times higher than returns over the remaining days of the year. Likewise, Pettengill (1989) finds that returns on days immediately preceding holiday closings are unusually high regardless of firm size.

The existence of a pre-holiday effect has also been documented in several markets outside of the US. For example, Barone (1990) examines stocks trading in the Italian stock market over the period 1975-1989 and finds that the average rate of change in the Italian MIB index on days immediately preceding main public holidays is higher than other days. Likewise, Cadsby and Ratner (1992) find that pre-holiday effects are evident in several countries such as the US, Canada, Japan, Australia, and Hong Kong. In addition to finding abnormally high returns on pre-holidays for listed stocks on the NYSE, AMEX and NASDAQ, Kim and Park (1994) also report that the holiday effect is present in the UK and the Japanese stock markets, despite each country having different holidays and institutional arrangements. Vos et al. (1993) examine and document the existence of a pre-holiday effect in the New Zealand share market. They show that the mean pre-holiday return in New Zealand is 3.8 times the mean return over other days during the 20-year period, 1967 to 1987. Similarly, Boyle et al. (2003) analyse the behaviour of the New Zealand stock market under five economically-neutral events which, according to psychology researchers, affect the mood and emotion of investors. They find that only the pre-holiday period offers returns that are statistically different from returns on non-event days.

Several factors, including economic and behavioural, could contribute towards the observed positive returns. One possible explanation is that the high pre-holiday returns are a manifestation of the well-documented closing effect in which high returns for securities are observed at market closings. Another group of studies links the pre-holiday effect to systematic patterns in the dataset used to compute pre-holiday returns. On the behavioural side, explanations range from short-sellers closing their risky positions prior to holidays, to psychological reasons such as investors' good mood around holidays indicating greater optimism about future prospects.

Using a sample spanning four decades, our primary findings include the following. First, we find a strong and persistent pre-holiday effect which appears to have increased in recent times. Pre-holiday returns are strongest during Christmas and Easter and lowest during the Labour Day weekend. Second, the pre-holiday returns do not appear to be a manifestation of the well-documented US holiday effect. Third, we find an inverse relationship between firm size and pre-holiday returns. Finally, analysis of individual firm level data suggests that the persistence of the pre-holiday effect may be due to the low liquidity of such stocks which, therefore, does not permit a profitable trading strategy.

The remainder of the paper is organized as follows. Section 2 provides a description of the data and definition of holidays. Section 3 reports the results of the empirical tests for the pre-holiday effects. A conclusion is presented in Section 4.

## 2. Data and methodology

Our data need is driven directly by our stated objectives in the opening paragraph. First, in an effort to look for return patterns around major holiday closings, we examine all firms that comprise the NZSE40 and NZSE50 indices. Return data for such firms are obtained for a period covering January 1967 to 2006, which is a much longer time horizon than that used in Vos et al. (1993). Second, in an effort to examine a possible link between the pre-holiday return pattern and the well-documented small firm effect, we use all firms that comprise the NZX10 (Large Cap Index), NZX Mid Cap (Mid Cap Index) and the NZX Small Cap Index. Third, to test whether the anomalous returns around NZ-holidays are a manifestation of the US-holiday effect, we draw daily data on the S&P500 index over the period 1967 to 2003 from Yahoo Finance. Finally, to search for a possible explanation for the persistence of the observed pre-holiday anomaly, we obtain data on the bid and ask prices of 20 large and 20 small listed NZ stocks. All the necessary data for NZ companies is obtained from the University of Otago's New Zealand Share Price Database.

We define 'holidays' as those public holidays which involve market closure. The following holidays are included: Waitangi Day, Easter, Anzac Day, Queen's Birthday, Labour Day, Christmas and New Year's Day. Pre-holiday returns are defined as daily close-to-close returns on the day prior to a market closing day. Likewise, post holiday returns are the daily close-to-close returns occurring on the day following market closure. Consequently, the remaining close-to-close returns are defined as non-holiday returns.

## 3. Empirical findings and discussion

### 3.1. Pre-holiday effect in New Zealand

In this section, we examine the existence of a pre-holiday effect in New Zealand using NZSE40 and NZSE50 index data over the period 1967 to 2006. Using data over a 40-year period has several advantages. First, it updates the findings reported in Vos et al. (1993) who report the existence of the pre-holiday effect for data over 1967 to 1987. Second, several studies have documented that the pre-holiday effect has decreased in recent years. For example, Chong et al. (2005) find that the pre-holiday effect has declined in the US, UK and Hong Kong markets. Moreover, Keef and Roush (2005) report that a strong pre-holiday effect in the US market prior to 1987 has greatly diminished since. There is, however, no documented evidence to show whether the pre-holiday effect in the New Zealand stock market has changed in any way over time. A long time series affords a good opportunity to examine such time-trends in the observed anomaly. Finally, in March 2003 the New Zealand Stock Exchange introduced the NZSE50 as its headline index. Since the expanded index is likely to afford greater participation to smaller stocks, observing the performance of this index could potentially shed additional light on our understanding of the anomaly in New Zealand.

#### 3.1.1. Pre-holiday returns

We first classify the 8930 trading days over the period, 1967-2003, into two subsets, pre-holidays and other trading days. Panel A of Table 1 summarizes the daily mean and return variances for the entire sample as well as for each subset. We find that the average pre-holiday return is 10.26 times the average return on other trading days and the difference is significant at the 10% level. This is a significant increase from the 3.8 times reported in Vos et al (1993) i.e. the pre-holiday effect seems to still be present and also appears to have

**Table 1:** Descriptive Statistics
Means, standard deviations and the proportion of positive returns in the pre-holidays and other days are reported for the NZSE40 Index over the period, 1967-2003. 'Pre-holiday' is the trading day immediately preceding a public holiday while 'other trading days' are the trading days that do not contain the pre-holiday trading day.

