國 立 交 通 大 學

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碩 士 論 文

管理者假性擇時能力之購併事件的驗證

Pseudo Market Timing: Evidence from M&A Events

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中文摘要

過去許多學者發表關於購併的文章中，發現公司進行購併宣告後，主併公司股價存在著長期負向異常報酬的現象。然而一直以來大部分的文章認為購併後的異常報酬的現象是因為管理者具有預測股價的能力所造成的。不過管理者是否具有預測未來股價的能力，一直遭受到學者的質疑。在2003年Schultz提出了假性擇時假說，假性擇時假說認為即使管理者不具有預測股價的能力也會造成異常報酬的發生。有鑒於美國公開市場購併活動的熱絡，本論文採用1995年至2006年間美國公開市場宣告購併活動4358個事件為研究樣本來探討宣告購併事件後所產生的異常報酬是否因為管理者具有預測未來股價的能力所造成的現象還是因為假性擇時假說所造成的現象。本論文的結果發現購併事件後的異常報酬可由假性擇時假說部分解釋，而非因管理者有預測股價能力。

關鍵詞

購併、預測股價能力、假性擇時假說

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ABSTRACT

Numerous authors have documented the long-run underperformance by acquiring firms following mergers and acquisitions. A managerial timing ability hypothesis provided a rational explanation for the past years. However, whether managers have timing ability is subject to much controversy. Schultz offers a new explanation for the phenomenon in which he refers to pseudo market timing in 2003. This thesis uses a sample of 4358 M&As events in the US during the period of 1995 to 2006. This thesis discusses which hypothesis can explain the abnormal returns. Our conclusion proves that the pseudo market timing hypothesis properly explains the abnormal returns of acquiring firms after a merger.

KEYWORDS

Merger and Acquisition, managerial timing ability, pseudo market timing

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育維　二零零八年六月

謹誌於　　新竹交大

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1. Introduction

According to Fama's(1970) "efficient market theory, when the market presents new material information, the stock price of a company will adjust immediately". It is said that portfolio managers and owners cannot obtain abnormal returns in an efficient market. However, many literatures references have studied long-run stock performance which follows important corporate decisions.(e.g. initial public offering、SEO、mergers and acquisitions、the payment of dividends、stock repurchases… …) . This finding, in contrast to the prediction of the efficient market hypothesis, is both interesting and puzzling because it presents an efficient market anomaly in general and is an unknown entity for merger activity in particular.

This section provides a brief review of prior research on post-merger underperformance in both the US and the UK markets. A more comprehensive review is available in Agrawal and Jaffe (2000). It begins with studies that use US market events. Langetieg (1978) reports significant negative cumulative abnormal returns over a six-year period after a merger. Magenheim and Mueller (1988) report a significant CAR of -2.4% in three years after the merger announcement. Anderson and Mandelker(1993) also find significant negative five-year CARs under a size and book-to-market adjustment model respectively. Loughran and Vijh(1997) report a statistically significant five-year BHAR of -15.9% following mergers relative to a size and book-to-market adjusted benchmark. Agrawal and Jaffe (2000) conclude that the long-run post-merger stock performance is significantly negative. In addition, Malatesta (1983) Agrawal et al. (1992) Rau and Vermaelen (1998) documented the underperformance on M&A activity in their papers. Many prior research reports on post-merger stock price performance of UK firms are also provided. Franks and Harris (1989);used a large comprehensive sample of 1800 UK mergers between 1955 and 1985 and found that acquiring firms suffer significant value loss in two-years after the merger. Chatterjee (2000), Aw and Chatterjee (2004), used the market model; and found significant negative

CARs. In addition, Barnes (1984), Dodds and Quek (1985), Limmack (1991), and Limmack and McGregor (1995) documented the underperformance on M&A activity in their papers. A general conclusion from these studies using UK data; is similar to that seen for the US market, statistically significant underperformance following the merger on using different event study metrics.

However, managerial timing ability explains the abnormal returns of acquiring firms after a merger. On M&A activity, the managerial timing ability hypothesis states that managers or owners can predict their stock price and decide to merge their target firms when the acquiring firms were overvalued. There are many examples of literature about the managerial market timing hypothesis which can explain the abnormal returns. Loughran, Ritter and Rydqvist (1994) find little evidence for an ability of IPO activity to forecast future returns. Baker and Wurgler (2000) provide evidence that the proportion of equity issuance in total securities issuance predicts future equity returns in the US. Spiess and Affleck- Graves (1995) discovered long-run negative abnormal returns in SEOs. Baker, Greenwood, and Wurgler (2003)found that managers carefully adjusted the duration of liability to control the change of the yield rate. Ikenberry, Lakonishok and Vermaelen (1995, 2000), as well as Chan, Lkenberry and Lee (2006) discovered that companies with stock repurchases have long-run excess returns. Thus, Loughran and Vijh (1997), Pagano, Panetta and Zingales (1998), Cornett, Mehran and Tehranian (1998), Teoh, Welch and Wong (1998a, 1998b) and Ahn and Shivdasani (1999) also supposed that managers have the ability to predict future returns.

Andrade, Mitchell and Stafford(2001) documented that full merger results hid an important distinction based on the financing of these transactions. In particular, mergers financed with stock, at least partially, have different value effects from mergers that are financed without any stock. Loughran and Vijh (1997) separately calculate long-term abnormal returns for acquiring firms using stock financing and those paying with cash over the period covering 1970-1989. They find that acquiring firms using stock financing have abnormal returns of -24.2 percent over the five-year period after the merger, whereas the abnormal return is 18.5 percent for cash mergers. Travlos

(1987) and others have attributed the negative CARs for merger announcements of acquisitions financed by using stock to this. A firm might be more likely to use stock to finance an acquisition when its stock price has been increasing and, thus, is more likely to be overvalued. Based on mergers financed with stock, this thesis discusses whether the stock price of mergers financed with stock is more likely to be overvalued.

Another grouping that produces a large difference in long-term abnormal returns is based on the book-to-market equity ratio. Firms classified on the basis of high book-to-market are commonly referred to as "value" firms, and tend to have higher returns on average. Firms identified as low book-to-market ratios are referred to as "growth" or "glamour" firms, and have relatively low returns on average. Interpretations of these findings vary. For example, Fama and French (1992, 1993) argue that the relatively high returns of value firms are due to increased risk, perhaps related to distress. On the other hand, Lakonishok, Shleifer and Vishny (1994) argue that the differential returns of value and growth stocks are not related to risk, but instead arise because investors mistakenly estimate future performance by extrapolating from past performance. Using the value/growth distinction, Rau and Vermaelen (1998) calculate the three-year abnormal returns of -17.3 percent for glamour acquirers and 7.6 percent for value acquirers over the period 1980-1991. Based on the book-to-market ratio, this thesis discusses whether the stock price of growth firms is more likely to be overvalued.

