

# Cross-sectional Stock Returns on Fundamental Value vs. Market Value in Mergers and Acquisitions: Evidence from Japan

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## **Abstract**

This study looks at the difference between the fundamental value and the market value of firms during the merger and acquisition process, and investigates the role of that difference on the method of payments (cash vs. stock) and on the subsequent stock performance around the merger and acquisition (M&A) announcement date. The number of M&A transactions has dramatically increased since the stock swap and stock transfer schemes were introduced in 1999. We investigate the scenario that managers who specialize in analyzing the corporate value of the firms possibly shorten the value correction time and partially reduce misvaluation in the capital market. The Means of Payment hypothesis suggests that the managers should choose stock payment over cash payment when the acquiror is over-valued in the market. However, we found that Japanese managers more positively use cash payment when the firm has sufficient financial slack (is cash rich). The Misvaluation hypothesis suggests that positive excess returns of the acquiror could be detected around the announcement day of M&A transactions, when the acquiror and/or the target is/are under-valued in the market. We found strong evidence which supports the Misvaluation hypothesis. In calculating the fundamental value of the firms, we employed the Residual Income Model, using financial analysts forecast value of future profits, after controlling the book-to-market ratio. We found strong evidence which supports the Misvaluation hypothesis. In particular, the hedging portfolio strategy supports the long position of the acquiring firms (M&A transactions are categorized as high acquiror's valuation-high target's valuation group) and simultaneously holds the short position of the acquiring firms (M&A transactions are conversely categorized as low acquiror's valuation-low target's valuation group). This combination shows more persistent and more positive abnormal returns than the long position strategy of simply holding acquired stock after all M&A transactions. However, the simple long position strategy in Japan is still positive, when compared to the US.

## **Keywords**

Merger and acquisitions, Means of Payment hypothesis, Misvaluation hypothesis, Fundamental value, Residual income model

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## 1. Introduction

### (1) Purpose

This study investigates the difference between the fundamental value and the market value of firms (Misvaluation) when mergers and acquisitions (M&A) have occurred and examines the subsequent effects on cross-sectional stock returns. The number of M&A transactions in Japan has dramatically increased since the revision of corporate law, such as the introduction of the pure holding company (corporate law revision 1997), the stock swap and stock transfer schemes, and the corporate divestiture scheme (corporate law revision 1999; 2000). The stock swap and stock transfer schemes were introduced to achieve the smooth shift to the holding company and to establish the relationship between the 100% parent and subsidiary company. These schemes resulted in the number of M&A transactions nearly doubling--going from 669 in 1998 to 1,251 in 2001<sup>1</sup> [Source: Marr M&A data CD-ROM by Recof Ltd.] In the late 1990s, Japanese firms greatly relied on funding from banks, but after the stock swap schemes, many firms shifted from bank funding to stock issuance.

The corporate situation and resulting legal climate stimulated activity in the M&A market. A shift in financing from lending (especially main banking lending) to direct funding from a capital market was much needed. Large shareholders require corporate managers to maximize the firms' value, unlike conventional creditors. Firms have to 'select and focus' on their business and carefully allocate resources in order to be more efficient and maximize value. In these cases, M&A and spin-off transactions are utilized as enhancement methods to shorten the 'select and focus' process, as opposed to restructuring the business internally.

Within an active M&A market, larger shareholders, especially investment fund holders, increase their managerial participation. For instance, the number of buy-outs by investment funds was 31 (total transaction value was 2,292 billion yen) in 2001; 76 (total value was 9,225 billion yen) in 2006; and 86 (total value was 655.9 billion yen) in 2007. The cumulative total number stood at 395 (total value was 40,939 billion yen) since the first occurrence of a buy-out fund in 1998 [Source: Japanese Buy-out Research Institute Ltd.]

The increase in activity in such an M&A market increases the possibility of shortening the value correction time and reducing misvaluation. It is commonly believed that investment funds analysts have privileged access to information. Their influential position gives them an advantage over individual investors because analysts directly meet with managers and obtain a better and more insightful understanding of management decisions. Therefore investment funds analysts are believed to play a significant role in correcting misvaluation.

Our study investigates the difference between the fundamental value and the market value of firms (Misvaluation) when M&As have occurred and their subsequent effects on cross-sectional stock returns. We examined the following two aspects:

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<sup>1</sup> The Business Accounting Council issued a new Accounting Standards for Business Combination on October 31, 2003, which has been executed since the business fiscal year that begins after April 1, 2006. The number of the transactions of merger and acquisition reached a new high of 1,897 (total value was 1,174 billion yen) in 2006.

Our first hypothesis concerns the manager's decision of payment method (cash vs. stock). We hypothesize that managers focus on misvaluation (the difference between the fundamental value and the market value of the firm). We predict that if managers take the fundamental value of their own and the target firms into consideration, and their own stock is overvalued or the target firm's stock is undervalued, then stocks will be positively used as payment.

Our second hypothesis is whether the investors are able to profit after an M&A. If the investors *buy* the stock of the acquiring firms when the acquirors and targets are both *undervalued*, and simultaneously *sell* the stock of acquiring firms when the acquirors and targets are both *overvalued*, then we predict this will be a profitable investment strategy.

In this paper, both hypotheses were investigated by focusing on short-term abnormal returns. The fundamental value was calculated according to the Residual Income Model (RIM), using stock holders' equity value and the expected future net income of the firm's value.

## **(2) Composition**

The composition of this paper is as follows:

Section 2 reviews the previous research on short-term stock performance of M&A transactions. We especially examined the differences of post-M&A stock performance between the U.S. and Japan. We also compare the post-M&A stock performance between payment methods (cash vs. stock).

Section 3 describes the Means of Payment hypothesis and the Misvaluation hypothesis.

Section 4 gives a general view of our data sample, data characteristics, and our method of estimating the fundamental value of the firm.

Section 5 presents the results of our investigation of the payment method (cash vs. stock) and the subsequent cross-sectional stock returns using univariate and multivariate tests.

Section 6 reports additional results of subsequent cross-sectional stock returns constructed with a hedging portfolio strategy utilizing the V/P ratio (Fundamental value to Market value ratio).

Section 7 provides our main conclusions and future research goals.

## **2. Short-term Stock Performance of M&A Transactions**

### **(1) Previous Research of Short-term Stock Performance of M&A Transactions**

In the US, the measurement of the economic effect of M&A information has been thoroughly investigated with event study methodology for more than thirty years. Jensen and Ruback (1983) surveyed previous research of successful sample M&A transactions in sample periods from 1962 to 1979. They reported the following short-term excess returns occurred around M&A announcements. For *target firms*, the announcement effect for two days around

the announcement day was 7.72% on average, whereas the announcement effect for one month is 15.90% on average. For the *acquiring firms*, the announcement effect for two days around the announcement day was -0.05% on average, and the announcement effect for one month was 1.37% on average.

Regarding acquiring firms, a significant excess return has not been reported prior to 1983, except for Asquith, Bruner, and Mullins (1983), who reported an average excess return of 3.48% for a one month period, during the sample period from 1963 to 1979. If we expand the sample periods to the 1990s, we find that Andrade, Mitchell, and Stafford (2001), using the sample period from 1973 to 1998, reported a significantly positive average excess return of 16.0% around the announcement day (-1, +1) for the target firms. However, there was an insignificantly average negative excess return of -0.7% around the announcement day (-1, +1) for acquiring firms. Andrade, Mitchell, and Stafford reported that acquiring firms paid a high M&A premium (the median was 37.9%) from 1973 to 1998 in the U.S. Also, taking into consideration the high M&A premium in the U.S., we may conclude that the shareholders of the target firms receive exclusive benefits of the short-term stock appreciation that occurs around M&A transactions.

In Japan, the number of M&A transactions was far lower than in the U.S., until the early 1990s. Pettway and Yamada (1986), examined sixty-six M&A transactions in the period 1977 to 1984 and reported an insignificantly negative excess return (-0.07% on average) around the announcement day (-1, +1) for the target firms. There was also an insignificantly positive excess return (0.82% on average) around the announcement day (-1, +1) for acquiring firms. Usui (2001) examined the period of 1989 to 1999 and reported an average positive excess return of 4.08% (10% significant level) around the announcement day (-1, +1) for the target firms, as well as an average positive excess return of 1.62% (10% significant level) around the announcement day (-1, +1) for acquiring firms. His sample period included a much larger number of M&A transactions than Pettway and Yamada (1986). Similarly, Inoue (2002), examining the period 1990 to 2002, also reported an average positive excess return of 4.37% (10% significant level) around the announcement day (-1, +1) for the target firms, as well as an average positive excess return of 1.51% (10% significant level) around the announcement day (-1, +1) for acquiring firms.