| **Panel A: Means and standard deviations for the pre-holiday and other days** | |
|---|---|
| **Total number of trading days** | 8930 |
| Mean return | 0.000280115 |
| Standard deviation of returns | 0.008800956 |
| **Total number of pre-holiday trading days** | 224 |
| Mean return | 0.002331433 |
| Standard deviation of returns | 0.008844125 |
| **Total number of other trading days** | 8706 |
| Mean return | 0.000227336 |
| Standard deviation of returns | 0.00879404 |
| t-statistic for difference of the means | 3.535*** |
| p-value | 0.00041*** |
| **Panel B: Proportion of positive returns in the pre-holidays and remaining days** | |
| **Proportion of positive returns for all the trading days** | |
| Total number of days | 8930 |
| Days with positive returns | 4660 |
| Proportion of positive days | 0.5218 |
| **Proportion of positive returns for pre-holiday trading days** | |
| Total number of pre-holidays | 224 |
| Days with positive returns | 150 |
| Proportion of positive days ($p_{PH}$) | 0.6696 |
| **Proportion of positive returns for remaining trading days** | |
| Total number of other days | 8706 |
| Days with positive returns | 4510 |
| Proportion of positive days ($p_{OT}$) | 0.518 |
| Hypothesis: $H_0$: $p_{PH} = p_{OT}$ | |
| $H_1$: $p_{PH} \neq p_{OT}$ | |
| Z-statistic testing $H_0$ | 4.5411*** |

*** represents significance at the1% level.

strengthened over time. In panel B, we present the proportion of positive returns in the pre- and the remaining days. About 67% of pre-holiday trading days experience positive returns while the corresponding figure for the remaining days is 51.8%. A non-parametric z-statistic rejects the hypothesis that the proportion of positive returns in the pre-holidays is equal to that of the remaining days. These results are consistent with findings in Vos et al. (1993) and illustrate the persistence of the effect especially in the most recent 15-year period not covered in their study. This suggests that the pre-holiday effect is still present in the New Zealand stock market. Moreover, the high proportion of positive returns in the pre-holiday period is still significantly different compared to the proportion of positive returns on other trading days.

Moving on from the univariate analysis of the existence and magnitude of the pre-holiday effect, we estimate the following time series regression:

$$R_t = \alpha_0 + \alpha_1 D_{PRE\text{-}PRE} + \alpha_2 D_{PRE} + \alpha_3 D_{POST} + \alpha_4 D_{PRE*} t + \epsilon_t \quad (1)$$

$R_t$ is the daily index return for the period t, $D_{PRE}$ is a dummy variable assigned a value one for pre-holiday trading days (i.e., the trading day immediately preceding the holiday) and zero for non-pre-holiday trading days, $D_{PRE\text{-}PRE}$ is a dummy variable assigned a value one for the pre-pre-holiday days (i.e., trading days that immediately precede the pre-holiday) and zero otherwise, $D_{POST}$ is a dummy variable which takes the value one for the post-holiday days and zero otherwise, and the time trend variable t represents the elapsed number of trading days from the start of the investigation period.

Results from estimating regression equation (1) are presented in Table 2. Consistent with our univariate results in Table 1, Panel A of Table 2 show that returns on pre and pre-pre holidays are significantly higher than those on other trading days. The post-holiday mean returns are lower than the mean returns of other days, but not significantly so. The coefficient of $\alpha_4$ represents the trend of the pre-holiday effect over the period, 1967 to 2003. Contrary to findings in Chong et al (2005), however, the positive sign on this coefficient suggests that the average effect has tended to increase over the investigation period, although this trend is not statistically significant.

**Table 2:** Stock Returns on Pre-holidays and other trading days Results from estimating the following models (equations (1) and (2)) are provided:

$$R_t = \alpha_0 + \alpha_1 D_{PRE\text{-}PRE} + \alpha_2 D_{PRE} + \alpha_3 D_{POST} + \alpha_4 D_{PRE*} t + \epsilon_t$$

$$R_t = \alpha_0 + \alpha_1 D_{PRE} + \alpha_2 D_{PRE*} t + \epsilon_t$$

$R_t$ is the daily index return for the period t, $D_{PRE}$ is a dummy variable assigned a value one for pre-holiday trading days (i.e., the trading day immediately preceding the holiday) and zero for non-pre-holiday trading days, $D_{PRE\text{-}PRE}$ is a dummy variable assigned a value one for the pre-pre-holiday days (i.e., trading days that immediately precede the pre-holiday) and zero otherwise, $D_{POST}$ is a dummy variable which takes the value one for the post-holiday days and zero otherwise and the time trend variable t represents the elapsed number of trading days from the start of the investigation period.

| **Panel A: Dummy variable regression: pre-pre, pre and post-holiday (NZSE40)** | | | |
|---|---|---|---|
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$ (Other Days) | 0.000215 | 2.22 | 0.0262** |
| $\alpha_1$ (Pre-pre-holidays) | 0.001000 | 1.68 | 0.0929* |
| $\alpha_2$(Pre-holidays) | 0.00193 | 1.68 | 0.0935* |
| $\alpha_3$ (Post-holidays) | -0.0005255 | -0.88 | 0.3775 |
| $\alpha_4$(Trend) | $4.4337*10^{-8}$ | 0.19 | 0.8487 |
| **Panel B: Dummy variable regression: pre-holidays (NZSE40)** | | | |
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$(Other Days) | 0.00022734 | 2.41 | 0.0159** |
| $\alpha_1$(Pre-holidays) | 0.00192 | 1.67 | 0.0955* |
| $\alpha_2$(Trend) | $4.4337*10^{-8}$ | 0.19 | 0.8487 |
| **Panel C: Dummy variable regression: pre-pre, pre and post-holiday (NZSE50)** | | | |
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$ (Other Days) | 0.000740 | 3.7 | 0.0002* |
| $\alpha_1$(Pre-pre-holidays) | 0.000324 | 0.28 | 0.7808 |
| $\alpha_2$(Pre-holidays) | -0.00154 | -0.67 | 0.5029 |
| $\alpha_3$(Post-holidays) | 0.000411 | 0.35 | 0.7244 |
| $\alpha_4$ (Trend) | 0.0000032 | 0.69 | 0.4904 |

* and ** represent significance at the10% and 5% levels respectively.

Panel B of Table 2 contains results from estimating equation (2) below, which is a variation of regression (1) where the pre- and pre-pre holidays are combined.

$$R_t = \alpha_0 + \alpha_1 D_{PRE} + \alpha_2 D_{PRE*} t + \epsilon_t \quad (2)$$

The definitions of the variables in regression (2) are similar to those in regression (1). We find that the relative performance on pre-holidays vis-à-vis non-holiday returns and the sign and significance of the time-trend variable are similar to those reported in Panel A of Table 2.