In recent years, some papers have allowed the rejection of managerial timing ability. In contrast to the findings described above, other studies find phenomena and behavior patterns on US capital markets that contradict the market timing hypothesis. For instance, on the basis of data about insider-trading, Lee (1997) shows that some managers buy shares prior to price declines. This is contradictory if managers have market timing abilities. Spiess and Affleck-Graves (1999) find stock underperformance as a following to debt issuance. According to market timing, firms tend to issue equity in times of overvaluation and debt in times of undervaluation. Thus, market timing implies that

the there is over performance after debt issues. Rehkugler and Schenek (2001) have to reject the market timing hypothesis as they find larger underperformance for firms that went public in periods of low IPO activity. Similarly at odds with market timing, Loughran, Ritter and Rydqvist (1994) detected a positive correlation between the number of IPOs and future returns.

Other researches alternatively choose to study this issue by means of pseudo market timing. Schultz (2003) proposes an explanation for the apparent long-run underperformance of firms that go public. This explanation is based on the assumption that IPO activities rise with market prices and especially with prices of recent IPOs as managers' or owners' propensity to go public increases with potential IPO proceeds irrespective of their ability to predict future market returns. He argues that the underperformance may be a statistical illusion caused by the clustering of IPOs after a period of unusually high abnormal returns on previous IPO firms. This effect is known as pseudo market timing.

Although managerial timing ability offers an explanation for the phenomenon from prior researches, the pseudo market timing hypothesis also provided another way to explain it. The aim of this thesis is to try to find a better explanation of abnormal returns of acquiring firms after merger. The thesis proceeds via three questions: Could managers predict event-time abnormal returns reasonably between growth firms and value firms? Are the future returns associated with the number of acquiring firms in calendar time and/or event time? Are the future returns associated with the number of acquiring firms on stock mergers in calendar time and/or event time?

The findings of this thesis are easily summarized as follows. First, according to managerial timing ability, the stock price of growth firms are overestimated compared to the stock price of value firms, so the growth firms' abnormal returns should be lower than the returns of the value firms'. This thesis discovered that the growth firms' abnormal returns are higher than value firms'. By definition, it is not consistent with the managerial timing ability hypothesis. Secondly, this

paper tests whether event-time abnormal returns after the merger are negative which is consistent with pseudo market timing and managerial timing ability. Furthermore, this paper tests whether the number of M&As at the decision point is significantly related to the M&A index after the merger in calendar time. However, this thesis discovered that event-time abnormal returns after the merger are negative and that the number of M&As are not significantly related to the M&A index after merger in calendar time. By definition, it is partly consistent with the pseudo market timing hypothesis but allows for a rejection of managerial timing ability. This thesis explains this by using 144 monthly data spanning from 1995 to 2006. Finally, analogically, according to managerial timing ability, they will be more intense to merge by utilizing stock mergers if managers have the timing ability to predict the overvalued price. This thesis detects that the number of M&A activities are not significantly related to the future M&A index in calendar time. However, this thesis discovered that event-time abnormal returns after the stock merger are negative and that the number of M&As on stock financed is not significantly related to the M&A index after the stock merger in calendar time. By definition, it is partly consistent with the pseudo market timing hypothesis but allows for a rejection of managerial timing ability. This paper examines a phenomenon that we refer to as pseudo market timing partly and shows that it can explain the poor event-time performance of stocks that have recently undergone M&A activities.

The remainder of the paper is organized as follows. Section II introduces the pseudo market timing hypothesis. Section III describes the research method. Section IV introduces the research results and section V offers conclusions for this study.

2. Pseudo Market Timing

The idea of pseudo market timing is that many firms make M&As when past returns have been positive and; because higher stock prices imply more downside space and prompt firms do mergers and acquisitions. Firms could make more mergers and acquisitions at higher prices

because managers trust that they result in less earnings dilution and incorrectly believe that stock prices are too high, or for other reasons. Returns of private firms (that potentially may make M&As) and firms that actually make M&As are assumed to follow a simple binomial process.

A simple example:

This thesis follows Schultz (2003) and analyzes the pseudo market timing hypothesis in a two-period model. This thesis examines two-period returns following mergers rather than multi-period returns. The market return is normalized to zero in both periods. We assume that the market earns a return of zero and the aftermarket return of M&A is equal to the market return plus an excess return of either + 10 percent or - 10 percent. Positive and negative excess returns are equal, and are unpredictable. According to the binomial process, (the abnormal return in period 1 (between date 0 and date 1) is denoted by r_1. Similarly, let r_2 denote the abnormal return in period 2 (between date 1 and date 2))

I. $r_1 = +10\%$ and $r_2 = +10\%$;

II. $r_1 = +10\%$ and $r_2 = -10\%$;

III. $r_1 = -10\%$ and $r_2 = +10\%$;

IV. $r_1 = -10\%$ and $r_2 = -10\%$.

The abnormal returns in periods 1 and 2 can take four different paths. This thesis assumes that the stock price of each firm is $100 at time zero. For this example, we assume that no firms make M&As if stock prices for potential M&As are $95 or less; There is one M&A if prices are between $95 and $105; There are three M&As if prices exceed $105. When two possible paths excess returns for each period, there are four equally possible paths of mergers and excess returns. Figure 1 corresponds to one of these paths.

Considering the upper path as shown in figure1, it is evident that M&As earn positive excess

returns for each period. At time 0, stock prices are $100 and one firm makes mergers and acquisitions. The M&A earns an excess return of 10 percent following the period. At time 1, with a M&A price of $110, three firms make mergers and acquisitions. Each of these M&As earns an excess return of 10 percent. In total, there are four M&As for this path: one at time 0 and three at time 1. If we calculate the average excess returns, we weigh each M&A equally and get a mean excess return of 10 percent after mergers.

There are four equally possible stock price paths and only one will occur. Figure I reveals that when the average aftermarket excess returns are calculated in event time, that is weighting each return equally on M&As, the mean excess returns are positive for one path and negative for three paths. Even though the expected aftermarket return for any individual M&A is zero, there is a 75 percent probability that the observed mean aftermarket return will be negative.

In this example, the decision to make mergers and acquisitions is a response to the current price; It is not made because future returns are predictable. As an illustration, two of the paths have a stock price of $110 at time 1 in the example. On each of the paths, three M&As are issued at time 1. The aftermarket excess return for M&As issued at time1 is positive for one of the paths and negative for the other. Ex-ante, the number of M&As is unrelated with future excess returns.

This thesis observes that although the probability of observing a price path where equal-weighted aftermarket returns are negative is 75 percent, a M&A is never a bad decision ex-ante. To see this, note that if you weigh each of the four price paths by the number of M&As on each, the expected return is zero. Those price paths with the highest excess returns also have the most mergers.

This example is simple, but it includes the key point of pseudo market timing. First, the likelihood of observing negative abnormal returns in event time far exceeds 50 percent even though the ex-ante expected excess return of every M&A is zero. This is because as the number of M&As increase with higher stocks prices, the M&As will cluster when prices are near their peak. Second,

excess returns are negative in event time and zero in calendar time. The results are still unchanged if more than two periods are considered, if aftermarket returns are calculated over more than one period or if the market earns a non-zero return. Similarly, if the number of M&As increase after the M&As have done well in the aftermarket, the likelihood of losing money on average is high, even though each M&A is a fair game. In this example, the decision to conduct a merger is a response to current price levels; it is not made because future returns are predictable.