## **(2) Measurement of the Economic Significance of M&A Transactions**

In this paper, we adopted standard event study methodology to measure the economic effect of an M&A announcement on the acquiring firms, the target firms, and on the total economic wealth of the acquiror and target firms. Table 1 shows Cumulative Abnormal Return (CAR, equal-weighted) for various periods around the announcement day, given as (0), of the M&A, including 372 M&A transactions in the period January, 1996 to October, 2007 [Source: Recof Ltd. MARR M&A data CD-ROM]. The sample includes merger bids and tender offers in which both acquiror and target were listed on the Japanese Stock Market in order to

eliminate small cases. We excluded cases where either acquiror or target was a financial institution, or cases with a bailout takeover where the transaction was a result of the target being in financial distress, etc.

According to Fuller, Netter, and Stegemoller (2002), the abnormal returns of the acquiror and target were calculated by the market adjustment model based on NYSE index data; in our study, we used the Topix indicator as a market portfolio. Regarding acquirors, we found on average short-term positive abnormal returns for the following time periods: 1.49% (1% significant level) around the announcement day (-1, +1); 1.20% (5% significant level) around the announcement day (-3, +3); and 1.35% (1% significant level) on around the announcement day (-5, +5). If we extend the announcement period from (-1, +1) to (-1, +3) or (-1, +5), the short-term positive abnormal returns worsened to 1.00% and 0.95% respectively. This means that investors over-reacted immediately after the M&A announcement.

Focusing specifically on tender offers, we found the following positive abnormal returns: 1.40% (1% significant level) around the announcement day (-1, +1); 1.57% (5% significant level) around the announcement day (-3, +3); and 0.79% (1% significant level) around the announcement day (-5, +5). Unlike M&As, we found that the announcement effect persisted for tender offers. The abnormal return of around the announcement day (-1, +1) does not diminish. If we extended the period from (-1, +1) to (-1, +5), the positive abnormal return was maintained at the level of 1.50% (5% significant level).

Regarding targets, we found a short-term positive abnormal return of 7.16% (1% significant level) around the announcement day (-1, +1), 7.82% (1% significant level) around the announcement day (-3, +3), and 8.10% (1% significant level) around the announcement day (-5, +5). These returns are considerably larger than those of acquiring firms. These results show that stock holders of the target firms substantially benefit more than those of the acquiring firms. However, the combined wealth of the stock holders of the acquiring and target firms is far less than than their counterparts in the U.S. We emphasize that in Japan the stock holders of the acquiring firms also benefit from M&A transactions, which is contrary to the U.S.

We also found that in tender offer cases, the announcement effect persisted for targets. The abnormal return 7.16% around the announcement day (-1, +1) does not diminish even if we extend the period to (-1, +5). The positive abnormal returns were 6.82% (1% significant level) (-1, +3) and 6.52% (1% significant level) (-1, +5). We found the positive abnormal returns of targets are found mainly in the tender offer cases. In the more friendly merger bids, we found a positive significant abnormal return 2.09% (10% significant level) only at (-1, +1). On the other hand, in tender offers, which can be friendly or hostile, we found considerably larger positive abnormal returns (over 10%) over various periods. These results support the prevailing economic intuition that acquiring firms, especially in hostile tender offers, have to pay a larger portion of premiums to the stock holders of the target firms.

In Japan, the number of M&A transactions has dramatically increased since the late

1990s. So, we have included early data from the 1990s in our sample period, as Usui (2001) and Inoue (2002) did. Our extended time period (late 1990s to 2007) revealed similar results: the short-term increase of stockholders' equity value in Japan is shared between acquirors and targets, contrary to findings in the U.S. However, we also found that the increase of the stockholders' value of the target firm is reduced. The lower appreciation is due to lower premiums: median values are 2.43% in M&A and 5.13% in tender offers.

### **(3) Payment method of M&A (cash vs. stock) and the measurement of economic significance**

Regarding the discretionary use of payment (cash vs. stock), we believe that managers are well-advised to positively use their *stocks* as payment in M&A transactions, especially when their stocks are priced higher than the fundamental value. In this case, for acquiring firms we predict that the short-term stock performance following stock payment transactions will be negative around the announcement day. On the other hand, the managers should positively use *cash* as a payment in M&A transactions, when their stocks are priced reasonably or lower than the fundamental value. In this case, for acquiring firms we predict that the short-term stock performance would be positive around the announcement day.

This suggested discretionary use of payment was first examined by Travlos (1987) in the U.S. For the period 1972 to 1981, Travlos reported a significant excess return of -3.94% following stock payment M&A transactions, and a non-significant positive excess return of 0.25% following cash payment M&A transactions around the announcement day (-1, +1) for the acquiring firms. Louis (2004) examined a later period (1992 to 2000) and also reported an excess return of -2.28% (1% significant level) following stock payment M&A transactions, and a positive excess return of 0.44% (10% significant level) following cash payment M&A transactions around the announcement day (-1, +1) for the acquiring firms, which is similar to Travlos' (1987) results.

On the other hand, the results of previous research in Japan are inconsistent with the discretionary use of payment described above. For the period 1990 to 2002, Inoue (2002) reported a positive excess return of 1.8% (10% significant level) following stock payment M&A transactions, and an insignificant positive excess return of 0.1% following cash payment M&A transactions around the announcement day (-1, +1) for the acquiring firms.

In our study, we compared the performance of payment methods (cash vs. stock) on short-term stock performance following M&A transactions in Japan for the period 1996 to 2007 for only tender offer cases, see Table 1. We focused on tender offers when analyzing payment methods because all merger bids in our sample were stock payments (see footnote in Table 2). We excluded transactions in which the acquiror and/or target were financial institutions, or the transaction involved a bailout takeover as a result of the target being in financial distress. Table 1 also presents the short term stock performance of all cases, merger bids cases, and tender offers cases.

Unlike Inoue (2002), we could not detect the suggested discretionary use of cash/stock in

our sample period. Regarding the acquiror CARs, we found that the positive abnormal returns of tender offers occurred only in stock payment cases, not in cash payment cases. Examining stock payment cases alone, we found that the positive abnormal returns leapt from 1.40% to 2.47% (1% significant level) around the announcement day (-1, +1); from 1.57% to 3.41% (1% significant level) around the announcement day (-3, +3); and from 0.79% to 3.25% (1% significant level) around the announcement day (-5, +5), respectively. Cash payment tender offers, however, were all positive but non-significant: 0.33% around the announcement day (-1, +1); 0.36% around the announcement day (-3, +3); and 1.12% around the announcement day (-5, +5) for the acquiror.

Finally, turning our attention to target CARs, we found substantial positive significant abnormal returns (over 10%) both in stock payment cases and cash payment cases. This is in striking contrast to the acquirors, where the positive abnormal returns of tender offers were obtained only in stock payment cases.

### **3. Means of Payment Hypothesis and Misvaluation Hypothesis**

According to previous researchers, the positive effect of disciplined management and the negative effect of the agency problem significantly impact M&As as well as the subsequent stock performance of the acquiring firms. Disciplined management, which entails adhering to the shareholders directives, involves the effective channeling of funds into (1) new businesses which have a synergistic effect with the core business, or (2) businesses which have economies of scale, economies of scope, and involve the acquisition of new technologies.

Other negative effects have been reported in the literature. Two negative effects are free cash flow problems (Jensen, 1986) and manager entrenchment behavior (Shleifer and Vishny, 1986). They each pointed out that undisciplined managers make use of M&A transactions as a means of pursuing personal private profit. In such cases, managers tend to invest free cash flows into inefficient business opportunities (overinvestment) in an attempt to exaggerate their management skill and overstate their business ideas as a means of retaining their current position and strengthening their managerial powers. The positive short-term excess return overviewed in Section 2 might be explained to some degree by the primacy of positive effects over negative ones. However, since the early 2000s, much research in the U.S. has reported evidence that M&A transactions were driven by the perceived difference between the fundamental value and the market value of the firms.

#### **(1) Means of Payment Hypothesis**

Shleifer and Vishny (2003) reported that managers have the incentive to increase the stockholder value by acquiring relatively under-valued companies through the payment of their own stock when their stocks are over-valued. In these cases, the subsequent stock performance of the acquiring firm would be negative. On the other hand, managers have the incentive to use cash payments when their own stocks are reasonably-valued or under-valued.