All of the results so far have been generated using the NZSE40 benchmark index. As noted earlier, in March 2003 the New Zealand Stock Exchange introduced the NZSE50 as the new headline index for the NZ share market. Since the expanded index affords a greater opportunity for small firms to participate in the index, we next re-estimate regression (1) to see if our previous findings are in any way sensitive to the composition of the index. The results summarized in panel C of Table 2 are very different to those reported earlier: the hypothesis that pre-holiday returns, using the NZSE50 index in the most recent period, are not significantly different than those on non-holidays cannot be rejected at conventional levels. While these results are consistent with findings elsewhere (see, for example,

Chong et al (2005)), one must be mindful that meaningful test statistics need more observations than those afforded by the limited number of observations with the newer index. Once again, the positive coefficient of $\alpha_4$ suggests that the effect has not tended to decline over the last few years although this coefficient is not significant.

### 3.1.2. Individual pre-holiday returns

Research into mood changes around holidays suggests that the arrival of an extended weekend may positively influence mood and emotion (see, for example, Rossi and Rossi (1977)). Moreover, Christie and Venables (1973) document that the likelihood of an upbeat mood among males is highest during weekends and lowest on Mondays. On the contrary however, Kossof (1992) documents poor mood and emotions during Christmas. Collectively, these findings suggest that the aggregate pre-holiday effect may primarily be driven only by a select group of holidays and may not be pervasive across holidays. In order to examine whether the average returns for each pre-holiday are significantly different from the mean returns of other trading days, the pre-holiday data is split into seven individual holiday subsets, namely Waitangi Day, Anzac Day, Easter, Queens's Birthday, Labour Day, Christmas and New Year's Day to estimate the following time series regression.

$$R_t = \alpha_0 + \alpha_1 D_{Waitangi} + \alpha_2 D_{Anzac} + \alpha_3 D_{Easter} + \alpha_4 D_{Qbday} + \alpha_5 D_{Labour} + \alpha_6 D_{XMAS} + \alpha_7 D_{NYR} + \epsilon_t \quad (3)$$

$R_t$ is the daily index return and the dummy variables take the value one for the day before the corresponding holiday (Waitangi Day, Anzac Day, Easter, Queen's Birthday, Labour Day, Christmas and New Year's Day) and zero otherwise.

The results from estimating equation (3) above are summarized in Table 3.

**Table 3:** Dummy variable regression for individual pre-holiday Results from estimating the following model (equation (3)) are provided:

$R_t = \alpha_0 + \alpha_1 D_{Waitangi} + \alpha_2 D_{Anzac} + \alpha_3 D_{Easter} + \alpha_4 D_{Qbday} + \alpha_5 D_{Labour} + \alpha_6 D_{XMAS} + \alpha_7 D_{NYR} + \epsilon_t$

$R_t$ is the daily index return for the period t and $\alpha_1$ through $\alpha_7$ represent the differential return on trading days immediately preceding the respective holiday and other trading days. The figures in the last column represent the number of times the return in the pre-holiday exceeds returns on other trading days. Following the methodology suggested in Vos (1993), this number is computed by dividing the parameter estimates of each individual holiday by the parameter estimate of other days.

| | **Parameter estimate** | **t-stat** | **p-value** | **# of times greater than other days ($\alpha_i/\alpha_0$)** |
|---|---|---|---|---|
| $\alpha_0$ (Other Days) | 0.0002277 | 2.42** | 0.0157** | 1 |
| $\alpha_1$ (Waitangi Day) | 0.00237 | 1.45 | 0.1467 | 10.40660402 |
| $\alpha_2$ (Anzac Day) | 0.00224 | 1.52 | 0.1285 | 9.835777641 |
| $\alpha_3$ (Easter) | 0.00298 | 2.02** | 0.0432** | 13.08509704 |
| $\alpha_4$ (Queen's Birthday) | 0.00248 | 1.69* | 0.0915* | 10.88961096 |
| $\alpha_5$ (Labour Day) | -0.0008424 | -0.57 | 0.5663 | -3.698954949 |
| $\alpha_6$ (Christmas) | 0.00334 | 1.93* | 0.0531* | 14.66584702 |
| $\alpha_7$ (New Year's Day) | 0.0008846 | 0.51 | 0.6085 | 3.884122245 |

* and ** represent significance at the10% and 5% levels respectively.

We find that the average returns on pre-holidays are significantly higher than the average returns on other trading days and this difference is significant at less than the 5% level. We also find that the average pre-holiday returns, after adjusting for the effect of other variables, over the 35-year period range from -3.70 times to 14.67 times the average returns on other days. While the Easter pre-holiday returns are significantly different from other days at less than the 5% level of significance, the Queen's Birthday and Christmas pre-holiday average returns are significantly different from those of the other days only at the 10% level of significance. Contrary to Kossof (1992), who documents increased levels of depression during Christmas, we find that the pre-holiday average return is the highest during Christmas at 14.67 times that on other trading days, followed by Easter at 13.09 times. This suggests that, if returns during economically neutral events are subject to investor mood and

emotion, these upbeat mood swings are the highest during these two major holidays. In contrast however, the Labour Day pre-holiday return is 3.70 times lower than returns on other trading days, a result consistent with Christie and Venables (1973) (who find that the level of depression is highest on Mondays), since the fourth Monday in October is observed as Labour Day in New Zealand.

### 3.1.3. Persistence of the anomaly

We next examine whether the observed pre-holiday effect persists uniformly over the period under examination or whether such seasonalities themselves follow a random pattern across time. In order to test the extent to which the holiday effect changes in different sub-periods, the NZSE40 index data is divided into seven sub-periods of equal length. Then, univariate results, similar to those shown in panel A of Table 1, are computed and presented in Table 4. As is readily apparent, the mean returns on pre-holidays are larger than the mean returns on non-pre-holidays for every sub-period examined. Moreover, the mean returns on pre-holidays are positive, in contrast to the mean returns achieved on non-pre-holidays. However, the difference in mean returns is particularly pronounced in the period 1973-1977 when pre-holiday returns are 11.37 times the non-holiday returns, and over the period 1988-1992 when they are 23.16 times non-holiday returns. In addition, about 70% of the positive return days in these two sub-periods happened during pre-holidays. A Chi-square statistic

**Table 4:** Descriptive StatisticsMeans, standard deviations and the proportion of positive returns in the pre-holidays and other days are reported for seven different 5-yearly time intervals. 'Pre-holiday' is the trading day immediately preceding a public holiday while 'other trading days' are the trading days that do not contain the pre-holiday trading day. The expected number of pre-holidays with positive returns is computed by multiplying the fraction of positive return days among total days by the number of pre-holiday days.

