The Implication of a Merger Announcement on Share Price: An Event Case Study of Trust Bank New Zealand Limited

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1.   Introduction

Information from bank mergers prices provide an important insights into the determinants of value at commercial banks and into the factors that management should concentrate on to increase bank value. The impact of mergers on the market value of merging firms has been widely discussed in the literature of economics and finance, and numerous studies have examined the impact of merger announcements on the prices of the stocks of the bidding and target firms. Rhoades (1987), for example, examined the determinants of the price-book ratio for mergers that took place from 1973 to 1983 in which only three variables were consistently related to the merger premium. Two of these - the growth of the assets of the target firm and the growth of its market - are outside the bank's control, while the negative sign on the target's capital-to-assets ratio suggested that management should be cautious about carrying excess capital above that required by the regulatory authorities. Beatty (el al., 1987) examine the determinants of the price-book ratio in bank mergers and found that the more profitable the target bank (measured by return on equity), the higher the merger premium. Hawawini and Swary (1990) examined the stock market reaction for 123 target banks and 130 bidder banks for mergers that took place during the 1980s. They discovered that targets perform extremely well in a merger. The price of a target bank's share increases, on average, by about 11.5 percent during the week of the merger announcement (11.5 more that would be expected given movements in the stock market during that week). The target bank's share price appreciates more the larger were the assets of the bidding banks. These and other studies have been primarily concerned with the effect of merger on the market value of merging firms' common stock and conclude that the stockholders of the bidding firm experience no decline in wealth around the merger announcement, while target firm stockholders appear to gain significantly.

The impact of merger announcement can be analysed using 'event study methodology', based on the efficiency market hypothesis. This well-known hypothesis states that security prices will reflect all available information and so an event study focuses on how quickly and correctly the market (i.e. share price) reacts to a particular type of new information (i.e.economic events, such as earnings announcements, merger announcement,

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stock splits). The objective of the analysis is to access whether there are any abnormal or excess returns earned by security holders, where an abnormal or excess return is defined as the return beyond what would be predicted from the market movements alone (Bodie et al., 1995). If the market is efficient, security prices should reflect these potential changes that is, one should not be able to make ongoing excess returns from these announcements.

According to Gabriel & Itzhak (1990), a number of hypotheses have been advanced to explain these gains: namely: the potential reduction in production or distribution costs resulting from the adoption of more efficient technology; the removal of the target firm's inefficient management, and the creation of monopoly power in the product market which may lead to higher product prices and profits. Consistent with this, Mandalker (1974), Langetieg (1978), and Dodd and Asquith (1980) have concluded that there is evidence that mergers have a favourable effect on the market value of the common stocks of merging firms. The acquired firms' stockholders earn large positive abnormal returns from the merger and the acquiring firms' stockholders are affected little if at all.

Similarly, Asquith and Kim (1982) examined the returns to the common shares of the merged firms. Their results are consistent with those found by other researchers; namely, abnormal returns to the common shares of acquired firms are positive and statistically significant but the abnormal return for the acquiring firm's shareholders are not significantly different from zero. It has been argued that the above mentioned announcement period result measure the economic impact of mergers only if it is assumed that investors do not anticipate the event prior to the announcement period. This is consistent with the semi-strong form of the efficient market hypothesis where this version states that all public information is reflected in the market price of a security so that only those possessing inside information can outperform the market on a risk adjusted basis. However, if the market anticipates the merger before the first announcement (i.e. does not conform with the semi-strong form of the efficient market hypothesis), then the returns to the target firm stockholders around the merger announcement date do not reflect the full economic impact of the merger.

The purpose of this paper is to examine the behaviour of the share prices on the acquired bank, Trust Bank New Zealand Limited, involved in a merger proposal. Asquith, Burner and Mullins (1983) have identified a number of different techniques available for this type of study.

One technique is based on the examination of variances on an ex-post basis, and is a simple extension of the technique used in event studies to detect changes in mean returns on a security. A second technique is ex-ante in nature and involves the examination of variances implied in call option prices. A possible advantage in using the latter technique is that it provides a variance estimate that is based on investor expectations of the future volatility of returns on the stock. Thus, if merger proposal causes a change in the market's estimate of the volatility of returns on the stock, then an examination of implied variance would allow one to draw inferences regarding both the impact on merger proposals on volatility and investors' anticipation of the variance of the merger proposals change (Jayaraman & Shastri, 1993).