In these cases, the subsequent stock performance of the acquiring firm would be positive. They concluded that managers attempt to increase their stockholders' value in two ways: (1) by positively acquiring relatively under-valued target firms and using *stock payment* when their own stocks are relatively over-valued, and (2) by positively using the *cash payment* when their own stocks are relatively under-valued. They call this "stock market driven acquisitions," and their assertion is widely known as the Means of Payment hypothesis.

*In the means of payment hypothesis, managers positively use stock payment when their own stocks are relatively over-valued in the capital market and they positively use cash payment when their own stocks are reasonable or relatively under-valued in the capital market.*

The fundamental value of firms has been variously determined in the past. Shleifer and Vishny (2003) used book value in place of fundamental value, whereas Dong, Hirshleifer, Richardson, and Teoh (2006) used the Residual Income Model (RIM, detailed methodology is shown in Section 4 (2)). Dong et.al. reported that managers executed M&A transactions by focusing on the difference between fundamental and market value. In particular, they concluded that for cases where both the acquiror and the target were under-valued in the market, this dual undervaluation actually initiated M&A transactions and reduced Misvaluation in the capital market. This is widely known as the Misvaluation Hypothesis.

## **(2) Misvaluation Hypothesis**

Frankel and Lee (1998) pioneered research in capital market misvaluation. They examined the investment strategy of hedging portfolios using RIM<sup>2</sup> in U.S. M&A transactions from 1975 to 1993, and they reported a positive long-term excess return. They estimated the fundamental value of the firm by using the value of future profit and the long term growth rate forecast by financial analysts in the I/B/E/S data base for RIM. They constructed quintile portfolios sorted by the V/P ratio. They estimated that the fifth quintile (the highest V/P ratio) represents the most under-valued firms whose subsequent stock performance would be the highest. The first quintile (the lowest V/P ratio) represents the most over-valued firms whose subsequent stock performance would be the lowest.

They defined a cumulative performance of hedging portfolios (long-short portfolios) that promotes the long position for the fifth portfolio (the highest V/P ratio) and simultaneously promotes the short position for the first portfolio (the lowest V/P ratio). They reported that this strategy outperforms a hedging portfolio strategy which merely utilizes the B/P ratio or size (market value).

In Japan, previous research (Okumura and Yoshida, 2000; Suda and Takehara, 2005;

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<sup>2</sup> Dechow, Hutton, and Sloan (1999) and Lee, Myers, and Swaminathan (1999), etc also reported the results of investment strategy following this V/P anomaly.

Muramiya, 2008) also reported positive long-term excess returns for hedging portfolios using RIM, similar to Frankel and Lee (1998).

*The difference between the fundamental value and the market price has an impact on the subsequent stock performance of both the acquiror and the target. The more under-priced both the acquiror and the target are, the higher the stock performance of both firms around the M&A announcement day.*

Regarding short term returns, Dong, Hirshleifer, Richardson, and Teoh (2006) examined U.S. M&A transactions from 1998 to 2000 and obtained evidence which supports the Misvaluation Hypothesis. They calculated the fundamental value of the firm by using RIM and showed that the V/P ratio (fundamental value to market value) has explanatory power even after controlling for the B/P ratio (book value to market value). The V/P ratio, which represents the degree that the market has mispriced the stock, is not equivalent to the B/P ratio; it has additional explanatory power in predicting future stock performance following M&A transactions.

#### **4. Characteristics of Sample Data and Methodology**

##### **(1) Characteristics of Sample Data**

Our study focuses on the payment method (cash vs. stock) and the short-term stock returns of both the acquiror and the target around the announcement day of M&A transactions, and tests the hypotheses addressed in Section 3. Our sample includes M&A transactions from January 1996 to October 2007, available in the database of RECOF MARR CD-ROM, that satisfy the following criteria:

- (a) Acquiror and/or target firms were not financial institutions, nor involved in a bailout takeover where the transaction was a result of the target being in financial distress, etc.
- (b) Both acquiror and target firms were listed in the stock exchange in order to exclude small cases.
- (c) The payment method of the M&A transaction (cash vs. stock) was identified by Nikkei Telecom 21, Nikkei Newspaper digital Ltd., or MARR M&A data CD-ROM by Recof Ltd.
- (d) Stock price and financial data were available from the Nikkei NEEDS-Financial QUEST by Nikkei Media Marketing, Inc., in order to calculate the B/P ratio.
- (e) Financial analyst forecast value of future profit was available from the I/B/E/S or Tokyo Keizai data base, in order to calculate the V/P ratio.
- (f) Monthly returns were available for at least twenty-four months in order to calculate the cost of the equity capital.

Table 2 shows our sample characteristics for both tender offers and merger bids by calendar year. For tender offers, the number of listings of targets and acquirors dramatically

increased from single digits to double digits, after stock swap and stock transfer schemes were introduced in 1999. The level exceeded thirty in 2005 and 2006.

For merger bids cases only, all of the Japanese firms in our sample used the stock payment method. This is very different from the U.S. payment method, which typically uses half stock payment, half cash payment in merger bids transactions. For tender offers cases, Japanese firms in our sample used a mix of cash and stock payment. Since 1999, the number of firms which used the stock payment method exceeded the number of firms that used cash payments. However, the cash payment method also increased in 2005 - 2007.

We presented the following financial attributes of our sample: market equity (which represents firm size), book-to-market ratio, leverage, and ROE. We calculated these figures based on the data that was available on the M&A announcement dates.

The median market equity value of the acquiring firms (¥128,507 million) is 12.36 times greater than the medium market value of the target firms (¥9,245 million). The acquirors in our sample have a considerably higher median stock value than the median firm value listed on the stock exchange (¥128,507 million vs. ¥15,342 million).

Regarding the book-to-market ratio, the medium of the acquiror is 0.7207, and that of the target is 1.0515. Regarding financial leverage, the medium of the acquiror is 0.6468, and that of the target is 0.6038. Regarding ROE, the medium of the acquiror is 4.84%, and that of the target is 2.91%. The book-to-market is widely interpreted as the proxy variable of the firm's growth. The medium 0.7207 of the acquiror is much less than the medium book-to-market ratio 1.119 of all the listed firms, and the medium ROE 4.84% of the acquiror is much higher than the medium ROE 3.93% of all listed firms. Therefore, the acquirors in our sample are composed of firms that are highly profitable and have the characteristics of growth stocks (i.e., low book-to-market stocks), in other words, possessing high qualified growth opportunities.

Table 2 shows our sample characteristics by year and Table 3 shows them by industry. M&As in Japan are concentrated because only four sectors account for 45% of all M&As in our sample. These four sectors are: service (15.79%), retail trade (10.88%), electric & electric devices (9.82%), and wholesale trade (9.47%). Construction (5.96%) and foods (5.61%) were the fifth and sixth ranked sectors. In the service, retail trade, and food sectors, M&As were all within the same sectors (non-diversified) as opposed to across sectors (diversified). On the other hand, in electric & electric devices, wholesale trade, and construction industries, diversified and non-diversified M&As were found in equal proportions.

## **(2) The Residual-Income Valuation Model**

Dividends are defined as the net distribution of value to the common stockholders (payment of dividends to shareholders minus buy-backs of their treasury stocks). Therefore, a stock's intrinsic value is typically defined using the dividend discount model (DDM), which expresses the present value of future dividends based on the current available information set. Denoting the stock's intrinsic value at date  $t$  as  $V_t$ , this means that

$$V_t = \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r_e)^i}$$

where

$E_t(D_{t+i})$  = the expected future net dividends paid for the period ending at date  $t+i$ ,  
 $r_e$  = the cost of equity capital

Ohlson (1995) and Feltham and Ohlson (1995) demonstrated that if the accounting system satisfies the ‘clean surplus relation,’

$$B_{\tau} = B_{\tau-1} + NI_{\tau} - D_{\tau}, \tau = 1, \dots$$

where

$B_t$  = the book value of common equity at date  $t$ ,

$NI_{t+i}$  = the net income attributable to common equity for the period ending at date  $t+i$ ,

$D_t$  = the net dividends paid for the period ending at date  $t$ ,

then the DDM can be rewritten as the current book value plus an infinite total of discounted residual income, which describes the residual income model (RIM), as follows:

$$\begin{aligned} V_t &= B_t + \sum_{i=1}^{\infty} \frac{E_t[NI_{t+i} - (r_e * B_{t+i-1})]}{(1+r_e)^i} \\ &= B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e) * B_{t+i-1}]}{(1+r_e)^i}, \end{aligned}$$

where

$B_t$  = the book value of common equity at date  $t$ ,

$E_t[\cdot]$  = the expectation operator at date  $t$ ,

$NI_{t+i}$  = the net income attributable to common equity for the period ending at date  $t+i$ ,

$r_e$  = the cost of equity capital,

$ROE_{t+i}$  = the after-tax return on common equity for the period ending at date  $t+i$ .