| Sub-period | 1967-72 | 1973-77 | 1978-82 | 1983-87 | 1988-92 | 1993-97 | 1998-03 |
|---|---|---|---|---|---|---|---|
| **Non-holidays** | | | | | | | |
| Mean | 0.00028 | -0.00017 | 0.00057 | 0.00102 | -0.00033 | 0.00034 | -0.00012 |
| Standard deviation | 0.00458 | 0.00643 | 0.00509 | 0.01241 | 0.01143 | 0.00959 | 0.00927 |
| Number of days | 1408 | 1186 | 1183 | 1206 | 1218 | 1222 | 1283 |
| **Pre-holiday days** | | | | | | | |
| Mean | 0.00175 | 0.00189 | 0.00198 | 0.00128 | 0.00773 | 0.00112 | 0.00046 |
| Standard deviation | 0.00478 | 0.00344 | 0.00533 | 0.01048 | 0.01074 | 0.01150 | 0.00906 |
| Number of days | 30 | 28 | 30 | 31 | 35 | 35 | 35 |
| t-stat diff of means | 1.73083 | 3.05072 | 0.90818 | 0.11571 | 4.37202 | 0.40212 | 0.37909 |
| p-value (alpha=5%) | 0.08370 | 0.00456 | 0.36397 | 0.90790 | 0.00010 | 0.69004 | 0.70685 |
| Ratio of pre-holiday to non-pre-holidays | 6.16492 | 11.37027 | 3.43905 | 1.25547 | 23.16025 | 3.35344 | 3.72461 |
| **Frequency of advances** | | | | | | | |
| # Positive return days | 751 | 572 | 688 | 708 | 607 | 658 | 652 |
| % positive returns | 0.52225 | 0.47117 | 0.56719 | 0.57235 | 0.48444 | 0.52347 | 0.49469 |
| # Pos ret: pre-holidays | 17 | 20 | 21 | 22 | 26 | 25 | 17 |
| % positive pre-holiday | 0.56667 | 0.71429 | 0.70000 | 0.70968 | 0.74286 | 0.71429 | 0.48571 |
| Expected number of positive pre-holidays | 15.6675 | 13.19275 | 17.01566 | 17.74293 | 16.95531 | 18.32140 | 17.31411 |
| Chi-square statistic | 0.22662 | 7.02486 | 1.86592 | 2.04281 | 9.64966 | 4.86903 | 0.01140 |
| t-statistic | 0.47605 | 2.65045 | 1.36599 | 1.42927 | 3.10639 | 2.20659 | 0.10676 |

* and ** represent significance at the10% and 5% levels respectively.

rejects the null hypothesis that the expected frequency of positive return days among the pre-holidays equals the realized frequency of positive return days among all trading days in the period. In unreported results, the pattern of return results across individual holidays remains similar to that reported in Table 3.

In summary, the results reported in Section 3.1 are as follows. First, over the entire investigation period (1967-2006), there is evidence that the pre-holiday effect still exists in New

Zealand. Second, the analysis of holiday returns across holiday identity indicates that the mean pre-holiday return is the highest before Christmas at 14.67 times followed by Easter at 13.09 times. In contrast, the Labour Day pre-holiday return is 3.70 times lower than non-holiday returns. Third, the positive coefficient of the trend variable in the regression analysis indicates that the effect has tended to increase over the last three decades, but this increase is not statistically significant. Finally, robustness checks on sub-periods reveal that the effect is more positive and strongly significant particularly in the second (1988-1992) and fifth (1973-1977) sub-periods.

### 3.2. International pre-holiday effect

Finance literature suggests that markets with the most similar behaviour are those that are geographically and economically closest. Cadsby and Ratner (1992), for example, suggest that the pre-holiday effects generated in one market may spread throughout the world by investors trading on foreign markets. Therefore, it is likely that the large pre-holiday effects before Easter and Christmas (holidays common to the US and New Zealand) may have been generated in the US and spilled into the NZ market. On the contrary, integration of New Zealand and the US markets is weak at best, particularly for market upturns. While international evidence indicates a transmission of information flow from the major stock markets to other markets, findings in Bennett, Bhabra and Hislop (2000) show that information affecting NZ stocks is primarily generated in New Zealand. Thus, if anomalies were generated in the US that then spread to the New Zealand market, we would observe a pre-holiday effect on days prior to US holidays and not during NZ holidays.

To test this hypothesis, we use the NZSE40 index data over the periods from 1967 to 2003 and daily returns on the S&P500 extracted from the Yahoo Finance website over the period, 1967 to 2003. US holidays examined include President's Day, Good Friday, Memorial Day, Independence Day, Thanksgiving Day, Christmas and New Year's Day.

#### 3.2.1. Impact of US holidays on NZ returns

In order to determine the magnitude of the local (New Zealand), international (US) and joint pre-holiday effects, the following dummy variable regression is estimated for each index i over the period, 1967-2003.

$$R_t = \alpha_{0+} \alpha_1 USR_{t-1} + \alpha_{2NZ-US} D_{NZ-US} + \alpha_{3US-NZ} D_{US-NZ} + \alpha_{4NZ+US} D_{NZ+US} + \epsilon_t \quad (4)$$

$R_t$ is the holding period return on the NZ index, $USR_{t-1}$ is the lagged US returns, $D_{NZ-US}$ is a dummy variable assigned a value one if it is a NZ holiday and not a US holiday and zero otherwise, $D_{US-NZ}$ is a dummy variable assigned a value one if it is a US holiday but not a NZ holiday and zero otherwise, and $D_{NZ+US}$ is a dummy variable assigned a value one for holidays common to both NZ and the US and zero otherwise.

Panel A of Table 5 reports the results of the dummy variable regressions testing the significance of differences in average returns on days before NZ holidays, US holidays and non-holidays. As is readily apparent, controlling for the pre-holiday effect in the US, average NZ holiday returns are significantly higher than non-holiday mean returns at the 10% level of significance. More importantly, consistent with Bennett, Bhabra and Hislop (2000), there are no significant pre-holiday effects in NZ on days preceding US holidays. Table 5 also shows that pre-holiday returns for common holidays are significantly higher than either NZ local or US returns at less than 5% level of significance. However, a test of the null hypothesis that $\alpha_{4NZ+US} = \alpha_{2NZ-US} + \alpha_{3US-NZ}$ cannot be rejected at 5% level of significance.