Although the example employed here used only two periods, the pseudo market timing is not a small sample. In fact, underperformance is more likely to be observed in a long time series than in a short one. Schultz demonstrates this. He relies on simulations of a binomial model like the one in the Figure I example. The likelihood of observing underperformance increases steadily with the length of the time series. Pseudo market timing is not a small sample problem.

3. RESEARCH METHOD

3.1. RESEARCH HYPOTHESIS

According to the definition of managerial timing ability and pseudo market timing, this paper constructs three types of research hypotheses to clarify which theory explains the post-merger abnormal returns correctly.

Hypothesis 1: According to managerial timing ability hypothesis, the correlation between post-merger abnormal returns and a firm's book-to-market ratio is negative.

According to the managerial timing ability hypothesis, managers decide to merge with other firms because managers predict that their stock price is overvalued. Rau and Vermaelen (1998) discovered that the value firms' (high book-to-market ratio) abnormal return is higher than the returns of the growth firms'. Thus, the growth firms' stock price is overvalued more heavily. According to the managerial timing ability, the growth firms' post-merger abnormal returns should be lower than the value firms' post-merger abnormal returns.

Hypothesis 2: According to managerial market timing hypothesis, the relation between the number of M&A and the future M&A index is negative and event-time abnormal returns after mergers are also negative. However, according to pseudo market timing, event-time abnormal returns after a merger is also negative but the relation between the number of M&A and the future M&A index is not negative.

According to the managerial market timing hypothesis, managers have the ability to predict future prices. When managers predicted that their price is overvalued, they decided to merge with other firms. The relation between the number of M&As and the future M&A index should be negative. The event-time abnormal return after the merger should also be negative. Furthermore, according to pseudo market timing, firms merger when past returns were positive. However, it presents a case that event-time abnormal returns are also negative but the relation between the number of M&As and the future M&A index should not be negative.

Hypothesis 3: According to managerial market timing hypothesis, the relation between the number of M&As using stock financing and the future M&A index is negative and the event-time abnormal returns of firms using stock financing is also negative.

The full samples hide an important distinction based on the financing of these transactions. In particular, mergers financed with stock, at least partially, have different value effects from mergers that are financed without any stock. Myers and Majluf, (1984) explained that post-merger abnormal returns are the result from the information differences between managers and outside investors. The basic idea is that managers are more likely to merger when they perceive that it is overvalued by the stock market than when they think the company is undervalued. According to managerial market timing hypothesis, mergers financed with stock are more intense with the stock market than mergers that are financed without any stock. The relation between the number of mergers financed with stock and the future M&A on the stock merger index should be more significant than the full M&As and event-time abnormal return also is more significantly negative.

3.2. Definition of Variables

1. Number of M&A:

This paper uses the number of M&A as the announcement activity. Monthly number of M&A is calculated by summing the number of announcement on merger each month from1995 to 2006.

2. The M&A Index

This paper uses the M&A index as a monthly equally weighted performance index consisting of companies characterized as having M&As which date back a maximum of three years. The M&A index is calculated by equally weighing the companies' monthly prices in computing the results. Analysis of the movement of the post-merger profitability ratios are one of the major objectives in this paper.

3. Abnormal Stock Returns

Abnormal stock returns measures stock performance both prior to and subsequent to the M&A announcement. Abnormal stock returns are calculated by subtracting the expected returns from actual returns in event time. This paper uses BHRs method to calculate the holding returns. Because of its ability to provide a more meaningful interpretation, much of our analysis relies on an annual buy-and-hold returns approach (BHRs).

4. Cold Months

Figure 2 ranked a three-month moving average of M&A number into quartiles. The cold months are defined as a period of at least three consecutive months where the number of M&As are below the lower quartile (1rd quartile). The variable of cold months is coded "1" if the number of M&As are below the lower quartile; and otherwise it is coded as "0".

5. Hot Months

Figure 2 ranked a three-month moving average of M&A numbers into quartiles. We define hot periods as occurring for at least three consecutive months where the number of M&As exceed the upper quartile (3rd quartile). The variable for hot months is coded "1" if the number of M&As is

above the upper quartile; and otherwise it is coded as “0”.

6. Stock-financed mergers

Stock-financed mergers refer to the case when bidders use majority payment with stock to obtain absolute control.

7. Book-to-Market Ratio

This paper calculates a firm’s book-to-market ratio by using the book value of common equity divided by the market value of common equity from the COMPUSTAT data. The book value of common equity is subtracted from annual data prior to the announcement date. The market value of common equity is subtracted from the daily data prior to the announcement date. According to the book-to-market ratio degrees, we ranked them into five levels. The highest level defines the high B/M and the lowest level defines the low B/M. The rest of the levels define the mid B/M.

8. Firm Size

This paper calculates firm’s size using numbers of outstanding shares minus monthly prices from the COMPUSTAT data. According to the degree of a firm’s size, we ranked five levels.

3.3. Research Model

In order to analyze the event-time abnormal return, this paper uses the BHARs method to test the hypotheses 1~3 and the bootstrap to perform hypothesis tests in the presence of nonnormality. In order to analyze the calendar-time relation between M&A activity and the M&A index, this paper uses the negative binominal regression model to test hypothesis 2 and hypothesis 3.

3.3.1. BHAR Method

Although a conventional cumulative abnormal return (CAR) approach is straightforward to estimate, this approach implicitly assumes frequent rebalancing,[1] which induces an upward return

bias due to a bid-ask bounce[2] (Conrad and Kaul (1993)). To avoid this problem, we focus on buy-and-hold returns, BHRs.

This thesis tried to calculate the long-horizon buy-and-hold abnormal returns as:

$$BHAR_i = \prod_{t=1}^{T}(1 + r_{it}^{a}) - \prod_{t=1}^{T}(1 + r_{it}^{e}) \quad (8)$$

Where $BHAR_i$ is the t period buy-and-hold abnormal return for sample firm *i*, r_{it}^{e} is the t period buy-and-hold return of control firms, and r_{it}^{a} is the t period buy-and-hold return of sample firm *i*. We calculate annual BHRs for each firm in our sample for the year before and the five years following the M&A announcement, where each year is defined as 252 trading days.

This thesis follows the findings from Lee (1997) and Chan, Ikenberry and Lee (2004) and uses five matching firms to reduce the noise that may occur when examining smaller sub-samples. These control firms are selected by choosing non-M&A firms with the closest B/M ratios relative to the M&A firm which also belong to the same size deciles. It is well-documented that the common stocks of small firms and firms with high book-to-market ratios earn high rates of return (Fama and French (1992), Chan, Jegadeesh, and Lakonishok (1995), Davis (1994), Barber and Lyon (1997b), Fama and French (1997)). Consequently, this thesis considers portfolios or control firms selected on the basis of firm size and book-to-market ratios.