The equation expresses the firm’s intrinsic value in terms of infinite series, but we must specify an explicit forecast period to apply RIM in practice. It is necessary to estimate a ‘terminal value’ – an estimate of the firm’s value based on the residual income earned after the explicit forecasting period. Lee et al. (1999) reported the predictive power of  $V_t$  estimates using three different forecast horizons beyond three years, and  $V_t$  estimates were not sensitive to the number of the forecast periods or the cost of equity capital. Thus we used three period forecast horizons following Dong et al. (2006),

$$V_t = B_t + \frac{E_t[(ROE_{t+1} - r_e) * B_t]}{1+r_e} + \frac{E_t[(ROE_{t+2} - r_e) * B_{t+1}]}{(1+r_e)^2} + \frac{E_t[(ROE_{t+3} - r_e) * B_{t+2}]}{(1+r_e)^2 * r_e},$$

where

$B_t$  = the book value of common equity at date  $t$ ,

$E_t[\cdot]$  = the expectation operator at date  $t$ ,

$r_e$  = the cost of equity capital,

$ROE_{t+i}$  = the after-tax return on common equity for the period ending at date  $t+i$ ,  
and the last term discounts the period  $t+3$  residual income in perpetuity.

Forecast ROEs are calculated as

$$ROE_{t+i} = EPS_{t+i} / \bar{B}_{t+i-1},$$

where

$EPS_{t+i}$  = the forecasted earnings per share (EPS) for the period ending at date  $t+i$ ,

$$\bar{B}_{t+i-1} = (B_{t+i-1} + B_{t+i-2}) / 2,$$

If we assume that the firm's book value increases with a sustainable growth rate, then the future book values of common equity at date  $t+i$  are calculated as

$$B_{t+i} = B_{t+i-1} + (1 - k)EPS_{t+i},$$

To estimate the sustainable growth rate  $k$ , RIM calls for an estimate of the expected proportion of earnings to be paid out in dividends. We estimated this ratio by dividing actual dividends from the current fiscal year by the same time period:

$$k = \frac{D(t)}{EPS(t)}.$$

We excluded stock repurchases due to the practical problems associated with determining the likelihood of their occurrence in future periods, following Lee et al. (1999). For firms with negative earnings for period  $t$ , we assumed their payout ratio was 0.06 times the stockholders' equities because historically the long term return-on-equities (ROE) in Japan is approximately 6%<sup>3</sup>.

### (3) Estimation of the Cost of Equity Capital

The cost of equity capital  $r_e$  for each firm (annual rate) was estimated using the Capital Asset Pricing Model (CAPM).  $\beta$  at the time of  $t$  was estimated monthly using the estimation window from minus 60 months to minus 1 month of the announcement day. We required minimal return data of at least 24 months preceding the announcement date. We estimated the cost of equity capital for each firm as 4.4%, assuming that the risk premium of the market portfolio equaled the average annual rate of Topix<sup>4</sup>.

## 5. Results of Our Univariate and Multivariate Tests

### (1) Equity Valuation and Univariate Test

Our study estimated the fundamental value of firms by using the forecast value of the future profit and the long term growth rate by financial analysts in the I/B/E/S data base (or

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<sup>3</sup> The long-run return-on-equities (ROE) in Japan is approximately 6%. Therefore we use 6% of ROE as a proxy for normal earnings levels when current earnings are negative. Lee et al. (1999) and Dong et al. (2006) use 6% of return-on-total-assets, which is approximately the same as the long-run performance of the United States, as a proxy for normal earnings levels when current earnings are negative.

<sup>4</sup> Average TOPIX risk premium for 30 years, from January 1976 to December 2005, was 4.4% [Source: Stocks Risk Premium Report of Japan (version in fiscal year 2006) by Ibbotson Associates Japan Ltd.]

Tokyo Keizai data base if the forecast value was not available in the I/B/E/S data base) for RIM<sup>5</sup>. Table 4 shows the V/P ratio (fundamental value to market value ratio) and B/P ratio (book-to-market ratio) of both acquirors and targets. This includes comparisons between various financial attributes and CARs by the modes of offers (merger bids and tender offers) and was obtained by consulting Nikkei Telecom 21 by Nikkei Newspaper Digital Ltd. or MARR M&A data CD-ROM by Recof Ltd. It includes comparisons between various financial attributes and CARs by the modes of offers (merger bids and tender offers). We identified the payment methods (cash vs. stock) of 351 transactions within our sample from the same sources. We calculated V/P ratios for 372 cases by using the financial analyst forecast value of the future profit and estimating the cost of equity capital by CAPM. Our sample required that both acquiror and target were listed in the stock exchange in order to eliminate small cases. All of the merger bid cases in our sample used the stock payment method.

Using univariate tests, we investigated the statistical differences of various financial attributes and CARs between the low V/P rank group and the high V/P rank group of both acquirors and targets. Table 4 summarizes the results of the differential test of mean values. We reported *t* values assuming independent samples.

## **(2) Univariate Test of V/P Ratio Rank of Acquirors**

First, we focused on the difference of the acquiror's financial attributes between the low V/P ratio rank group and the high V/P ratio rank group. We treated tender offer cases separately. Our main concern was to see if the V/P Ratio was significant after controlling for the B/P Ratio. We found that if the acquiror's V/P ratio is high, then the B/P ratio is also high (10% significant level), although the correlation (14.26%) between these ratios is not very high. We concluded that V/P and B/P are only marginally correlated.

The mean ROE of high V/P groups (14.07%) is considerably higher than the mean ROE of low V/P groups (-3.37%) at only the 10% significant level. Economic intuition suggests that if the current ROE is high, then the expected ROE may be high too, leaving some firms undervalued.

The mean liquidity of high V/P groups (12.29%) was also considerably higher than the mean liquidity of low V/P groups (7.54%), which is significant at the 1% level. High ROE was strongly correlated with high liquidity. We defined liquidity as operating income plus depreciation minus interest, taxes, and all dividends. This is expressed as a ratio to total assets; this definition is typical of the accounting area and emphasizing the cash flow viewpoint. We also found that the undervalued firm (high V/P ratio) is inclined to have some

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<sup>5</sup> The I/B/E/S updates the fiscal year-end of all their forecasts (that is, FY1, FY2, and FY3) in the month that actual annual earnings are announced. If EPS forecast for any horizon is not available, it is calculated by multiplying the long-term growth rate (provided by the I/B/E/S) by EPS forecast for the previous period. If the long-term growth rate is not available in the I/B/E/S, it is substituted by the first preceding available EPS forecast, following a constant forecast model (see Dong et al. (2006)). Contrary to the United States, the book value of the equity for the most recent fiscal year end is also available in Earnings announcement by firms in Japan, where the Tokyo Stock Exchange requires listed firms to report the financial result in their Earnings announcements within 45 days of a fiscal year-end, and which are the highlight of annual report, together with the summary of financial statements.

financial slack.

On the other hand, the mean cash ratio of high V/P groups (10.38%) is lower than the mean cash ratio of low V/P groups (14.79%), significant at the 1% level. The cash ratio is defined as cash equivalent plus short-term investments and is expressed as a ratio to assets. In general, the B/P ratio is regarded as the best predictor of the firm's growth potential. We predict that a firm with high growth potential (low B/P ratio) has an advantage in future investment opportunities because they are cash rich and have fewer financial constraints.

Secondly, we examined general financial attributes as a function of target V/P rank (low vs. high). Despite the varying financial attributes of acquirors, the targets' financial attributes do not vary significantly between the low and high groups.