The next section of this paper presents a general description of the data and methodology used in this study. The estimated results will be presented in Section 3, and the paper concludes with a summary.

2.   Data and Methodology

2.1   The Data

A sample of 520 daily observations of Trust Bank New Zealand Limited was selected from those listed on the New Zealand Stock Exchange. The daily observations range from 30 March 1994 to 29 April 1996. and were taken from *DATEX Investment Data in New Zealand*. The Returns on Market (NZSER) was also obtained from DATEX.[1]

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[1] **Note**: Refer to Appendices for Trust Bank Daily Share Price. Also please refer to Limitations on announcement date.

2.2 General Methodology

The notion of information efficient markets leads to a powerful research methodology. If security prices reflect all currently available information, then price changes must reflect all new information. Therefore, it seems that one should be able to measure the importance of an event of interest by examining price changes during the period in which the event occurs.

An event study describes a technique of empirical financial research that enables an observer to assess the impact of a particular event on a firm's stock price. An example of an event study is to analyse the impact on stock price of announcements concerning mergers, acquisition, earnings or dividends.

Analysing the impact of a merger announcement is more difficult than it might appear. This is because on any particular day stock prices respond to a wide range of economics news such as updated forecasts for GDP, inflation rates, interest rates, or corporate profitability. Hence, we have to isolate the part of a stock price movement that is attributable to the merger announcement. The statistical approach that researchers commonly use to measure the impact of a particular information release, such as the announcement of a merger is the 'marriage' of efficient market theory with the index model (Bodie, et al., 1995).

In line with this approach, the study reported here measures the unexpected return that resulting from a merger announcement. This is defined as the difference between the actual stock return and the return that might have been expected given the performance of the market (e.g. expected return) where the expected return is also be calculated using the index model (Lakonishok & Vermaelen, 1986).

According to Lakonishok & Vermaelen (1986), the index model holds that stock returns are determined by a market factor and a firm-specific factor. The stock return, r_t, during a given period, t, would expressed mathematically as :

$$r_t = a + br_{Mt} + e_t \qquad\qquad (1)$$

<u>where</u> r_{Mt} is the market's rate of return during the period; e_t is the part of a security's return resulting from firm-specific events; the parameter b is measures sensitivity to the market return; and a is the average rate of return the stock would realise in a period with a zero market return.

Equation (1) provides a decomposition of r_t into market and firm-specific factors. The firm-specific return may be interpreted as the unexpected return that results from the event. Determination of the firm-specific return in a given period requires that an estimate of the term e_t be obtained. Hence, rewriting the above equation can give us e_t,

$$e_t = r_t - (a + br_{Mt}) \qquad\qquad (2)$$

A simple interpretation of the equation is that in order to determine the firm-specific component of a stock's return, we must subtract the return that the stock ordinarily would earn for a given level of market performance from the actual rate of return on the stock. Therefore, the residual, e_t is the stock's return over and above what one would predict based on broad market movements in that period, given the stock's sensitivity to the market. This residual term, e_t , is sometimes referred to as the abnormal return meaning the return beyond what would be predicted from market movements alone.

The general approach to this event study such as this is to estimate the abnormal return the day before and the day after information is released to the market. The first step is to estimate parameters or coefficients for the security so that the estimates of the parameters can be used to get the forecasted or predicated returns to obtain abnormal returns.

2.3   The Model

Before the parameters can be estimated, the models have to be specified with the variables chosen. In the models, the variables used are constant, returns on the market (NZSER) , dummy variable for weekend effect (DMON), and two dummy variables for observation I443 and I444. The models can be represented as follow[2] :

Model 1: $Y = \beta_1 + \beta_2\ DMON + \beta_3\ NZSER + U_t$ (3)

Model 2: $Y = \beta_1 + \beta_2\ DMON\ + \beta_3\ NZSER + \beta_4\ I443 + \beta_5\ I444 + U_t$ (4)

2.4   Event Windows

In this study the announcement date for Trust Bank New Zealand Limited is taken to be 20 March 1996. In order to define the event date, however, consideration must be given to the possibility that the dissemination of company-specific information may extend over more than one day. Mitchell & Netter (1990), for example, observe that a corporation may release information one day and the financial press may report this information on the following day, therefore it is sometimes unclear on which day the information reaches the market because it generally is not known whether market participants had the information during the market trading hours on the day the information is released by the corporation. Hence the extended length of time for information dissemination requires alteration of daily return analyses to take into account a multiple day event rather than a one day event. Since the market processes information rapidly, however, it is conventional to expand the event window only a short period after the release of the pertinent information. In order to take this into account in our event study, the forecast period was lagged 9 days before the assumed announcement date.