McGuiness (2005) points out that, since the Asian trading day occurs in advance of that in the US, it is important to include lagged US returns in any analysis of daily returns in Asia. Therefore, we examine whether a significant pre-holiday effect persists in New Zealand after controlling for lagged US returns. Results in Table 5 show that the lagged US returns are 0.54% lower than the average non-holiday returns, but this result is not significant. In other words, the local (New Zealand) pre-holiday effect continues to remain strong after including lagged US returns in the model.

**Table 5:** Testing pre-holiday returns for International effects Results from estimating the following models (equations (4) and (5)) are provided:

$R_t = \alpha_0 + \alpha_1 USR_{t-1} + \alpha_{2NZ-US} D_{NZ-US} + \alpha_{3US-NZ} D_{US-NZ} + \alpha_{4NZ+US} D_{NZ+US} + \epsilon_t$

$R_t = \alpha_0 + \alpha_{1NZ}(D_{NZ-US} + D_{NZ+US}) + \alpha_{2US}(D_{US-NZ} + D_{NZ+US}) + \epsilon_t$

$R_t$ is the holding period return on the NZ index, $USR_{t-1}$ is the lagged US returns over period 1967 to 2003, $D_{NZ-US}$ is a dummy variable assigned a value one if it is a New Zealand holiday and not a US holiday and zero otherwise, $D_{US-NZ}$ is a dummy variable assigned a value one if it is a US holiday but not a New Zealand holiday and zero otherwise, and $D_{NZ+US}$ is a dummy variable assigned a value one for holidays common to both New Zealand and the US and zero otherwise.

| **Panel A: Dummy variable regressions testing international effects** | | | |
|---|---|---|---|
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$(Non-holidays) | 0.0002 | 2.44*** | 0.0147*** |
| $\alpha_1$(Lagged US returns) | -0.0054 | -0.55 | 0.579 |
| $\alpha_2$(NZ holidays) | 0.0015 | 1.92 | 0.0545* |
| $\alpha_3$(US holidays) | -0.0002 | -0.29 | 0.7692 |
| $\alpha_4$(Both NZ and US holidays) | 0.0031 | 3.31*** | 0.0009*** |
| Test of $H_0$: $\alpha_{4NZ+US} = \alpha_{2NZ-US} + \alpha_{3US-NZ}$ | | 1.8 | 0.1798 |
| **Panel B: Dummy variable regression incorporating restriction $\alpha_{4NZ+US} = \alpha_{2NZ-US} + \alpha_{3US-NZ}$:** | | | |
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$(Non-holidays) | 0.00022 | 2.36*** | 0.0184*** |
| $\alpha_1$(All NZ holidays including those also holidays in US) | 0.00197 | 3.08*** | 0.0021*** |
| $\alpha_2$(All US holidays including those also NZ holidays) | 0.00249 | 0.43 | 0.6689 |

* and *** represent significance at the10% and 1% levels respectively.

### 3.2.2. International effect with linear restriction

Acceptance of the null hypothesis ($\alpha_{4NZ+US} = \alpha_{2NZ-US} + \alpha_{3US-NZ}$) motivates us to estimate a dummy variable regression which incorporates the linear restriction contained in the null hypothesis. Thus, a new dummy variable regression model that incorporates the above linear restriction is tested using the following regression:

$$R_t = \alpha_0 + \alpha_{1NZ}(D_{NZ-US} + D_{NZ+US}) + \alpha_{2US}(D_{US-NZ} + D_{NZ+US}) + \epsilon_t \quad (5)$$

$(D_{NZ-US} + D_{NZ+US})$ is a dummy variable representing days before NZ holidays whether or not these holidays are also celebrated in the US, and $(D_{US-NZ} + D_{NZ+US})$ is a dummy variable representing days before US holidays whether or not these holidays are also celebrated in New Zealand.

The results of this regression are reported in panel B of Table 5. Once again, we observe that returns on days just prior to local holidays are significantly higher, at the 5% level of significance, than they are on non-holiday returns. However, we also find that NZ returns on days just prior to US holidays are higher than non-holiday returns, but not significantly so.

Overall, results in Section 3.2 suggest that the pre-holiday effect remains strong in New Zealand even after controlling for lagged US returns. This implies that the trading day difference between the US and NZ does not have a significant impact on New Zealand stock returns. Moreover, the New Zealand stock market exhibits significant local pre-holiday effects on returns even after the restriction ($\alpha_{4NZ+US} = \alpha_{2NZ-US} + \alpha_{3US-NZ}$) is imposed. Finally, returns on days just prior to US holidays are not significantly higher than non-holiday returns, implying that the pre-holiday effect in New Zealand is primarily driven by local factors.

### 3.3. Firm size effects

The interaction between firm size and the weekend, January, and holiday effects is well documented in the extant literature. Rogalski (1984) and Pettengill (1989), for example, document an inverse relationship between firm size and the holiday effect in the US. Likewise, Liano and White (1994) find that the magnitude of the pre-holiday effect in the US is related to the level of economic activity and firm size. Specifically, the US pre-holiday effect is stronger in small firms than in large firms during

expansionary periods and the reverse is true during periods of economic contraction. There is, however, no documented evidence of a relation between firm size and calendar anomalies, in particular the pre-holiday effect, in NZ. Vos et al. (1993) test the pre-holiday effect using the NZSE40 index, which consists of the top 40 companies listed on the NZ stock exchange. This implicitly limits the test to large firms. Therefore, we examine the pre-holiday effect in this section using the NZX10, NZX Mid Cap and NZX Small Cap indices which, by construction, represent different firm sizes. The Large Cap Index, NZX10, has data for the period from 1997-2006, which includes 2039 trading days, the Mid Cap Index data ranges from 1997-2006 and includes 2267 trading days, and the Small Cap Index covers a period from 1991-2006 and includes 3920 trading days.

### 3.3.1. Firm size and the pre-holiday effect

In order to investigate the effect of firm size on the pre-holiday effect in NZ, the pre-holiday and non-pre-holiday returns are examined using the following dummy variable regression.

$$R_{it} = \alpha_0 + \alpha_{i1}D_{PRE\text{-}PRE} + \alpha_{i2}D_{PRE} + \alpha_{i3}D_{POST} + \alpha_{i4}D_{PRE*}t + \epsilon_t \quad (6)$$

where, i = the NZX10, NZX Mid Cap or the NZX Small Cap index, $R_{it}$ is the return on the ith index. The definitions of the other variables are similar to those in regression (1).