Thirdly, we examined the likelihood of cash vs. stock payment as a function of V/P ratio (low vs. high) of the acquirors. In our sample, payment methods of merger bids were all stock payments; therefore, we limited our analysis to tender offer cases. The probability of cash payment by the low V/P group (48.19%) is lower than the probability of cash payment by the high V/P group (54.41%), but this difference is not significant. The Means of Payment hypothesis suggests that the managers will select stock payment when their own stock is over-valued in the market. Our results did not support this hypothesis. We address the results of the multivariate test of the Means of Payment hypothesis (after controlling for explanatory variables) in the next section.

Finally, we examined the various CARs as a function of V/P ratio (high vs. low) of the acquirors. For example, the mean acquiror CAR (-3,+3) -0.38% and the mean acquiror CAR (-5,+5) -0.09% of the low group are significantly lower than the corresponding values for the high group (2.47% and 2.37%) and are significant at the 5% and 10% levels, respectively. For nearly all of the various periods, our sample showed that the stockholders of the acquirors typically benefit from M&A transactions when acquirors are undervalued, which is consistent with the Misvaluation hypothesis.

### **(3) Univariate Test of V/P Ratio Rank of Targets**

First, we focused on the difference of the acquirors' V/P ratio between the low targets' V/P ratio group and the high targets' V/P ratio group. The mean acquirors' V/P ratio of low targets' V/P ratio group (1.0476) is significantly lower than of high targets' V/P ratio group (1.2512), which is only significant at the 10% level. The mean target V/P ratio of the low acquiror V/P ratio group (0.9958) is lower than the high targets' V/P ratio group (1.1378), but not significantly so. We predict that, in general, relatively under-valued acquirors positively search for relatively under-valued targets in Japan, which is similar to the conclusion pointed out by Shleifer and Vishny (2003) that misevaluation drives mergers and acquisitions in the U.S.

Secondly, we focused on the difference of the acquiror's financial attributes between the low V/P ratio rank group and the high V/P ratio rank group of the targets. The mean liquidity

of the low group (9.76%) is considerably higher than the mean liquidity of the high group (7.75%), which is significant at the 10% level. This result suggests that, on average, firms with low accounting cash flow positively search for under-valued target firms (high V/P ratio firms).

Thirdly, we focused on the difference of the targets' financial attributes between the low V/P ratio rank group and the high V/P ratio rank group of the targets. Regarding the B/P ratio, the higher the V/P ratio of the target, the higher the B/P ratio of the target (5% significant level), although the covariance (18.90%) between these ratios is not so high. Moreover, ROE of all groups are negative. This means that firms with low profitability could be targets of an acquisition. The mean liquidity of the low group (4.24%) is considerably lower than the mean liquidity of the high group (9.05%), significant at the 1% level. Additionally, the mean E/P of low groups (-0.1116) is considerably lower than the mean E/P of high group (0.0123) which is significant at the 10% level. The under-valued firms' financial attributes are inclined to include a sufficient financial liquidity and a comparably high E/P.

Finally, we focused on the difference of the various CARs between the low V/P ratio rank group and the high V/P ratio rank group of the targets. In our sample, all period CARs of the acquirors and the targets, both separately and together, are significantly higher in the high group than the low group, which is consistent with Misvaluation hypothesis. For example, the mean acquiror CAR (-3, +3) 2.87%, the mean target CAR (-3, +3) 10.44%, and both the mean acquiror and target CAR (-3, +3) 13.36% of the high group are significantly higher than the respective values of the low group (-0.29%, 5.54%, and 5.21%) at the 1%, 5%, and 10% significance level, respectively. Regarding total wealth from M&A transactions, existing stock holders of acquirors and targets of the under-valued target group amazingly obtained 8.14% more than the of the over-valued group. In our univariate test, the explanatory power of the Misvaluation hypothesis is much stronger for the target V/P ratio than for the acquiror V/P ratio. The reason could be partially attributed to the size of the target firms. In our sample, the target firms' size is less than one tenth of the acquiror's size (Table 2). Investors who specialize in analyzing corporate valuation might not cover all the firms, and may pay less attention to smaller firms; therefore the smaller firms are more likely to be under-valued. Following M&A transactions, investors carefully monitor the stock values and consequently, misvaluation in the capital market diminishes.

## **(2) Equity Valuation and Multivariate Regression**

### **(2-1) Payment Methods and the Means of Payment Hypothesis**

Table 5 shows the results of logit multivariate regression. The Means of Payment hypothesis may be tested by examining the relationship between the V/P ratio and payment methods (cash vs. stock) after controlling for other variables. The independent variable was payment method and the dependent variable was B/P ratio. In table 5, we included the

following control variables: B/P ratios of both the acquiror and the target, acquiror's liquidity, acquiror's cash ratio, diversification Dummy, log of relative equity, acquiror's log of equity, target's log of equity, and acquiror's financial leverage. The other possible variables (such as ROE and E/P) which are given in Table 4, are omitted because they do not have any additional explanatory power in our sample.

The control variables in our study are defined as follows:

*Liquidity* is operating income plus depreciation minus interest, taxes, and all dividends, and is expressed as a ratio to total assets.

The *cash ratio* is cash equivalent plus short-term investments, expressed as a ratio to assets.

The *diversification dummy*=1 if the target is outside the acquiror's industry; *diversification dummy*=0 if they are both in the same industry.

*Relative equity* is the ratio of the acquiror's market equity to the target's market equity.

*Equity* is the market value of the common stock holders.

*Leverage* is the ratio of total debt to total assets.

In our sample, the payment method of merger bids are all stock payments; therefore, we report only on tender offer cases. In table 5, the second column gives the expected signs of the coefficient of the Means of Payment hypothesis. The coefficient is followed by the *p*-value in parentheses.

The Means of Payment hypothesis predicts that managers will select stock payment when the acquiror is overvalued in the market. In the logit multivariate regression (which includes only targets' V/Ps, acquirors' V/Ps, targets' B/Ps, and acquirors' B/Ps), all coefficients of the four independent variables are not significant. However, in the regressions which feature several control variables by their order, the coefficient of the acquiror V/P is statistically significant, but in the opposite of the predicted direction. We found counterevidence of discretionary use of payment (cash vs. stock) by Japanese managers in our multivariate test, which is inconsistent with our univariate test. (The direction of the sign of the payment method in our univariate analysis was opposite from our prediction, but was not significant.) We also found that Japanese managers positively use cash payment when their firm has sufficient financial slack, which is consistent with economic intuition. However, why Japanese managers positively use cash payment even when the firm's stock is over-valued is still an open question.

## **(2-2) Cumulative Abnormal Returns of the Acquirer and the Misvaluation Hypothesis**

Table 6 gives the results of ordinary multivariate regression. The Misvaluation hypothesis can be tested by examining the relationship between the V/P ratio and the subsequent stock performance of the acquiror, after controlling for other variables. We regressed cumulative abnormal returns of the acquiror for (-3, +3) on the V/P ratios of both the acquiror and the targets. In table 6, we present the control variables which were given in Table 5 and defined

in the previous section. The left side presents the results of merger bids/tender offers. The right side presents the results of tender offers alone. The second column gives the expected signs of the coefficient of the Misvaluation hypothesis. The first row gives the coefficient and the second row gives the  $p$ -value in parentheses.

The Misvaluation hypothesis suggests that positive excess returns of the acquiror will be detected around the announcement day of M&A transactions, when the acquiror and/or target is/are undervalued in the market. In the ordinary multivariate regression (which includes several control variables), the coefficients of the acquirors and targets V/P are almost significant consistent with our Hypothesis. For example, in the eighth column of merger bids and tender offers, both coefficients of the acquirors' and targets' V/P are significant at the 5% level. Likewise, in the fourteenth column of tender offers, both coefficients of acquirors and targets V/P are significant at the 5% level and 10% level, respectively. However, the explanatory power of the targets V/P is slightly weaker than in the univariate test. Also, the coefficient of CAR is slightly weaker for the target V/P (0.007943) than the acquiror V/P (0.012476, see column eight). The coefficient of the target V/P is still significant, after controlling for B/P, liquidity and cash ratio, which have had strong explanatory power in previous research.

We conclude that M&A transactions result in shortening the value correction time and partially reduce Misvaluation in the capital market within a short time. We also conclude that Japanese investors regard M&A investment as a means of managerial opportunism, or in other words, risk of over-investment in poor business opportunities when the firms have financial slack and/or cash equivalent. This is consistent with the findings of Myers and Majluf (1984), Smith and Kim (1994), Lung, Stulz, and Walkling (1999), and Bowers, Moore, and Majrice Tse (2000). Finally, we found that these results are similar for various periods of dependent variable CARs of the acquirors, including (-10, +10), (-5, +5), (-3, +3), (-1, +1), (-1, +3), and (-1, +5), which were not included in our original analyses.