In this research, this method uses either technique:

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1 Frequent rebalancing results in the CAR method in calculating return on a portfolio rebalances the portfolio, but firms on M&A announcement don't rebalance composed firms. In the BHAR method, the control firms and firms of the M&A announcement in calculating returns have no rebalance composed firms

2 Especially for smaller, less liquid stocks, bid-ask bounce can create the illusion of a price change when in fact there wasn't really a change. Recall that in a market, the interested buyers of a stock post the "bid,"

(1)This thesis uses twenty-five size and book-to-market reference portfolios. These portfolios are formed as follows. Five size reference portfolios are created. Each size portfolio is further partitioned into five book-to-market quintiles in year *t*.

(2)Portfolio returns are computed based on BHRs of sample firms, assuming an equal-weighted investment strategy. Longer horizon portfolio returns are obtained by compounding annual portfolio returns across event times.

(3)The BHAR is calculated by the portfolio returns minus the return of the matched firm on a size and book-to-market matched sample firm as a proxy for the expected returns.

3.3.2. Statistical Tests and Simulation Method

This section describes the statistical tests that this thesis analyzed in tests of event-time abnormal returns. This thesis describes the simulation method used to evaluate the empirical specification of these tests. The bootstrapping technique was used to calculate the empirical *p*-values. This method is recommended by Lyon, Barber and Tsai (1999) as a way to avoid a potential bias caused by skewness in long-horizon returns (Kothari and Warner(1997)). In this approach, the method generates the empirical distribution of long-run abnormal stock returns under the null hypothesis.

(1) Specifically, this thesis randomly replaces each sample firm with another firm with the same size and B/M group at the time of the M&A announcement, and thus formed a "pseudo" portfolio.

(2) This thesis tried to calculate BHRs and then BHARs for this particular portfolio as if it is our sample portfolio.

(3) This thesis repeated this process for a 1,000 times to form an empirical distribution of abnormal returns.

(4) The statistical significance of the sample portfolio abnormal performance is measured by the empirical *p*-value.

(5) The null hypothesis occurs when the mean long-run abnormal return is zero; The null hypothesis tested by approximating the empirical distribution of the mean long-run abnormal returns which is defined as being when the mean long-run abnormal return equals the mean long-run abnormal return for the 1,000 portfolios. This hypothesis is rejected at the significance level if:

$$\overline{AR}_t^p \leq y_l^* \quad \text{or} \quad \overline{AR}_t^p \geq y_u^* \tag{9}$$

The two *y** values are determined by solving

$$\Pr[\overline{AR}_t^p \leq y_l^*] = \Pr[\overline{AR}_t^p \geq y_u^*] = \frac{\alpha}{2} \tag{10}$$

where $\overline{AR}_t^p$ are the $p = 1, \ldots, 1{,}000$ mean long-run abnormal returns generated from the portfolios. This section summarized the statistical methods that this thesis evaluated.

3.3.3. Negative Binomial Regression Model

This thesis estimates the context that the decision to merge is a response to current price levels; and is not made because future returns are predictable.

In order to control for the discrete and non-negative natures of the variables, this thesis applies a count data regression model.[3] A natural starting point is the poisson regression model, where the dependent variable follows a Poisson distribution with mean u_t in each time point *t*.

3 See Green, 2003, p. 740. Dahlquist and De Jong (2004) apply similar count data regression models in order to analyze pseudo market timing in the US. Schultz (2003), however, ignores the count data characteristics of the number of IPOs and applies linear regression models.

u_t is linked to the independent variables $x_{1,t},...,x_{n,t}$ as follows:

$$u_t = \exp(\beta_0 + \beta_1 x_{1,t} + \beta_2 x_{2,t} + ... + \beta_n x_{n,t}) \tag{1}$$

Unfortunately, the Poisson distribution with density

$$f(y|u_t) = \frac{\exp(-u_t)u_t^{\,y}}{y!} \tag{2}$$

has only one free parameter u_t which at the same time corresponds to the mean and the variance of the distribution.

As in our sample, the count data usually shows more variability than what can be accounted for by the Poisson distribution. Hence, we introduce a stochastic parameter ε to allow for unobserved heterogeneity:

$$= \exp(\beta_0 + \beta_1 x_{1,t} + \beta_2 x_{2,t} + ... + \beta_n x_{n,t}) \exp(\varepsilon) \tag{4}$$

This equality of the mean and variance is referred to as equidispersion. When the variance is larger (smaller) than the mean, we have overdispersion (underdispersion). Empirically, overdispersion is common (for example, we have noted that the number of M&As is unconditionally overdispersed). To allow for overdispersion, we let the number of M&As in a month to be drawn from the mixing of a Poisson distribution and a gamma distribution.

Let the unobservable random variable $z = \exp(\varepsilon)$ follow a gamma distribution with density

$$g(z|\alpha,\beta) = \frac{z^{\beta-1}\exp(-z/\alpha)}{\Gamma(\beta)\alpha^{\beta}} \tag{5}$$

and with parameters α>0, β>0. Setting β=1/α, this gamma distribution has mean 1 and

variance α and therefore does not bias the model, but introduces unobserved heterogeneity. Especially, for α→0 we yield the simple poisson regression model since z equals 1 deterministically. The distribution of the dependent variable now results from the marginal distribution with density

$$h(y|u_t,\alpha)=\int_0^\infty f(y|u_t,z)g(z|u_t,\alpha)dz \tag{6}$$

$$=\frac{\Gamma(\alpha^{-1}+y)}{\Gamma(\alpha^{-1})\Gamma(y+1)}\left(\frac{\alpha^{-1}}{\alpha^{-1}+u_t}\right)^{\alpha^{-1}}\left(\frac{u_t}{\alpha^{-1}+u_t}\right)^{y} \tag{7}$$

This is a negative binomial distribution with mean u_t and $u_t(1+\alpha u_t)$. Thereby we come up with the negative binomial regression model which nests the poisson regression model, as noted earlier.[4]

If possible, the natural logarithms of the independent variables enter the regression models to avoid a fixed exponential link, but allow for different functional links between the independent variables and the dependent variable.

3.4. Source of Data

This thesis's analysis begins with all firms trading on the NYSE/AMEX/NASDAQ exchange with available data on the monthly stock returns; monthly price, daily price and daily stock return files are created by the Center for Research in Security Prices (CRSP). In addition, the book value of equity per share and the number of outstanding shares are obtained from COMPUSTAT data. This thesis eliminated all firms whose information was not present on the CRSP or whose accounting information was not available on the annual Compustat records.