Table 6 contains the results of the interaction between pre-holiday returns and firm size. As is readily apparent, the average pre-pre-holiday and the average pre-holiday returns for the Small Cap firms are higher than returns on other trading days and this difference is statistically significant at less than the 5% level. Interestingly, however, the same is not true for the Medium Cap and the Large Cap firms. Furthermore, the coefficient of the trend variable of the Small Cap Index is significantly positive at better than the 5% level. This is a significant observation since it shows that, as documented for the US by Rogalski (1984) and Pettengill (1989), there is a strong inverse relationship between firm size and pre-holiday returns. Moreover, this effect for small firms in NZ seems to be strengthening over time.

**Table 6:** Pre-holiday effect and firm size Results from estimating the following model (equations (6)) for three different size-based indices are provided:

$R_{it} = \alpha_0 + \alpha_{i1}D_{PRE\text{-}PRE} + \alpha_{i2}D_{PRE} + \alpha_{i3}D_{POST} + \alpha_{i4}D_{PRE*}t + \epsilon_t$

where, i = the NZX10, NZX Mid Cap or the NZX Small Cap index. $R_t$ is the daily index return for the period t, $D_{PRE}$ is a dummy variable assigned a value one for pre-holiday trading days (i.e., the trading day immediately preceding the holiday) and zero for non-pre-holiday trading days, $D_{PRE\text{-}PRE}$ is a dummy variable assigned a value one for the pre-pre-holiday days (i.e., trading days that immediately precede the pre-holiday) and zero otherwise, $D_{POST}$ is a dummy variable which takes the value one for the post-holiday days and zero otherwise and the time trend variable t represents the elapsed number of trading days from the start of the investigation period.

| **Small Cap Index** | | | |
|---|---|---|---|
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$(Other Days) | -0.00002046 | -0.1 | 0.9216 |
| $\alpha_1$(Pre-pre-holidays) | 0.001830 | 2.92*** | 0.0036*** |
| $\alpha_2$(Pre-holidays) | 0.00243 | 3.87*** | 0.0001*** |
| $\alpha_3$(Post-holidays) | 0.00027408 | 0.44 | 0.6634 |
| $\alpha_4$(Trend) | 1.983*10^-7 | 2.19** | 0.0288** |
| **Medium Cap Index** | | | |
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$(Other Days) | 0.00065362 | 2.26** | 0.0237** |
| $\alpha_1$(Pre-pre-holidays) | 0.000559 | 0.64 | 0.523 |
| $\alpha_2$(Pre-holidays) | 0.00084885 | 0.97 | 0.332 |
| $\alpha_3$(Post-holidays) | -0.00074124 | -0.85 | 0.3968 |
| $\alpha_4$(Trend) | -4.291E-07 | -1.97** | 0.0491** |
| **Large Cap Index** | | | |
| | **Parameter estimate** | **t-value** | **p-value** |
| $\alpha_0$(Other Days) | 0.00027263 | 0.58 | 0.5604 |
| $\alpha_1$(Pre-pre-holidays) | 0.000016 | 0.01 | 0.991 |
| $\alpha_2$(Pre-holidays) | -0.00015492 | -0.11 | 0.9135 |
| $\alpha_3$(Post-holidays) | -0.00060896 | -0.43 | 0.6694 |
| $\alpha_4$(Trend) | -1.2256E-07 | -0.31 | 0.755 |

* and ** and *** represent significance at the10%, 5% and 1% levels respectively.

Together with the results for the Mid-Cap and Large-Cap indices, these results suggest that the observed full sample results in New Zealand are primarily driven by small firms in the index while the effect is almost non-existent in larger firms.

### 3.3.2. Firm size and the individual holiday effect

In order to test the robustness of our results in Table 6, we replicate the previous analysis using the three size-based indices for the different holidays and on different time periods. Since none of the results using the Mid and Large Cap indices are significant for these set of tests, Table 7 reports results only with the Small Cap Index.

**Table 7:** Firm size, individual holidays and sub-periods Results from estimating the following model (equation (3)) for individual holidays and over different time periods using only the Small Cap Index are reported:

$R_t = \alpha_0 + \alpha_1 D_{Waitangi} + \alpha_2 D_{Anzac} + \alpha_3 D_{Easter} + \alpha_4 D_{Qbday} + \alpha_5 D_{Labour} + \alpha_6 D_{XMAS} + \alpha_7 D_{NYR} + \epsilon_t$

$R_t$ is the daily index return for the period t and $\alpha_1$ through $\alpha_7$ represent the differential return on trading days immediately preceding the respective holiday and other trading days. The numbers in the last column represent the number of times the return in the pre-holiday exceeds returns on other trading days. Following the methodology suggested in Vos (1993), this number is computed by dividing the parameter estimates of each individual holiday by the parameter estimate of other days.

| **Panel A: Firm size and the individual holiday effect** | | | | |
|---|---|---|---|---|
| | **Parameter estimate** | **t-stat** | **p-value** | **# times greater than other days** |
| $\alpha_0$(Other Days) | 0.000428 | 4.12*** | <.0001*** | 1 |
| $\alpha_1$(Waitangi Day) | -0.00008 | -0.05 | 0.9603 | -0.18689 |
| $\alpha_2$(Anzac Day) | 0.00288 | 1.73* | 0.0836* | 6.72724 |
| $\alpha_3$(Easter) | -0.0003 | -0.19 | 0.8498 | -0.7119 |
| $\alpha_4$(Queen's Birthday) | 0.00386 | 2.25** | 0.0248** | 9.01637 |
| $\alpha_5$(Labour Day) | 0.000373 | 0.22 | 0.8224 | 0.87143 |
| $\alpha_6$(Christmas) | 0.00405 | 2.44** | 0.0148** | 9.46019 |
| $\alpha_7$(New Year's Day) | 0.00558 | 3.36*** | 0.0008*** | 13.03403 |

| **Panel B: Dummy variable regression for firm size and sub-periods** | | | | |
|---|---|---|---|---|
| | **Variables** | **Parameter estimate** | **t-value** | **p-value** |
| 1991-1995 | $\alpha_1$ | 0.004 | 2.91*** | 0.0037*** |
| 1996-2000 | $\alpha_1$ | 0.0021 | 1.86* | 0.0637* |
| 2001-2006 | $\alpha_1$ | 0.00111 | 1.56 | 0.1192 |

* and ** and *** represent significance at the10%, 5% and 1% levels respectively.