## **6. Hedging Portfolio Strategy Following V/P ratio and Misvaluation Hypothesis**

In order to confirm the findings of the Misvaluation hypothesis, we executed a robustness check by constructing the hedging portfolio strategy given in Table 7. We constructed four partition cells with breakpoints based on the median valuation ratios (V/P and B/P ratio) of all listed firms. All M&A transactions were assigned to one of four groups. We specifically were interested in the cases where the acquirors and targets were both *undervalued* compared to those cases where the acquirors and targets were both *overvalued*. If the Misvaluation hypothesis accurately predicts economic performance, the stock performance of the former cases will outperform the latter.

According to Fuller, Netter, and Stegemoller (2002), an abnormal return is calculated with a market adjustment model. In our study, we used TOPIX as a market indicator, the benchmark for estimating the daily returns with the market adjusted model. First, we

calculated the daily abnormal returns (AR) around the announcement day of the sample firms, defined as the difference between the raw return and TOPIX. Second, we calculated the average abnormal returns (AR) of each cell. Cumulative abnormal returns (CAR) is accumulated from daily abnormal returns for the testing periods. The significance of AR and CAR was obtained by a cross-sectional  $t$  test.

Figure 1 plots the CARs for twenty-one days, (-10, +10), given by V/P and B/P based hedging portfolio strategies around the announcement day (0) of the M&A transactions. We confirmed that the stock performance of the acquiring firms where the acquirors and targets were both *undervalued* is definitely higher than acquiring firms where the acquirors and targets were both *overvalued* around the announcement day. V/P performance peaks on the fourth day and consistently exceeds B/P performance for ten days following the announcement day.

Table 8 shows the ARs and CARs for twenty-one days, (-10, +10), given by V/P and B/P based hedging portfolio strategies around the announcement day (0). In particular, we found significant CAR values one day after the announcement day for the V/P based strategy: AR was 1.28% (10% significant level), and CAR was 3.93% (10% significant level). CAR values of the V/P based strategy were considerably higher than that of the B/P based strategy (2.8%).

Table 9 shows CARs for various periods, given by V/P and B/P based hedging portfolio strategies around the announcement day (0) of M&A transactions. The results of CAR for (-1, +1), (-1, +3) and (-1, +5) are 1.60%, 3.57%, and 4.30%, respectively. The result of the V/P based strategy for twenty-one days (-10, +10) is 3.4% higher than the B/P based strategy. These results support the findings of the multivariate analysis in Section 5 (2-2).

## 7. Concluding remarks

In this paper, we found evidence that the increase of M&A transactions (in both number and magnitude) shortens the value correction time and reduces misvaluation in the capital market. We believe that investment funds analysts, whose main business focuses on corporate value, play an important role in this process. They are sometimes able to obtain direct information from managers. We supposed that they had played a primary role in our testing period. However, with a valuation model using data which is generally available, we showed how to construct the most profitable strategy. Therefore, we believe that value corrections are driven by ordinary investors not necessarily investment funds analysts.

The Misvaluation hypothesis predicts that positive excess returns of the acquiror will be detected around the announcement day of the M&A transaction, especially when the acquiror and/or target is/are undervalued. Our data provide new evidence from Japan which supports the Misvaluation hypothesis, as was initially reported by Dong, Hirshleifer, Richardson, and Teoh (2006) in the U.S.

In our multivariate analysis, we found that the positive post-M&A stock performance of firms with high V/P ratios (undervalued) was consistent with the Misvaluation hypothesis,

after controlling for the B/P ratio. Consequently, we confirmed that the Residual Income Model (RIM) adequately estimates the fundamental value of the firm.

On the other hand, we did not find evidence which supports the Means of Payment hypothesis, as reported in the U. S. The Means of Payment hypothesis suggests that managers select the stock payment option when the acquiror is overvalued in the market. But we found that regardless of overvaluation, Japanese managers most likely positively use cash payment when the firm has a sufficient financial slack. However, the question of why Japanese managers positively use cash payment even if the firm's stock is over-valued is still an open question.

Our results confirm the existence of V/P and B/P anomalies in the relatively highly efficient capital market, suggesting that the market possibly overlooks the mispricing of some stocks for a long time.

Observing the managers and investment fund analysts (who have far more information than the market) and understanding the base information that they utilize in evaluating the fundamental value is an extremely interesting research topic in the future. This may help explain why Japanese managers persist in using cash payments in M&A transactions even when the firm's stock is overvalued.

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Table 1 Acquiror and target announcement period cumulative abnormal returns (CAR)

(1) Acquiror Announcement Period CAR

Period	All		Merger Bids		Tender Offers		Tender Offers (stock payment)		Tender Offers (cash payment)
CAR (-10, +10)	1.1076%	*	0.4758%		1.5589%	*	0.4935%	**	0.8498%
CAR (-5, +5)	1.3548%	***	0.5021%		0.7905%	***	3.2544%	***	1.1174%
CAR (-3, +3)	1.1968%	**	0.6671%		1.5751%	**	3.4075%	***	0.3636%
CAR (-1, +1)	1.4889%	***	1.6099%	***	1.4025%	***	2.4667%	***	0.3321%
CAR (-1, +3)	0.9991%	**	0.2959%		1.5013%	**	2.9998%	***	0.3288%
CAR (-1, +5)	0.9504%	**	0.1880%		1.4950%	**	2.3604%	***	0.9141%
CAR (-1, +10)	0.7014%		-0.0083%		1.2082%		2.1815%	**	0.4043%
<i>N</i>	372		155		217		100		93

(2) Target Announcement Period CAR

Period	All		Merger Bids		Tender Offers		Tender Offers (stock payment)		Tender Offers (cash payment)	
CAR (-10, +10)	8.6169%	***	1.9766%		13.2873%	***	13.0501%	***	16.6361%	***
CAR (-5, +5)	8.0986%	***	1.4081%		12.9358%	***	12.3522%	***	16.0449%	***
CAR (-3, +3)	7.8196%	***	1.1551%		12.6155%	***	12.0437%	***	15.5219%	***
CAR (-1, +1)	7.1614%	***	2.0934%	*	10.7814%	***	10.7501%	***	13.1573%	***
CAR (-1, +3)	6.8173%	***	0.0398%		11.6946%	***	11.0506%	***	14.6614%	***
CAR (-1, +5)	6.5217%	***	-0.1576%		11.3508%	***	10.6905%	***	14.6033%	***
CAR (-1, +10)	6.1779%	***	-0.8460%		11.1181%	***	10.3334%	***	14.7260%	***
<i>N</i>	372		155		217		100		93	

(3) Acquiror and Target Announcement Period CAR

Period	All		Merger Bids		Tender Offers		Tender Offers (stock payment)		Tender Offers (cash payment)	
CAR (-10, +10)	9.9810%	***	2.8981%		14.9628%	***	16.1219%	***	17.4860%	***
CAR (-5, +5)	9.4959%	***	1.9246%		14.9700%	***	15.8163%	***	17.1623%	***
CAR (-3, +3)	9.0188%	***	1.8434%		14.1824%	***	15.4896%	***	15.8855%	***
CAR (-1, +1)	8.6503%	***	3.7033%	***	12.1839%	***	13.2168%	***	13.4894%	***
CAR (-1, +3)	7.8199%	***	0.3418%		13.2014%	***	14.1089%	***	14.9902%	***
CAR (-1, +5)	7.5062%	***	0.0418%		12.9030%	***	13.2140%	***	15.5174%	***
CAR (-1, +10)	7.1134%	***	-0.4941%		12.4641%	***	12.9127%	***	15.1303%	***
<i>N</i>	372		155		217		100		93	

Table 1 shows Cumulative Abnormal Return for various periods around the announcement day, given as (0), of the M&A, including 372 M&A transactions in the period January, 1996 to October, 2007. The sample includes merger bids and tender offers in which both acquiror and target were listed on the Japanese Stock Market in order to eliminate small cases. We excluded cases where either acquiror or target was a financial institution, or cases with a bailout takeover where the transaction was a result of the target being in financial distress, etc.

\*\*\*, \*\*, \* denote that the difference in mean values is significant at the 1%, 5%, and 10% level (one-tailed), respectively, based on the two-sample t-test.