4 For a more detailed derivation of the negative binomial model see Cameron/Trivedi (1998), pp.100.

4. RESEARCH RESULTS

4.1. DESCRIPTIVE STATISTICS

This thesis obtained the useful sample sets of material mergers and acquisitions from the Securities Data Corporation Worldwide Mergers and Acquisitions database (SDC). Table 1 presents the data that uses the following criteria:

(1)All acquiring and target firms are US public firms;

(2)The announcement date is from 1995 to 2006 inclusively;

(3) The deal value of the merger is more than one million US dollars;

(4) The study excludes financial and utility industries;

(5) Bidders acquire at least 50% of the targets in obtaining absolute control;

(6)The acquirer must trade on the New York exchange (NYEX), the American exchange (AMEX)and the NASDAQ exchange;

Table 1 presents sample data. After dropping those cases with missing daily stock returns, there are a total of 4358 firms in the sample. After dropping those with a missing book-to-market ratio and size, there are a total of 3330 firms in the sample.Hypothesis 1 discusses a large difference in event-time abnormal returns based on the book-to-market equity ratio, and this analysis uses a total of 3330 firms in the sample. Hypothesis 2 discusses the difference in event-time abnormal returns on M&A activity, and this analysis uses 4358 firms in the sample. Furthermore, this hypothesis discusses the relation between the number of M&A and the M&A index, and this analysis uses a total of 13685 firms in the sample. Hypothesis 3 discusses the difference in event-time abnormal returns based on the stock financing, and this analysis uses 2518 firms in the sample. Furthermore, this hypothesis discusses the relation between the number of M&A financed with stock

on and the M&A index, this analysis uses a total of 5,044 firms in the sample.

Table2 is the descriptive statistics of 4,358 sample firms from1995 to 2006. The book-to-market ratio is 0.66 on average, and registers an especially high number of 3.125 in 1997. The firms' size is $823 billion on average, but different periods have a large difference of values. The higher values are $1,663 billion in 2000, and the lower values are $159 billion in1995.

Figure 3 presents the number of M&As monthly and the M&A index monthly from 1995 to 2006. The number of M&As monthly gradually increases from 1995 to 2000 and then decreases until 2001. However, the number of the M&As above 100 in the M&A index from 1995 to 2000 is more than the number of M&As from 2001 to 2006.

4.2. Hypothesis 1

According to the managerial timing ability hypothesis, managers decided to merge with other companies because the managers predicted an overestimated stock price of acquiring firms. By definition, the growth firms' stock price is overestimated more heavily before the merger. The growth firms' abnormal returns before the merger should be higher than the value firms' abnormal returns before the merger and the growth firms' abnormal returns following the merger should be lower than the value firms' abnormal returns following the merger.

Table3 presents the results of abnormal returns sorted by a book-to-market ratio from a period of one year before the merger announcement to a five year after merger announcement. However, this thesis detects that the growth firms' abnormal returns over one year before the merger is 4.67% and the value firms' abnormal returns over one year before the merger are 75.6%. Furthermore, this thesis detects the growth firms' abnormal returns over one year after the merger is -9.5% and the value firms' abnormal returns over one year after the merger is quite significant at -11.39%. Obviously, the growth firms' abnormal returns over one year before the merger is lower than the value firms' abnormal return and the growth firms' abnormal return over one year after the merger is higher than

the value firms' abnormal return. Both of results are not consistent with the theory that managers could predict the future price. To conclude, the result allows rejection of the managerial timing ability hypothesis.

4.3. Hypothesis 2

According to the managerial timing ability hypothesis, if managers could predict overestimated stock prices, managers would have more desire to make M&As. As a result, the abnormal returns should be more significant compared to other firms and should be negative. Furthermore, according to pseudo market timing, acquiring firm mergers when past returns were positive and then event-time abnormal returns should also be negative. Table 3 presents the event-time abnormal returns of acquiring firms. The event-time abnormal returns of acquiring firms over one year after mergera are -4.53% significantly. The evidence is consistent with managerial timing ability and pseudo market timing.

According to pseudo market timing, abnormal returns of acquiring firms after a merger is zero in calendar time. However, according to managerial timing ability, if managers could predict overestimated stock price, abnormal returns after mergers should be negative in calendar time. If each calendar month is weighted equally, however, M&As do not underperform their benchmarks in efficient capital markets as a clustering of M&As is irrelevant in an analysis based on calendar time. Thus, pseudo market timing predicts that M&A activities do not underperform from their benchmarks. This section tries to test whether the number of M&As is associated significantly with the M&A index levels in calendar time. Table 4 presents the coefficient estimates for four negative binomial regression models with the M&A index level at t+1 point of time as the dependent variable based on the number of M&As and the M&As index levels at the decision point of time in the US between 1995 and 2006. The interpretation of a coefficient is not as straightforward as its impact on the M&A level at a certain point of time and depends on the realizations of the other

independent variables at that point of time. Model I comprises the calendar time control variables only. All coefficients are highly significant and exhibit the signs expected regarding the dummy definitions. As the model exhibits a highly significantly fits of the data, this thesis keeps the calendar time control variables in the following regression models. This phenomenon can be attributed to the release of updated corporate planning figures which facilitate the valuation of the IPO firm (Bösl (2004), pp. 57). Models II to III provide the view into the separate explanatory power of market return levels and the number of M&As at the decision point of time t. The coefficients of the number of M&A at the decision point of time are not significant. But the coefficients of M&As index levels at the announcement of M&As are significant.

The result might indicate that the M&As index level at t+1 point of time is not significantly related with the number of M&As at the decision point of time, while the market return level at t+1 point of time is more strongly driven by the market return level at the decision point of time. Model IV includes that all variables are considered. The signs and p-values of the coefficients reflect the results. Only, the positive coefficient of the market return level at the decision point of time is highly significant. As expected, model VI exhibits the high explanatory power of all models with a Pearson Chi-Square of 0.9537.

To conclude, the M&As index level at t+1 point of time on M&As activity is not significantly related to M&A activity, which is partly consistent with the pseudo market timing hypothesis and allows a rejection of the managerial timing ability.

4.4. Hypothesis 3

According to the managerial timing ability hypothesis, if managers could predict an overestimated stock price, managers will have more desire to pay with majority of stock to make M&As. However, the correlation between the stock market and acquiring firms on stock

mergers should be more intense. As a result, the abnormal returns should more significant compared to other firms. Furthermore, according to pseudo market timing, event-time abnormal returns also should be negative. This paper tests whether event-time abnormal returns after mergers are negative. Table5 presents the event-time abnormal returns of firms on stock mergers. The event-time abnormal returns of the firms on stock mergers over one year after merger are -14.49%. The evidence is consistent with the managerial timing ability hypothesis and the pseudo market timing hypothesis.

Analogically, according to managerial timing ability, abnormal returns of acquiring firms on stock mergers are negative. Furthermore, according to pseudo market timing, abnormal returns of acquiring firms on stock mergers are zero in calendar time. This section tries to test whether the number of M&As on stock mergers is associated with the M&A index levels in calendar time.

Table 6 presents the coefficient estimates for four negative binomial regression models with the M&As index level at t+1 point of time as the dependent variable based on the number of the firms on stock mergers and an M&A index level at the decision point of time between 1995 and 2006 in the US.