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[2] Reasons as to which model to be used and why the dummy variables such as DMON, I443 and I444 are included in the model will be discussed later on.

Normal or predicted returns for a security are those returns expected to be observed if no event occurs. These normal returns generally are estimated over a time period other than the period immediately surrounding the event date. The time line for a study employing a period prior to the event for parameter estimation may be represented as follows :

event period

estimation period

t_2 t_{486} t_{495} t_{520}

$\mathbf{AD}^3$

From the time line, observation 2 to 486 has been estimated to obtain the parameters of interest (β_1, β_2, β_3, β_4, β_5) so that the forecasted return on the event period can be computed.

2.5   Estimation of Abnormal Returns

As mentioned above, abnormal returns can be obtained by subtracting the forecasted returns from the actual returns of the event period. The actual returns, $\mathbf{R_t}$ can be calculated as the following:

$$\mathbf{R_t = [\ln (P_t) - \ln (P_{t\text{-}1})] * 100} \qquad (5)$$

where $\mathbf{P_t}$ is the price of Trust Bank on day t; and $\mathbf{P_{t\text{-}1}}$ is the price of Trust Bank on the previous day, t-1.

The forecasted return, $\hat{R}_t$, can be obtained as followed (Strong, 1992):

$$\mathbf{R_t = X_t} * \hat{\beta} \qquad (6)$$

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[3] **AD** represents the announcement date which is on the 20 March 1996, or can be denoted as t_{495}.

where $\mathbf{X_t}$ is the is the independent variables; and $\hat{\beta}$ is the beta coefficients that we obtained from estimating the model.

Thus, the abnormal returns, is $\hat{AR}_t = R_t - \hat{R}_t$. From the abnormal returns, we can calculate the standard error of the abnormal returns and the t-value. Individual t-test can be done to test the hypothesis that $H^1o:AR_t = 0$, $H^2o:AR_t = 0$,.... , $H^{35}o:AR_t = 0$ [4]. Not rejecting the null hypothesis provides evidence that the market is efficient.

All the tests done in this study used ten per cent level of significance and the tests for normality, autocorrelation and autoregressive conditional upon heteroskedasticity (ARCH) were also be carried out before the individual t-test for abnormal returns. The results are reported in the following section.

3. Empirical Results

The main test in this study is to test whether the market is efficient or not efficient in absorbing any merger announcement, ie. test for abnormal returns.

$$H_0 : \text{Market is efficient } (AR_t = 0)$$
$$H_1 : \text{Market is not efficient } (AR_t \neq 0)$$

Model 1

$$Y = \beta_1 + \beta_2 \, DMON + \beta_3 \, NZSER + U_t \qquad\qquad (7)$$

The results are summarised in Table 1:

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[4] In this study, I take 35 days as my 'event periods'.

Table 1
Summary of the Results Obtained from Model 1

Variable	Coefficient	Std. Error	t-value
Constant	-0.10293	0.094393	-1.090
DMON	0.41346	0.22012	1.878
NZSER	0.39516	0.10780	3.666
R^2	0.0341146		
n	483		
d.f	481		
Skewness	0.78208		
Excess kurtosis	0.58909		
Durbin Watson	2.56		
Normality ~ χ^2	4117.4		
AC ~ $F(2,479)$	20.368		
ARCH ~ $F(1,479)$	148.75		

Model 2

$$Y = \beta_1 + \beta_2 \, DMON + \beta_3 \, NZSER + \beta_4 \, I443 + \beta_5 \, I444 + Ut \qquad (8)$$

Two extra dummies - I443 and I444 - are incorporated into this model. The results from estimating this model are presented in Table 2

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Table 2
Summary of the Results Obtained from Model 2

Variable	Coefficient	Std. Error	t-value	p-value
Constant	-0.047419	0.063887	-0.742	
DMON	0.11942	0.14951	0.799	
NZSER	0.35759	0.072967	4.901	
I443	-21.848	1.2712	-17.187	
I444	21.259	1.2755	16.667	
R²	0.56051			
n	483			
d.f	479			
Skewness	0.3074			
Excess kurtosis	0.38795			
Durbin Watson	1.93			
Normality ~ χ²	184.71			0.00
AC ~ F(2, 477)	1.2246			0.2948
ARCH ~ F (1,477)	1.092			0.2966

3.1   Reasons for Choosing Model 2 in this Study

From the results of these two models, we have decided to focus our study on model 2 for the following reasons.