We examine the relation between firm size and individual holidays to see whether our results in Table 3 are also driven primarily by small firms. Results in Panel A of Table 7 show that, as with the full sample results in Table 3, the strong positive pre-holiday returns at Christmas are limited to Small Cap firms only. However, while such returns decrease during Easter for the Small Cap Index, there is a strong holiday effect around Waitangi and Queen's birthday. In unreported results, the negative returns on the Labour Day holiday reported in Table 3 appear to be driven purely by the larger firms, especially those that belong to the Mid Cap Index.

We next examine whether the association between firm size and pre-holiday returns is uniform across time. Once again, our full sample results in Table 4 appear to be driven only by the small firms, since significant average positive pre-holiday returns during period 1991-1995 and 1996-2000 are observed only with the Small Cap Index, further confirming the inverse relationship between pre-holiday effect and firm size in New Zealand.

Finally, to test the robustness of the relationship between size and individual holiday returns, we examine the relationship over different sub-periods. In unreported results, once again we find that the individual holiday effect is stronger with the Small Cap Index for each sub-period than with the Mid or the Large Cap Index. As a matter of fact, there is no significant individual holiday effect exhibited in the Large Cap Index for every sub-period examined. These results collectively suggest that the pre-holiday effect observed with the full sample is primarily driven by small firms within the index.

### 3.3.3. Firm size and the International holiday effect

In order to examine the relationship between firm size and the international pre-holiday effect, regression (4) is estimated separately with the Small Cap, Medium Cap and Large Cap indices. The results of this analysis are presented in Table 8. As with the previously reported results in Table 5, only the Small Cap Index exhibits significant average positive returns in the local (New Zealand) stock market, and there is no significant US holiday effect spilling onto the New Zealand stock market. While the pre-holiday returns in NZ during common holidays are also significant with the Mid Cap Index, there is no

**Table 8:** Firm size and the impact of international pre-holidays Results from estimating the following model (equations (4)) using the Small Cap, Medium Cao and Large Cap Indices are provided:
$R_t = \alpha_{0+} \alpha_1 USR_{t-1} + \alpha_{2NZ-US} D_{NZ-US} + \alpha_{3US-NZ} D_{US-NZ} + \alpha_{4NZ+US} D_{NZ+US} + \epsilon_t$
$R_t$ is the holding period return on the NZ index, $USR_{t-1}$ is the lagged US returns over period 1967 to 2003, $D_{NZ-US}$ is a dummy variable assigned a value one if it is a New Zealand holiday and not a US holiday and zero otherwise, $D_{US-NZ}$ is a dummy variable assigned a value one if it is a US holiday but not a New Zealand holiday and zero otherwise, and $D_{NZ+US}$ is a dummy variable assigned a value one for holidays common to both New Zealand and the US and zero otherwise.

| **Panel A: Small Cap Index** | | | |
|---|---|---|---|
| | **Parameter estimate** | **t-stat** | **p-value** |
| $\alpha_0$ (Non-holidays) | 0.000435 | 4.14*** | <.0001*** |
| $\alpha_1$(NZ holidays) | 0.00164 | 1.99** | 0.0469** |
| $\alpha_2$(US holidays) | -0.0004 | -0.48 | 0.6281 |
| $\alpha_3$(Both NZ and US holidays) | 0.00327 | 3.43*** | 0.0006*** |
| Test of $H_0$: $\alpha_{3NZ+US} = \alpha_{1NZ-US} + \alpha_{2\ US-NZ}$ | | 1.83 | 0.1767 |
| **Panel B: Medium Cap Index** | | | |
| $\alpha_0$ (Non-holidays) | 0.000151 | 1.04 | 0.2997 |
| $\alpha_1$(NZ holidays) | -0.00057 | -0.5 | 0.6165 |
| $\alpha_2$(US holidays) | 0.000669 | 0.59 | 0.5578 |
| $\alpha_3$(Both NZ and US holidays) | 0.00274 | 2.09** | 0.0369** |
| Test of $H_0$: $\alpha_{3NZ+US} = \alpha_{1\ NZ-US} + \alpha_{2US-NZ}$ | | 1.6 | 0.2063 |
| **Panel C: Large Cap Index** | | | |
| $\alpha_0$ (Non-holidays) | 0.000126 | 0.53 | 0.5948 |
| $\alpha_1$(NZ holidays) | 0.000687 | 0.37 | 0.7116 |
| $\alpha_2$(US holidays) | -0.00012 | -0.06 | 0.9482 |
| $\alpha_3$(Both NZ and US holidays) | -0.00059 | -0.27 | 0.7834 |
| Test of $H_0$: $\alpha_{3NZ+US} = \alpha_{1NZ-US} + \alpha_{2US-NZ}$ | | 0.12 | 0.7338 |

* and ** and *** represent significance at the10%, 5% and 1% levels respectively.

significant relationship in the Large Cap Index. These results further confirm our earlier finding that the New Zealand stock market exhibits significant local pre-holiday effects and that these are primarily limited to the small cap firms.

### 3.4. Possible explanations

The existence of predictable return patterns in response to economically-neutral events are a severe indictment on the efficient market hypothesis. Our findings thus far conclusively document not only the existence of the pre-holiday effect but also that this effect is strengthening over time. In this section we examine a possible cause for this persisting effect over the four decades we have examined.

Most studies use indices data to analyse the pre-holiday effect. Use of this type of data is likely to provide an overall view of the market. However, one problem with the use of indices data is the existence of thin trading and illiquidity. In this section we examine whether the pre-holiday return patterns are driven by illiquidity.

First, smaller less liquid stocks may be included in an index at stale prices and thus any inferences based on the index may not reflect economic reality. Second, if trading volumes are light on pre-holidays, then the economic significance of any findings may be limited, since light trading volume causes bid-ask spreads to widen. Therefore, in this section, we examine indices for stale prices (positive daily index autocorrelation is a good indicator, as are "last" prices that fall far outside the final bid-ask spread of the day). We also look at the behavior of spreads and volumes on pre-holidays and compare them to those on other trading days to see whether any abnormal returns are also accompanied by light trading volumes and/or wider bid-ask spreads.

### 3.4.1. Liquidity-related measures and the pre-holiday effect

Meneu and Pardo (2003) point out that aggregate data, such as indices, make it difficult to compute the cost of implementing any potentially profitable trading rule. To mitigate this problem, they suggest investigating the pre-holiday effect on individual stocks. Therefore, in an effort to look at the behavior of bid-ask spreads and volumes on pre-holidays compared to non-holidays, we study five large and five small firms based on capitalization.