This results in table 4 reveal that the M&A index level at t+1 point of time is not related with the number of firms on stock mergers at the decision point of time, while the M&As index level at t+1 point of time is more strongly driven by the M&As index level at the decision point of time. Model IV includes all variables considered here. The signs and p-values of the coefficients reflect the results. The positive coefficient of the M&As index level at the decision point of time is only highly significant. Model VI exhibits the high explanatory power of all models with a Pearson Chi-Square of 1.0862.

According to the Pseudo market timing hypothesis, no matter what the number of M&As are, the excess return should be zero in calendar time. Then the coefficient of the number of firms with stock mergers on M&A activity at the decision point of time is not

significant in calendar time. The result is partially consistent with the Pseudo timing ability hypothesis. According to managerial timing ability, abnormal returns of acquiring firms on stock mergers should be negative. Obviously, the result allows a rejection of managerial timing ability.

5. Conclusions

If managers have the ability to predict stock prices, they can choose the right time to make important decisions. Many empirical researches show the existence of long-run abnormal returns after important decisions. Managerial timing ability offers a rational explanation for the past year. In recent years, many authors doubt the results. However, pseudo market timing provides an alternative explanation. Based on a large sample of M&As in US between 1995 and 2006, we investigate whether the abnormal returns after mergers are due to the managerial timing ability or due to pseudo market timing.

The main results are as follows. First, according to growth firms' and value firms' characteristics, we find that the value firms' abnormal returns are lower than the growth firms' one year after the merger. The evidence allows the rejection of managerial timing ability.

Second, this thesis uses the negative binomial regression models with the M&A index level at t+1 point as the dependent variable based on the number of firms at the decision point of time and M&A index levels at the decision point of time. This result observed that it is not significantly negative between the numbers of M&As at the decision point of time and M&A index level at t+1 point of time. The results reveal that ex-post prices do not have significantly abnormal returns in calendar time. The evidence is in contrast with the managerial market timing and partly is consistent with pseudo market timing.

Finally, the correlation between the stock market and firms on stock mergers should be more intense, as a result, the abnormal returns should more significant compared to other

firms. This thesis tests whether the abnormal return of acquiring firms on stock mergers in event time and calendar time fit in with managerial timing ability hypothesis. The abnormal returns of firms on stock mergers over one year after the merger are -14.49% in event time. The M&A index level at t+1 point on M&A activity is not significantly related to the number of firms on stock mergers on M&A activity on decision points in calendar time. The result is partly consistent with a pseudo market timing hypothesis but in contrast with managerial market timing.

This findings of this thesis indicate that firms simply make M&As for current market prices but not for the future market prices. The evidence proves that the pseudo market timing hypothesis better explains the abnormal returns of firms after mergers.

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Figure1:Pseudo Market Timing Hypothesis and Mergers and Acquisitions

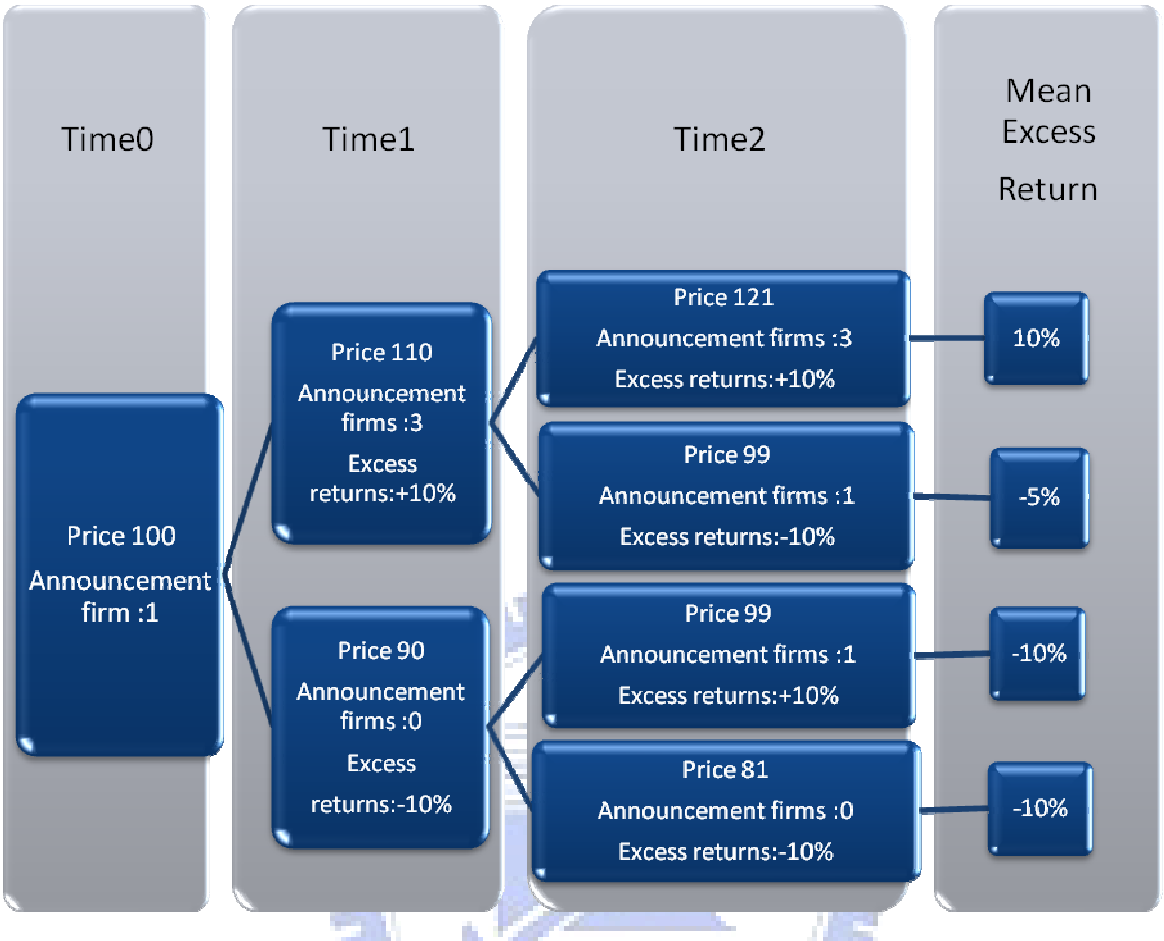

Figure 2: Hot and Cold Months Classified by the Number of Transactions

Hot and Cold months classifications are based on quartile ranking of a three-month moving average of the aggregate number of mergers and acquisitions in US, obtained from SDC. Hot months are at least three contiguous months where the number of mergers and acquisitions exceeds the upper quartile. Cold months are at least three contiguous months where the number of mergers and acquisitions are below the lower quartile.