According to Ramanathan (1995), if a researcher inadvertently omits an important independent variable then the error term in the model used will no longer be independent of the explanatory variable as long as they are correlated. Hence, the assumption that the explanatory variables are independent of the error term will be violated.

By comparing the Trust Bank Daily Returns (Figure 1) to New Zealand Share Market Index (Figure 2), one should be able to identify that there is sharp fluctuations (I443 and I444) in the Trust Bank daily returns. There are two possible interpretations of this pattern in the behaviour of I443 (5/1/96) and I444 (8/1/96).

One is that information is leaking to some market participants who then purchase the stocks before the public announcement. If this is the case, then stock prices may start to react days, weeks or even months before the official announcement date. Hence, there is some abuse of insider trading rules. Another interpretation is that in the days before the announcement date, the public may become suspicious of an event, hence start to trade their stocks in the market.

Leakage occurs when information regarding a relevant event is released to a small group of investors before official public release. According to Keown & Pinkerton (1981), the semi-strong form of the efficient hypothesis states that all public information is reflected in the market price of a security so that only those possessing inside information can outperform the market on a risk adjusted basis. Any information that is both publicly and private held will be considered as 'private information'. While it is impossible to monitor directly all trading motivated by the possession of inside information, the effects of such trading can be seen through stock price movements immediately prior to the public announcement of some major events (for example, the merger in this study). Systematic abnormal price movements can be interpreted as prima facie evidence of the market's reaction to information in advance of its public announcement.

Figure 1 suggests some leakage and such a finding in this study is consistent with the empirical results of Keown and Pinkerton (1981). who showed trading on inside information just two months before the announcement date of merger. Thus, this is consistent with my conclusion that the I443 and I444 might be due to leakage (as shown in Figure 3 - Abnormal Returns for Trust Bank New Zealand Limited) because if insider trading rules were perfectly obeyed and perfectly enforced, stock prices should

show no abnormal returns on days (as shown in Figure 4)[5] before the public release of relevant news, because no special firm-specific information would be available to the market before public announcement. Therefore, in order to take into consideration of the large increase in abnormal return as shown in Figure 3, it is important to incorporate the two dummies namely, I443 and I444 in the model.
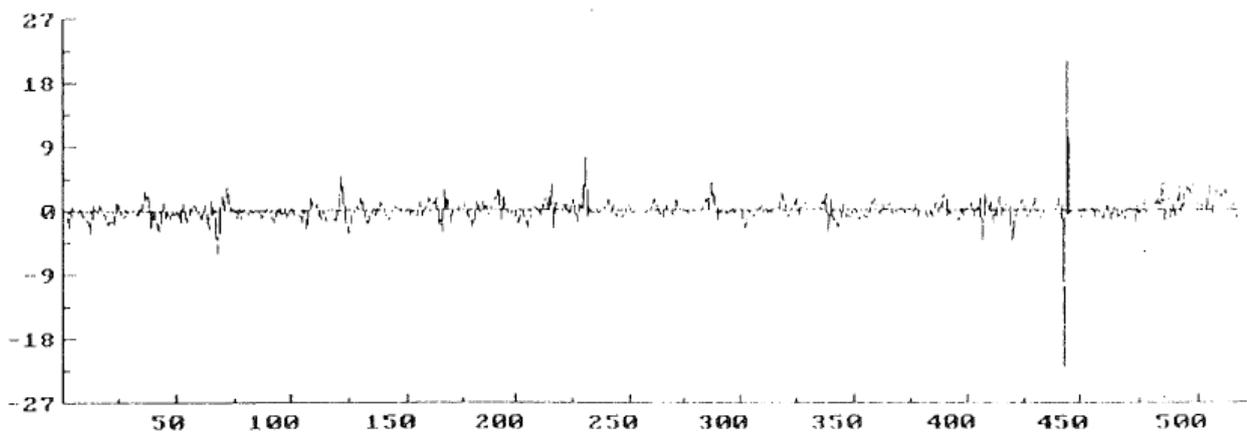
Figure 1
Percent Daily Return to Trust Bank New Zealand Limited from 30/3/94 to 29/4/96

Figure 1 shows that there is big fluctuations in returns of Trust Bank on the 5/1/96 and 8/1/96 (i.e. observation I443 and I444 respectively).