Results of this analysis are reported in Table 9. Panel A of Table 9 reports the average detrended trading volume for the five largest firms: AMP Ltd (Ticker, AMP), Australia and New Zealand Banking Group Ltd (Ticker, ANZ), Foreign and Colonial Investment Trust Plc (Ticker, FCT), Telecom Corporation of New Zealand (Ticker, TEL) and Telstra Corporation Ltd (Ticker, TLS) on pre-holidays and the remaining days. These results show that the daily de-trended trading volume on pre-holidays is lower for all the firms compared to that on non-holidays. This result reveals that volumes on pre-holiday trading days are generally lighter than on other trading days. However, this difference is statistically significant only for two stocks, AMP and TLS, suggesting that for such stocks investors may not be able to capture abnormal returns prior to holidays due to the light trading volume.

Panel A of Table 9 also reports the relative spreads for the large firms on pre-holidays and non-holidays. For three of the five large firms, the relative spreads on pre-holidays are higher than those on non-holidays, but no significant differences between both days appear in any stock at conventional levels. However, it is interesting to note that for both stocks, AMP and TLS, the spreads are wider before the holidays than on other trading days. This is consistent with the observed lighter volume before holidays thus implying that the efficacy of any potential trading rule may be limited due to increased transaction costs.

Panel B of Table 9 contains results for the five smallest stocks, Apple Fields Ltd (Ticker, APL), CER Group Ltd (Ticker, CER), Savoy Equities Ltd (Ticker, SVY), Training Solutions Plus Ltd (Ticker, TSP), and Utilico International Ltd (Ticker, UIL)**.** While there seems to be no evidence that the daily de-trended trading volumes on pre-holidays are different from those on other trading days, the relative spreads of the five smallest firms on pre-holidays show that three of the five stocks (CER, SVY and UIL) have wider spreads before holidays, albeit not statistically significant. Overall, the results in Table 9 suggest that trading impediments such as lighter volume and wider spreads could potentially prevent arbitrageurs from exploiting this predictable return behavior during pre-holidays.

**Table 9:** Spreads and volumes around pre-holidays In this Table we test the difference in the bid-ask spreads and trading volumes of five largest and five smallest stocks at the pre-holidays and other trading days. We use the t-test to test the null hypothesis of equality of the means of volume (spreads) between holidays and non-holidays, against the alternative hypothesis that the means of volume (spreads) before holidays.

| **Panel A: Volume and spread**<br>**(Five largest firms:** AMP Limited, Australia and New Zealand Banking Group Limited, Foreign & Colonial Investment Trust Plc, Telecom Corporation of New Zealand Limited (NS), Telstra Corporation Limited**)** | | | | | |
|---|---|---|---|---|---|
| | **AMP** | **ANZ** | **FCT** | **TEL** | **TLS** |
| **Volume** | | | | | |
| Pre-holidays | 0.456905 | 0.851108 | 0.836174 | 0.760299 | 0.578191 |
| Other days | 1.015269 | 1.004273 | 1.004701 | 1.006879 | 1.012105 |
| p-value | 0.094873* | 0.354886 | 0.174418 | 0.197801 | 0.047749** |
| **Spread** | | | | | |
| Pre-holidays | 0.017762 | 0.017929 | 0.013565 | 0.002892 | 0.008922 |
| Other days | 0.013465 | 0.034175 | 0.016625 | 0.002667 | 0.008454 |
| p-value | 0.366091 | 0.299266 | 0.429992 | 0.205774 | 0.349668 |
| **Panel B: Volume and spread**<br>**(Five smallest firms:** Apple Fields Limited, CER Group Limited, Savoy Equities Limited, Training Solutions Plus Limited, Utilico International Limited**)** | | | | | |
| | **APF** | **CER** | **SVY** | **TRS** | **UIL** |
| **Volume** | | | | | |
| Pre-holidays | 1.27122 | 1.24511 | 0.41311 | 0.38938 | 0.99931 |
| Other days | 0.99222 | 0.99297 | 1.01684 | 1.01752 | 1.00002 |
| p-value | 0.29015 | 0.33036 | 0.17386 | 0.14566 | 0.49954 |
| **Spread** | | | | | |
| Pre-holidays | 0.32217 | 0.08129 | 0.54936 | 0.83957 | 0.17212 |
| Other days | 0.37149 | 0.0801 | 0.49502 | 0.87053 | 0.13271 |
| p-value | 0.19488 | 0.45153 | 0.2389 | 0.39601 | 0.16036 |

* and ** represent significance at the10% and 5% levels respectively.

### 3.4.2. Limitations of the study

Since one problem with the use of aggregate data, such as indices, is thin trading and illiquidity, we home-brew our Large and Small Cap indices by drawing a sample of 20 large and 20 small stocks based on market capitalization over the last five years in an effort to examine if the indices data possesses stale prices. We find that the self-constructed small index[1] has strong positive auto-correlation ($\rho$=0.98), compared with the self-constructed large index, thus implying that the small stocks contain stale prices. Hence, if the indices which contain smaller less liquid stocks, such as the Small Cap Index, are used to analyze the pre-holiday effect, inferences based on the index may not reflect economic reality. Since Small Cap indices are likely to contain stale prices, any statistical tests based on this kind of index may not be powerful.

## 4. Conclusions

In this paper we demonstrate that a pre-holiday effect still exists in the New Zealand share market. Moreover, this effect seems to be increasing. The analysis of individual holiday returns indicates that the pre-holiday mean return is highest prior to Christmas, followed by Easter. However, the Labour Day pre-holiday return is lower than the returns on normal days. Interestingly, the robustness test of the model for each sub-period shows that the effect is positive and strongly significant only in the second

[1] New index value = Σ(price*number of outstanding shares)/base value*beginning index value.

(1988-1992) and fifth (1973-1977) sub-periods. Subsequent tests show that the abnormally large returns prior to holidays are not a manifestation of the US holiday effect.

Importantly, we find an inverse relation between firm size and the pre-holiday effect. This implies that the pre-holiday effects are limited to firms in the Small Cap Index, compared to Medium Cap and Large Cap firms. Therefore, it is likely that the pre-holiday effect in the New Zealand market may be driven by the illiquidity of the index. Another possible problem with the use of index data is the difficulty of computing the cost of implementing any potentially profitable trading rule. We get around this problem by analysing the five largest and the five smallest firms. All of the large firms exhibit light trading volume on pre-holiday days. Most of the large and small firms with light trading volume are also accompanied by wide bid-ask spreads. This suggests that, for such stocks investors may not be able to capture any abnormal returns prior to holidays.

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