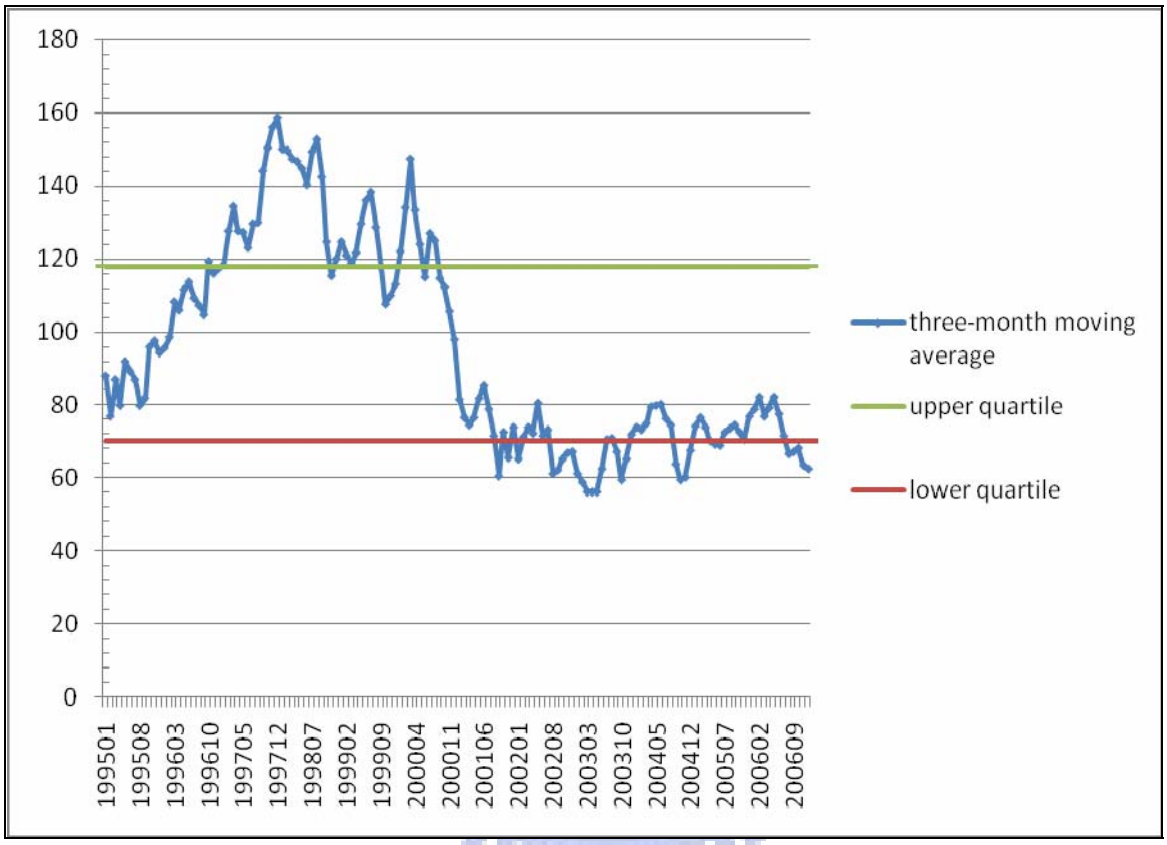

Table1: Sample data

The standard of criteria	Number of sample
The announcement date is from 1995 to 2006	133452
The acquirer traded on the New York exchange , the American exchange and the NASDAQ exchange	55422
Excluding financial and utility industries	40599
The deal value is more than one million US dollars	23619
Bidders acquire at least 50% of the targets	13685
Merger financed with stock	5044
Dropping those with missing daily stock returns	4358
Dropping those with missing B/M ratio and size	3330

Table2: The Descriptive Statistics of 4358 Sample Firms from1995 to 2006

	Number of announcement	Number of Stock-financed mergers	Number of announcement with fully stock return	size($M)	Book-to-market ratio
1995	1058	399	74	$159,138.75	0.4622444
1996	1332	448	183	$406,091.64	0.37743
1997	1680	699	225	$993,420.17	3.1245392
1998	1650	708	344	$812,372.98	0.393979
1999	1456	638	353	$1,249,754.15	0.3643382
2000	1425	753	526	$1,663,386.69	0.3872473
2001	884	395	336	$1,442,218.75	0.4403033
2002	826	253	407	$663,514.07	0.5497321
2003	775	209	401	$535,318.04	0.518838
2004	861	178	489	$630,562.29	0.4426811
2005	884	209	573	$859,165.89	0.4384489
2006	854	155	447	$464,085.92	0.4436487
All	13685	5044	4358	$823,252.45	0.66

Figure3: Monthly Number of M&A and Monthly M&A Index from 1995 to 2006

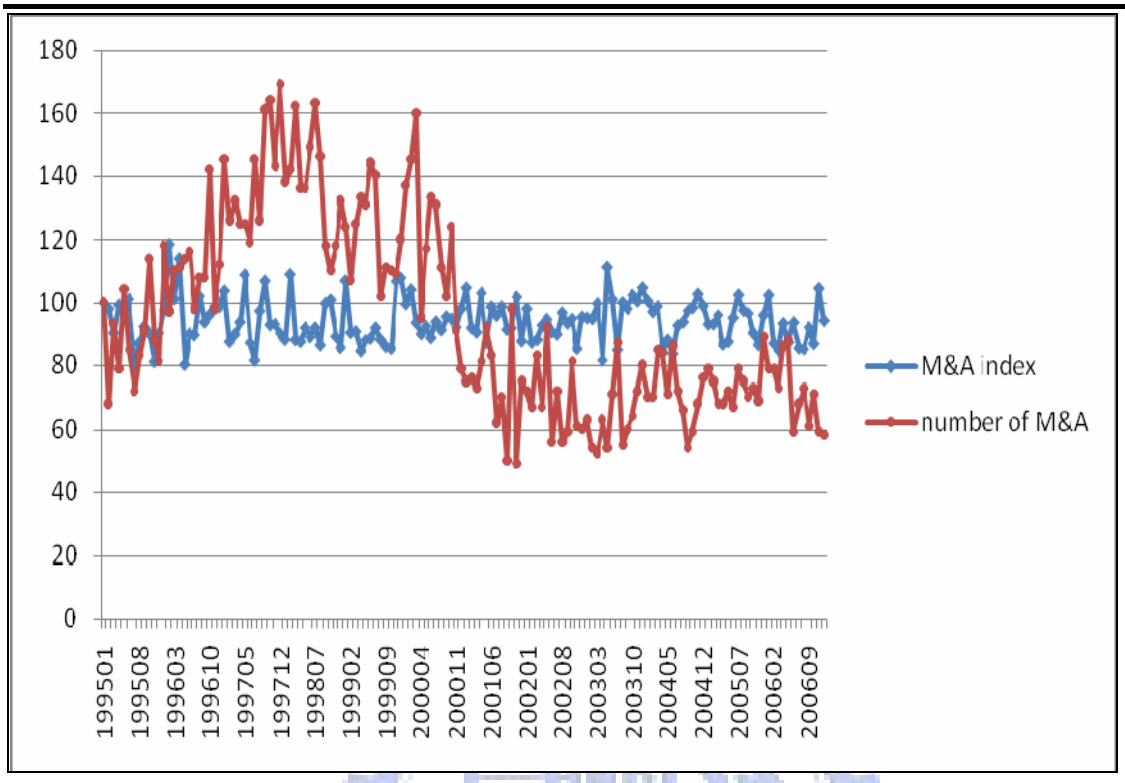

Table3: The Relation between Abnormal Returns and the Book-to-Market Ratio

The table presents the buy-and-hold abnormal returns of 4358 sample firms which is the difference between the buy-and-hold return of sample firms and the buy-and-hold return of control firms. I put t from 1 to 252 in order to calculate a year's abnormal return. Then I used the equally weighted method to calculate average abnormal returns. Time lags of 1 month(s) are indicated by t-1 and time futures of 1month(s) are indicated by t+1 and so forth. According to the book-to-market ratio, I ranked them it to five levels. The largest level defines High B/M. The smallest level defines Low B/M. The three middle levels define Mid B/M. The number in brackets is a p-value using the bootstrap method.