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[5] Figure 4 is taken from the Keown and Pinkerton article, <u>Merger Announcements and Insider Trading Activity:</u> <u>An Empirical Investigation</u>, p.862 where it shows the graph of the abnormal return on a market model where the market is assumed to be efficient.
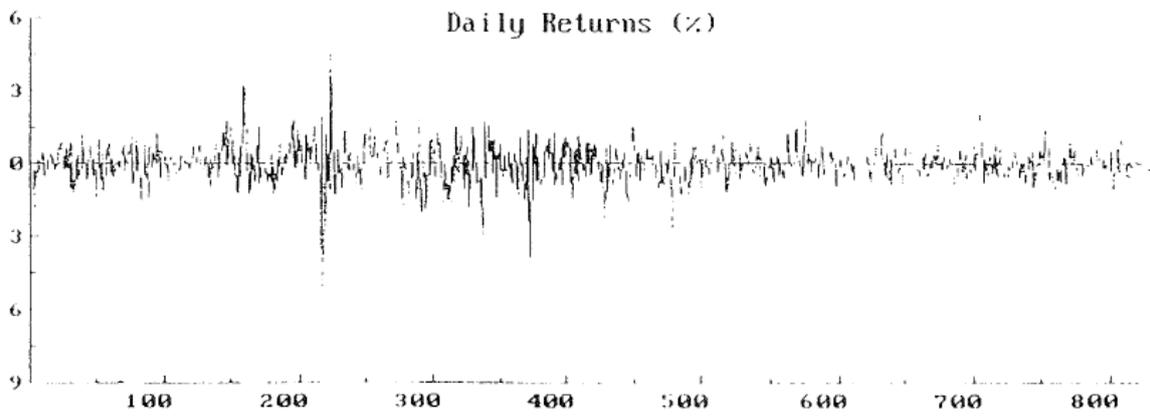
Figure 2
Percent Daily Return to NZSE40 from 6/1/93 to 29/4/96