Table 2 Descriptive statistics of M&amp;A transactions by calendar year

year	<i>N</i> of tender offers	<i>N</i> of merger bids	Acquiror				Target				transaction value	Total transaction value (¥ mln)	% completed M&A	Premium	Non Diversification	Diversification	Cash payment	Stock payment
			market equity (¥ mln)	book-to-market ratio	leverage	ROE	market equity (¥ mln)	book-to-market ratio	leverage	ROE								
1996	0	4	177,547	0.6142	0.7572	1.60%	120,938	0.3568	0.8180	3.86%	143,999	162,040	100%	-7.73%	3	1	0	4
1997	1	8	165,028	0.7715	0.7224	6.21%	18,062	1.0474	0.6050	3.98%	8,786	45,188	100%	-4.65%	6	3	0	9
1998	3	16	155,705	1.0834	0.7501	3.67%	11,017	1.3261	0.7808	2.74%	8,858	15,273	100%	2.51%	13	6	3	16
1999	13	21	102,351	0.7743	0.6609	2.22%	8,793	0.8106	0.5844	1.29%	8,954	70,744	100%	-3.69%	24	10	4	29
2000	29	11	156,020	0.5986	0.6600	1.20%	9,283	1.3939	0.5699	0.86%	9,930	18,250	95.45%	0.59%	13	9	3	17
2001	17	14	74,448	0.9208	0.5411	4.00%	5,901	1.3457	0.6008	1.49%	7,439	29,824	93.55%	-0.06%	17	14	4	27
2002	24	13	105,577	1.0222	0.6648	3.07%	4,597	1.7529	0.6688	0.65%	3,397	8,299	97.30%	3.66%	21	16	3	33
2003	28	14	124,333	0.9114	0.7250	1.90%	6,715	1.1632	0.6666	3.92%	3,800	20,998	92.86%	1.89%	25	17	11	36
2004	29	14	175,702	0.6651	0.5601	6.21%	8,841	1.0693	0.5465	3.98%	9,285	37,230	97.67%	2.15%	18	25	10	29
2005	31	19	69,485	0.5389	0.6406	6.47%	10,289	0.7921	0.5806	3.76%	6,441	47,326	96.00%	3.36%	27	23	19	28
2006	36	11	186,472	0.5974	0.5614	7.68%	14,854	0.8471	0.5106	4.38%	12,300	36,117	87.23%	8.21%	30	17	19	21
2007	24	10	378,141	0.6021	0.6361	7.52%	12,462	0.9335	0.6292	4.98%	5,911	46,170	94.12%	13.04%	22	12	17	15
Total	217	155	128,507	0.7207	0.6468	4.84%	9,245	1.0515	0.6038	2.91%	19,092	36,598	95.16%	3.39%	153	153	93	264

Market equity, book-to-market ratio, leverage, and ROE of both acquiror and target, transaction value, % completed M&A, Non Diversification, Diversification, cash payment, and stock payment are reported as median values, by calendar year. The sample includes merger bids and tender offers in which both acquiror and target were listed on the Japanese Stock Market in order to eliminate small cases. We excluded cases where either acquiror or target was a financial institution, or cases with a bailout takeover where the transaction was a result of the target being in financial distress, etc. In our sample, payment methods of merger bids are all stock payments.

Table 3 Descriptive statistics of M&amp;A transactions by industry

Acquiror's industry	N of tender offers	N of merger bids	Acquiror				Target			
			market equity (¥ mln)	book-to-market ratio	leverage	ROE	market equity (¥ mln)	book-to-market ratio	leverage	ROE
Foods	10	7	167,673	0.6686	0.4213	5.27%	16,884	0.9600	0.4199	4.15%
Textiles	7	3	82,263	1.1554	0.7082	-2.67%	2,299	1.1421	0.8023	3.22%
Pulp & Paper	5	7	462,671	0.8376	0.6966	2.93%	18,546	1.1849	0.7737	0.02%
Chemicals	13	7	178,522	0.6611	0.7066	4.79%	15,459	1.0522	0.5341	3.06%
Drugs	1	5	423,384	0.6634	0.2882	7.19%	192,864	0.6873	0.3946	5.56%
Petroleum	1	1	493,819	1.3498	0.7592	1.62%	76,403	1.2844	0.8152	-26.22%
Rubber	1	2	105,988	0.4337	0.7630	5.72%	15,449	1.0449	0.7566	5.27%
Stone, Clay & Glass	4	4	19,455	1.1516	0.6902	2.83%	3,040	1.7839	0.7419	-4.49%
Iron & Steel	5	4	163,446	1.2741	0.7777	2.47%	7,973	0.9324	0.6750	1.40%
Non-ferrous Metal	9	7	50,889	1.0951	0.4876	1.34%	4,823	1.2633	0.4882	1.54%
Machinery	8	14	141,793	0.6617	0.6320	4.28%	11,355	1.1745	0.5268	3.19%
Electric & Electronic Equipment	24	8	624,814	0.6459	0.5439	3.78%	9,002	1.0257	0.5524	1.10%
Shipbuilding & Repairing	1	0	164,087	1.0222	0.8622	3.75%	10,555	1.7053	0.5281	1.10%
Motor Vehicles & Auto Parts	7	5	2,082,111	0.9915	0.5890	7.30%	6,280	1.2427	0.6266	4.20%
Precision Equipment	2	3	284,209	0.6025	0.5982	13.31%	57,358	0.4908	0.6889	2.25%
Other Manufacturing	6	3	40,454	0.5414	0.4173	5.67%	5,132	1.3807	0.4843	5.42%
Fish & Marine	1	0	71,372	0.4781	0.8451	13.14%	30,904	0.5421	0.8474	12.64%
Mining	1	0	29,520	0.5744	0.9438	21.05%	6,208	1.7848	0.5260	-2.72%
Construction	13	15	45,897	0.9850	0.6130	5.65%	6,557	1.1052	0.7964	2.09%
Wholesale Trade	21	21	68,507	0.8054	0.7189	4.94%	7,480	1.0966	0.6291	4.60%
Retail Trade	25	10	87,366	0.5924	0.6526	6.66%	8,049	1.1231	0.5959	5.25%
Real Estate	3	2	218,529	0.2249	0.7557	18.42%	47,664	0.3882	0.6340	3.97%
Railroad Transportation	9	1	304,911	0.4494	0.8851	0.26%	14,350	1.3356	0.7705	-0.14%
Trucking	5	0	74,448	2.9563	0.4901	1.38%	5,617	3.4742	0.2092	2.19%
Sea Transportation	4	2	434,692	0.5966	0.8084	9.44%	20,740	0.5694	0.8444	-0.53%
Air Transportation	1	2	518,828	0.2780	0.9111	-55.64%	26,481	0.3956	0.6890	10.36%
Warehousing & Harbor Transportation	1	0	150,632	0.9288	0.4005	3.42%	6,940	1.4109	0.5526	6.98%
Communication Services	1	1	1,520,545	0.3048	0.7667	-40.15%	472,350	0.7028	0.6840	-1.53%
Utilities - Electric	4	0	1,422,822	0.9976	0.7526	1.54%	5,281	1.4696	0.6306	-20.14%
Services	24	21	36,880	0.4745	0.5249	6.06%	9,120	0.4807	0.4611	2.84%
Total	217	155	128506.7	0.7207	0.6468	4.84%	9,245	1.0515	0.6038	2.91%