Time	**Total**	**Low book-to-market**	**Mid book-to-market**	**High book-to-market**
Number	4358	1457	1747	126
-1	0.003273908 (1.00000)	0.046667594 (1.00000)	0.015517496 (1.00000)	0.756764502 (1.00000)
1	-0.04528083 (0.0216)**	-0.094958304 (0.9126)	-0.002605559 (0.001)***	-0.11387526 (0.0067)***
2	-0.120049832 (0.4167)	-0.194216992 (0.9031)	-0.008100445 (0.2271)	-0.278896126 (0.0511)*
3	-0.198097974 (0.4928)	-0.322480562 (0.8815)	-0.009030117 (0.385)	-0.139754377 (0.1293)
4	-0.206582024 (0.617)	-0.403809697 (0.8722)	-0.033435845 (0.3581)	-0.044199552 (0.2044)
5	-0.242212797 (0.681)	-0.405284111 (0.8211)	-0.116173782 (0.4322)	-0.115489973 (0.3215)

* 10% significance level **5% significance level ***1% significance level

Table 4: Negative Binomial Regression Estimations of the M&A Index Level at t+1 point

The dependent variable in all negative binomial regression models is a M&A index level at a t+1 point. Independent variables are the natural logarithm of the M&A index l (ln_ M&A index), the natural logarithm of the number of M&As (ln_NoM&As) and I define a hot period as at least three consecutive months where the number of M&A exceeds the upper quartile. The cold period is defined as at least three consecutive months where the number of M&As are below the lower quartile. The M&A index are set as 100 in January 1995. Time futures of 1 month(s) are indicated by t+1. In each model, the α is significantly different from 0, indicating that the negative binomial regression model fits the data better than the poisson regression model. N denotes the number of observations. Since we apply explanatory variables, we have 144 observations from July 1995 to December 2006. The theoretical measure for the models' explanatory power is the Pearson Chi-Square. The chi-square statistic is calculated by finding the difference between each observed and theoretical frequency for each possible outcome, squaring them, dividing each by the theoretical frequency, and taking the sum of the results.

Model	I	II	III	IV
Indep. Variables				
M&A index t=0		0.0041		0.0046
		(0.0631)*		(0.0381)**
NoM&As t=0			-0.4132	0.6483
			(0.4871)	(0.2752)
Cold-months	-0.2209	-0.0015	-0.0558	-0.0742
	(0.0946)*	(0.0447)**	(0.1030)	(0.0285)**
Hot-months	0.4617	0.4821	0.3232	0.2800
	(0.0772)*	(0.0532)*	(0.3278)	(0.3906)
Constant	4.2436	3.8798	2.3769	0.9044
	(0.0001)***	(0.0001)***	(0.3761)	(0.7405)
N	144	144	144	144
Pearson Chi-Square	0.9734	0.9844	0.9586	0.9537

* 10% significance level **5% significance level ***1% significance level

Table5: The Relation between Abnormal Returns and the Method of Payment

The table presents the buy-and-hold abnormal returns of 4358 sample firms that is the difference between the buy-and-hold return of sample firms and the buy-and-hold return of control firms. I put t from 1 to 252 in order to calculate a year's abnormal return. Then I used the equally weighted method to calculate average abnormal return. Time lags of 1 month(s) are indicated by t-1 and time futures of 1month(s) are indicated by t+1 and so forth. The method of payment in cash presents the acquiring firm mergers the target of at least 50% in cash. The method of payment in stock presents the acquiring firm mergers a target of at least 50% in stock. The number in brackets is a p-value using the bootstrap method.

Time	Total	Cash	Stock
Number	4358	2007	511
-1	0.003273908 (1.00000)	0.078004078 (1.00000)	0.059127811 (1.00000)
1	-0.04528083 (0.0216)**	0.014829901 (0.004)***	-0.144891946 (0.922)
2	-0.120049832 (0.4167)	-0.017564433 (0.0125)**	-0.3360443 (0.8216)
3	-0.198097974 (0.4928)	-0.069406424 (0.1219)	-0.393913816 (0.9144)
4	-0.206582024 (0.617)	0.112579715 (0.248)	-0.563896369 (0.8813)
5	-0.242212797 (0.681)	0.068928756 (0.301)	-0.581949247 (0.8011)

* 10% significance level **5% significance level ***1% significance level

Table 6: Negative Binomial Regression Estimations of the M&A on a Stock Merger Index Level at the t+1 point

The dependent variable in all negative binomial regression models is a M&A index level at the t+1 point. Independent variables are the natural logarithm of the M&A index (ln_ M&A index), the natural logarithm of the number of M&As on stock mergers (ln_NoM&As) and I define a hot period as at least three consecutive months where the number of M&As exceed the upper quartile. The cold period is defined as at least three consecutive months where the number of M&As below the lower quartile. The M&A index are set 100 in January 1995. Time futures of 1 month(s) are indicated by t+1. In each model, the α is significantly different from 0, indicating that the negative binomial regression model fits the data better than the poisson regression model. N denotes the number of observations. Since we apply explanatory variables, we have 144 observations from July 1995 to December 2006. The theoretical measure for the models' explanatory power is the Pearson Chi-Square. The chi-square statistic is calculated by finding the difference between each observed and theoretical frequency for each possible outcome, squaring them, dividing each by the theoretical frequency, and taking the sum of the results.

Model	I	II	III	IV
Indep. Variables				
M&A index t=0		0.0009		0.0009
		(0.0001)***		(0.0001)***
NoM&As t=0			0.0208	-0.0002
			(0.3976)	(0.9721)
Cold-months	-0.4276	-0.0178	-0.3886	-0.0204
	(0.0912)*	(0.7732)	(0.1302)	(0.7733)
Hot-months	0.4713	0.0206	0.4839	0.0170
	(0.0001)***	(0.4542)	(0.0001)***	(0.4676)
Constant	5.1603	4.6146	5.0851	4.6153
	(0.0001)***	(0.0001)***	(0.0001)***	(0.0001)***
N	144	144	144	144
Pearson Chi-Square	11.1188	1.0775	11.0765	1.0862

* 10% significance level **5% significance level ***1% significance level