Figure 2 shows that the daily return (in percent) for NZSE40 from 6/1/93 to 29/4/96.
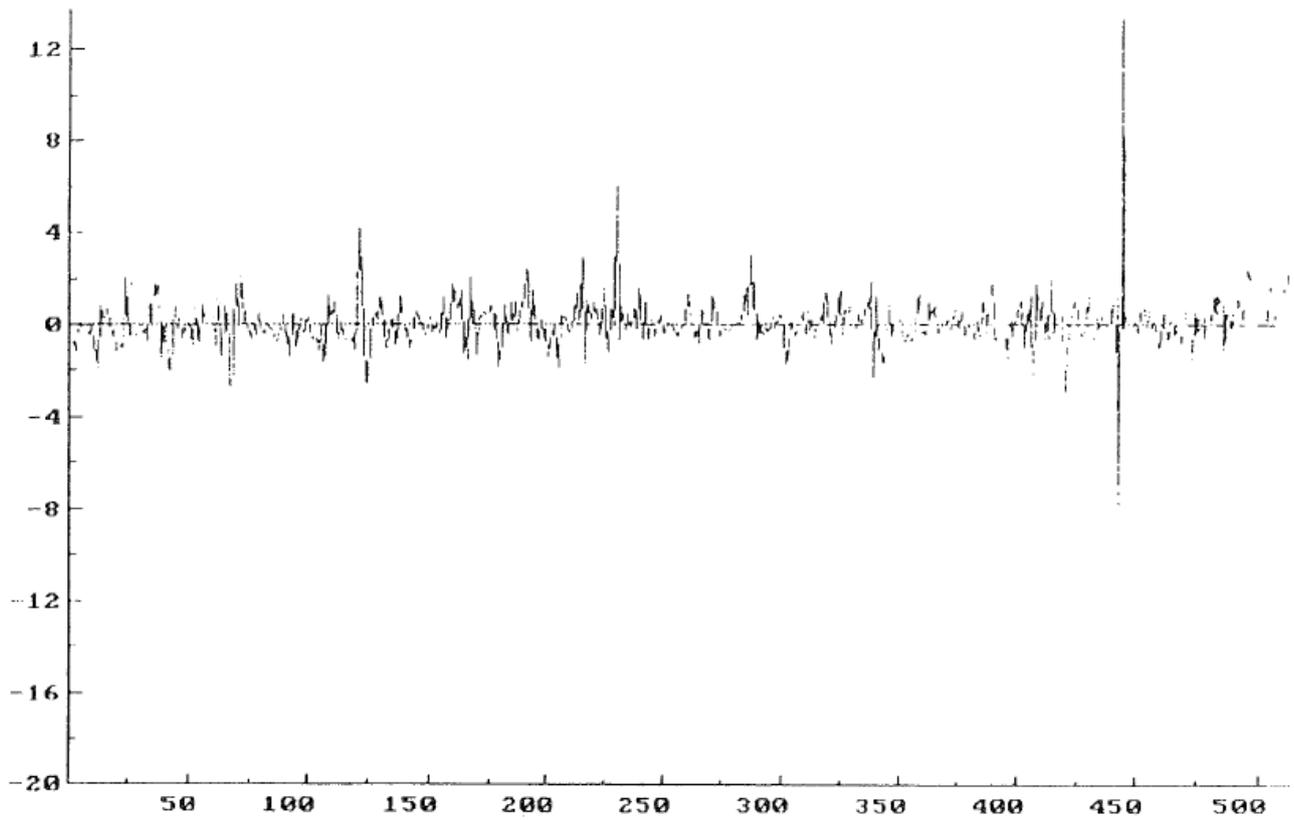
Figure 3
Abnormal Return for Trust Bank New Zealand Limited from 30/3/94 to 29/4/96

Figure 3 shows the abnormal return for Trust Bank on 5/1/96 and 8/1/96 (observation I443 and I444 respectively).

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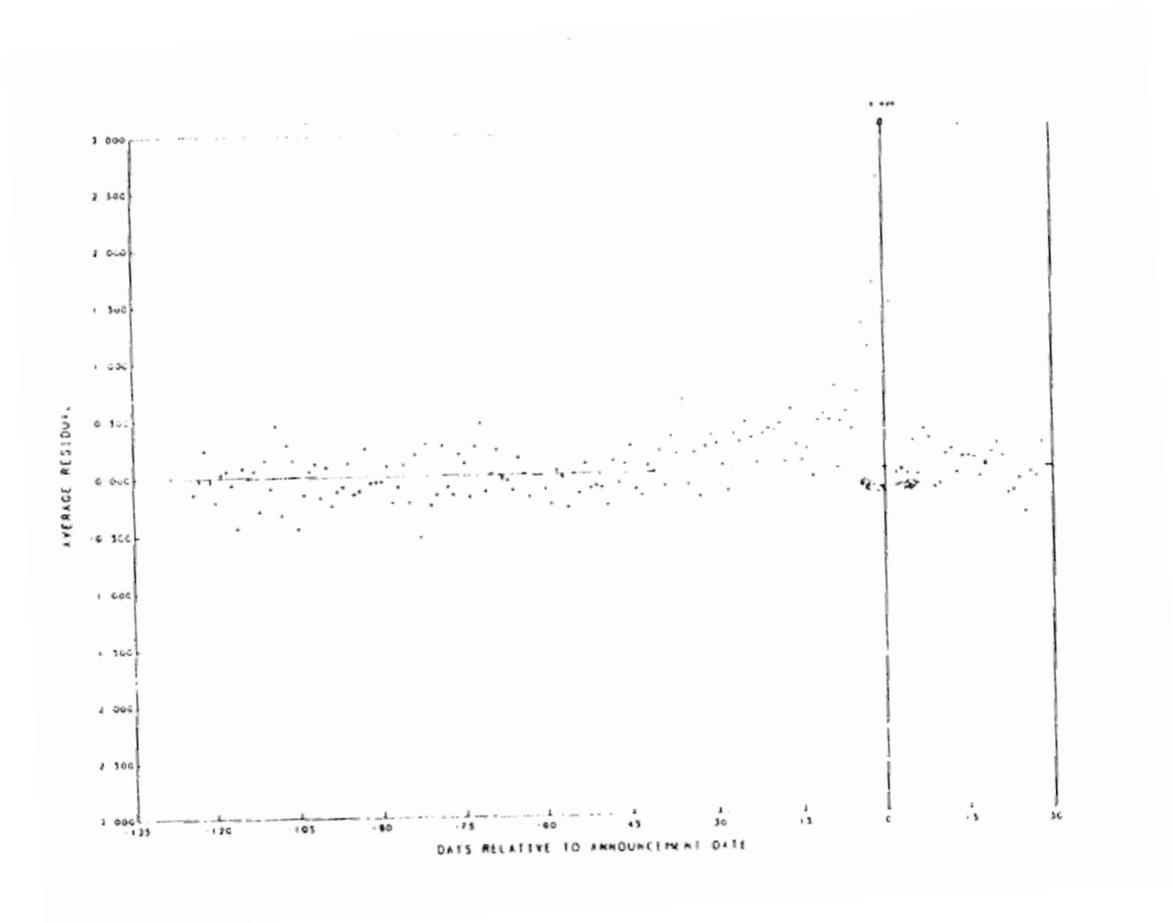
Figure 4
Abnormal Return for the Market Model

Source: J., Keown, and M., Pinkerton,   "Merger Announcements and Insider Trading Activity: An Empirical Investigation", Journal of Finance, Vol.36, No.4, September 1981, p.862.

Figure 4 shows the abnormal return for the market model in general.

There are many significant differences between the two models when the dummy variables I443 and I444 are included as variables in model 2. First, from Tables 1 and 2, we noticed that the R^2 improved significantly (from 3.41% to 56.05%) and the DMON, which was originally significant at 10% level of significance (1.878 vs. 1.645 - its critical value), is now insignificant (0.799 vs. 1.645). However, the t-statistic for NZSER has increased but still remains significant after the dummies, namely I443 and I444 is incorporated into the model.

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Besides, the t-statistics for both dummies are statistically significant different from zero, indicating that these variables are probably important as additional determinants for the stock returns of Trust Bank. To see the importance of these dummy variables in this study, Wald test is performed, (Ramanathan, 1992).

$$\textbf{Fcalc} = \frac{\textbf{\{(RSS1 - RSS2)/ (d.f. 1 - d.f. 2)\}}}{\textbf{(RSS 2 / d.f. 2)}} \qquad (9)$$

$$= \frac{\{(1692.804225 - 770.2476957)/ (481 - 479)\}}{(770.2476957/479)}$$

$$= \textbf{286.8587469} \text{ (approx. 287)}$$

where **RSS1** and **RSS2** are the Residual Sum of Squares from model 1 and model 2 respectively; and **d.f.1** and **d.f.2** are the degrees of freedom from each model. The observed Fcalc is very large and is statistically significant from zero. Thus, we reject the null hypothesis that the regression coefficients for I443 and I444 are zero. Since the two dummies are statistically significantly different from zero, they should be incorporated into the model.

3.2   Reasons for Including Constant and DMON in Model 2

Comparing the results of the two models above, notice that both the constant and the DMON coefficient are insignificant at ten per cent level of significance. Nevertheless, we have not omit them from the model. If the constant had been omitted, the regression line would have been forced through the origin, which might lead to a serious misspecification. In the case of the DMON variable, Keim and Stambaugh (1984),French (1980) and Rogalski (1980), all observe that the weekend effect is a 'hotbed' of empirical research. From their findings, they concluded that Monday effect is actually a weekend effect and this effect should be taken into consideration when the closing price data is used. Therefore, DMON should not be omitted from the model based on these theoretical reasons.

Having chosen model 2 in equation (8) above as the model used,[6] test on normality, autocorrelation (AC) and autoregressive conditional upon heteroskedasticity (ARCH) can be carried out. The test for normality is still rejected in this model although it has improved significantly from 4117.4 to 184.71 (Tables 1 & 2). This is because skewness and excess kurtosis has decreased substantially. The problems of autocorrelation (AC) and Autoregression Conditional upon Heteroskedasticity (ARCH) in model 1 have been taken care of with the inclusion of two dummies (I443 and I444). The p-value for AC is 0.2948, which is greater than 0.10 (10% level of significance) suggests that the null hypothesis is not rejected ($H_0 : AC= 0$) meaning that there is no serial correlation in the error terms. In the case of ARCH, the p-value is 0.2966 which is greater than 0.10 and so also suggests that the error variance is not serially correlated.

3.3   T-test for Abnormal Returns (AR_t)

As mentioned above, the abnormal returns are computed by subtracting the forecast returns from the actual returns[7]. To test whether the AR_t is equal to zero or not, we can use the t-value (Table 3) a day immediately before and after the announcement date (19.3.96 and 21.3.96) to see whether the t-value is significant or not. At the ten per cent level of significance, which gives a critical value of 1.645 (two tailed test), we reject the null hypothesis ($H_0 : AR_t = 0$) on the announcement day itself (20.3.96) because its t-value (2.89006) is greater than its critical value. If we were to test a day before and after the announcement day, which is 19/3/96 and 21/3/96 respectively, its t-value is insignificant (1.122813 and 1.553176 respectively) therefore we do not reject the null hypothesis that $H_0 : AR_t = 0$. This indicates that the market is efficient in absorbing any new information and we can conclude that there is evidence that the market is efficient.

Such a conclusion is consistent with the empirical research done by other researchers; for example, Kritzman (1994) concluded that if the event is unanticipated and the t-statistic is significant on the day of the event but insignificant on the day immediately after the event day, a reasonable conclusion is that the event does affect security returns but without contradicting the efficient market hypothesis. However, if the t-statistic continue to be

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[6] All the results reported from now on is referring model 2 unless stated otherwise.
[7] Refer to Appendices for the abnormal returns for observations from 486 to 520 (i.e. forecast periods - 35 days).

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significant on the post-event days, one might conclude that the market is inefficient as it does not quickly absorb such new information quickly.

Table 3
Summary of Results Obtained from Model 2

Date	AR_t	Std.Error of AR_t	t-value of AR_t
7/3/96	-0.382481	1.27461	-0.300077
8/3/96	1.68717	1.27116	1.32727
11/3/96	-1.00012	1.27983	-0.781445
12/3/96	0.826775	1.27028	0.650863
13/3/96	-0.558793	1.27190	-0.439337
14/3/96	0.861390	1.27008	0.678216
15/3/96	2.62320	1.27881	2.05128
18/3/96	-0.793022	1.27607	-0.6214544
19/3/96	**1.42563**	**1.26970**	**1.12281**
20/3/96	3.67974	1.27324	2.89005
21/3/96	**1.97402**	**1.27096**	**1.55317**
22/3/96	4.05849	1.27080	3.19365
25/3/96	2.31089	1.27691	1.80976
26/3/96	0.864429	1.26969	0.680819
27/3/96	-0.119292	1.27066	-0.0938818

Using the same table (Table 3), we can also observed that the stockholders of the acquired firm, Trust Bank New Zealand Limited, earned large positive abnormal returns around its announcement date. This is consistent with the empirical findings of Asquith and Kim (1982) who also found that the abnormal returns of the acquired firms are positive and statistically significant around announcement dates.

4. Conclusion

This study has examined market efficiency by analysing the behaviour of share prices of Trust Bank New Zealand Limited around the date it was involved in a merger proposition. Any test of market efficiency that is based on a predefined event is simultaneously a test of the information content of the event. There is, however, no general agreement in the literature regarding the relevance of dividend policy, stock splits or mergers for security values. A lack of market reaction following an event may therefore be interpreted as evidence of the irrelevancy of the event, rather than as an indicator of market efficiency. The exact timing of information available is also extremely critical to this study. It is difficult to determine the exact date on which information actually reaches investors. Additionally market price movements following the announcement of an event are effected, not only by the content of the information, but also by how it relates to previous information expectations.

Nevertheless, the empirical analysis of this paper provided some evidence that the market was efficient in assimilating information on the occasion under review, and it supported the semi-strong form of the efficient capital market hypothesis; that is, on average the stock market adjusts in an efficient manner to an event announcement. The results indicated that information that caused Trust Bank New Zealand Limited stock prices to change was absorbed by the market in a single day. There was no evidence of any significant price movements either preceding or following the announcement day. It would thus appear that the market is efficient and is characterised neither by leakage of information or by learning lags.

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