Acquiror's industry	transaction value	Total transaction value (¥ mln)	% completed M&A	Premium	Non Diversification	Diversification	Cash payment	Stock payment
Foods	15,813	49,623	100%	20.35%	15	2	5	10
Textiles	1,125	3,868	80%	-12.45%	5	5	1	8
Pulp & Paper	16,485	52,196	83.33%	0.22%	11	1	1	11
Chemicals	6,992	42,137	95%	8.71%	11	9	5	14
Drugs	111,693	355,645	83.33%	1.95%	4	2	1	5
Petroleum	61,776	61,776	100%	-11.24%	2	0	1	1
Rubber	7,670	11,675	100%	-2.89%	2	1	1	2
Stone, Clay & Glass	4,106	18,910	100%	5.70%	7	1	1	7
Iron & Steel	8,213	62,045	88.89%	6.33%	3	6	1	8
Non-ferrous Metal	3,985	14,815	100%	-6.78%	6	10	1	12
Machinery	6,305	25,195	95.45%	1.65%	13	9	5	16
Electric & Electronic Equipment	5,523	19,164	100%	3.36%	16	16	10	22
Shipbuilding & Repairing	6,599	6,599	100%	-58.48%	0	1	0	1
Motor Vehicles & Auto Parts	3,632	8,093	100%	2.84%	7	5	4	8
Precision Equipment	20,807	64,229	80%	0.52%	4	1	1	3
Other Manufacturing	3,176	27,582	100%	20.08%	2	7	5	3
Fish & Marine	38,283	38,283	100%	15.05%	1	0	0	1
Mining	-	-	100%	-	0	1	1	0
Construction	5,300	19,568	96.43%	-3.24%	16	12	3	23
Wholesale Trade	5,163	12,338	97.62%	7.09%	22	20	9	28
Retail Trade	5,759	41,395	91.43%	5.13%	29	6	11	21
Real Estate	3,755	54,707	80%	9.57%	1	4	3	1
Railroad Transportation	10,570	45,814	100%	7.36%	1	9	0	7
Trucking	12,572	12,382	100%	2.50%	3	2	0	5
Sea Transportation	10,474	11,334	100%	-7.05%	4	2	2	4
Air Transportation	33,529	33,529	100%	-10.84%	1	2	0	2
Warehousing & Harbor Transportation	5,660	5,660	100%	34.41%	0	1	1	0
Communication Services	948,597	948,597	100%	17.04%	1	1	1	1
Utilities - Electric	1,723	5,130	100%	16.16%	0	4	2	2
Services	9,308	19,591	93.33%	4.35%	32	13	17	26
Total	47,400	36,598	95.49%	3.39%	219	153	93	252

Market equity, book-to-market ratio, leverage, and ROE of both acquiror and target, transaction value, % of completed M&A, Non Diversification, Diversification, cash payment, and stock payment are reported as medium values, by calendar year. The sample includes merger bids and tender offers in which both acquiror and target were listed on the Japanese Stock Market in order to eliminate small cases. We excluded cases where either acquiror or target was a financial institution, or cases with a bailout takeover where the transaction was a result of the target being in financial distress, etc. In our sample, payment methods of merger bids are all stock payments.

Table 4 Univariate Test of V/P Ratio Rank of Acquirors or Targets

All							
	Acquiror V/P Rank			Difference 1-3		<i>t</i> -Statistics	<i>p</i> -value (two-tailed)
	1	2	3				
Acquiror V/P	0.4412	0.9897	2.0332	-1.5920	***	-16.7487	0.0000
Acquiror B/P	0.8272	0.9960	0.9876	-0.1604	*	-1.6574	0.0988
Target V/P	0.9958	0.9472	1.1378	-0.1420		-0.8259	0.4097
Target B/P	1.1959	1.4896	1.3363	-0.1404		-0.9551	0.3405
Diversification	43.70%	43.90%	35.09%	8.62%		1.3841	0.1663
Acquiror In equity	25.3275	25.8141	25.2894	0.0381		0.1543	0.8775
Target In equity	23.2859	23.2023	22.9594	0.3265	*	1.6784	0.0945
Acquiror Leverage	0.6091	0.6178	0.6233	-0.0142		-0.5151	0.6070
Target Leverage	0.6051	0.5445	0.6141	-0.0090		-0.2910	0.7713
Acquiror ROE	-3.37%	2.82%	14.07%	-17.44%	*	-1.7872	0.0757
Target ROE	-53.54%	-1.08%	-7.71%	-45.83%		-1.2438	0.2156
Acquiror Cash Ratio	14.79%	10.24%	10.38%	4.40%	***	2.9272	0.0038
Target Cash Ratio	14.22%	11.79%	13.56%	0.67%		0.4012	0.6887
Acquiror Liquidity	7.54%	7.59%	12.29%	-4.75%	***	-3.5402	0.0005
Target Liquidity	6.42%	6.48%	8.28%	-1.86%		0.0071	0.1560
Probability of Cash Payment	29.37%	25.00%	25.93%	3.44%		0.5855	0.5582
Probability of Tender Offers	56.30%	62.60%	56.14%	0.16%		0.0247	0.9803
Probability of Success	97.78%	94.31%	92.98%	4.80%	*	1.8346	0.0666
Acquiror CAR(-10,+10)	-0.22%	1.87%	1.86%	-2.08%		-1.3492	0.1786
Acquiror CAR(-5,+5)	-0.09%	2.00%	2.37%	-2.46%	*	-1.8219	0.0697
Acquiror CAR(-3,+3)	-0.38%	1.75%	2.47%	-2.85%	**	-2.3149	0.0215
Acquiror CAR(-1,+1)	1.31%	1.74%	1.43%	-0.13%		-0.1369	0.8913
Target CAR(-10,+10)	8.11%	11.50%	6.00%	2.12%		0.8143	0.4163
Target CAR(-5,+5)	7.86%	10.35%	5.89%	1.97%		0.8030	0.4229
Target CAR(-3,+3)	7.67%	10.08%	5.50%	2.16%		0.8792	0.3803
Target CAR(-1,+1)	7.15%	8.15%	6.12%	1.03%		0.5376	0.5914
Acquiror & Target CAR(-10,+10)	8.05%	13.91%	7.85%	0.21%		0.0619	0.9507
Acquiror & Target CAR(-5,+5)	7.88%	12.34%	8.28%	-0.40%		-0.1377	0.8906
Acquiror & Target CAR(-3,+3)	7.26%	11.83%	8.03%	-0.78%		-0.2737	0.7846
Acquiror & Target CAR(-1,+1)	8.45%	9.88%	7.55%	0.90%		0.4100	0.6822

<b>All</b>							
	<b>Target V/P Rank</b>			Difference 1-3		<i>t</i> -Statistics	<i>p</i> -value (two-tailed)
	1	2	3				
Acquiror V/P	1.0476	1.0608	1.2512	-0.2036	*	-1.7218	0.0863
Acquiror B/P	0.8294	0.8768	1.1378	-0.3084	***	-2.7479	0.0067
Target V/P	0.0730	1.0170	2.4371	-2.3641	***	-18.3916	0.0000
Target B/P	1.1662	1.4340	1.4932	-0.3270	**	-2.2523	0.0251
Diversification	43.13%	44.23%	35.19%	7.94%		1.3018	0.1930
Acquiror ln equity	25.5282	25.8512	25.0398	0.4884	**	2.0787	0.0386
Target ln equity	23.2520	23.5018	22.6883	0.5637	***	3.1405	0.0019
Acquiror Leverage	0.6047	0.6047	0.6304	-0.0258		-0.9297	0.3534
Target Leverage	0.6000	0.6000	0.6176	-0.0176		-0.5755	0.5654
Acquiror ROE	8.15%	8.15%	-2.65%	10.80%		1.3627	0.1742
Target ROE	-30.14%	-30.14%	-31.32%	1.19%		0.0326	0.9741
Acquiror Cash Ratio	13.76%	13.76%	11.65%	2.12%		1.3245	0.1865
Target Cash Ratio	13.19%	13.19%	13.28%	-0.10%		-0.0632	0.9497
Acquiror Liquidity	9.76%	9.17%	7.75%	2.01%	*	1.8017	0.0727
Target Liquidity	4.24%	9.15%	9.05%	-4.81%	***	-4.1583	0.0000
Probability of Cash Payment	25.85%	29.29%	26.00%	-0.15%		-0.0264	0.9790
Probability of Tender Offers	54.38%	61.54%	61.11%	-6.74%		-1.0928	0.2745
Probability of Success	93.75%	94.23%	98.15%	-4.40%	*	-1.7076	0.0877
Acquiror CAR(-10,+10)	-0.74%	1.31%	3.64%	-4.38%	***	-2.8349	0.0050
Acquiror CAR(-5,+5)	-0.25%	1.53%	3.56%	-3.80%	***	-3.0335	0.0027
Acquiror CAR(-3,+3)	-0.29%	1.75%	2.87%	-3.16%	***	-2.6521	0.0085
Acquiror CAR(-1,+1)	0.34%	1.71%	2.98%	-2.65%	***	-3.0143	0.0028
Target CAR(-10,+10)	6.07%	9.37%	11.66%	-5.59%	**	-2.0687	0.0396
Target CAR(-5,+5)	5.72%	8.75%	10.99%	-5.27%	**	-2.0422	0.0421
Target CAR(-3,+3)	5.54%	8.60%	10.44%	-4.90%	**	-2.0002	0.0466
Target CAR(-1,+1)	5.02%	9.17%	8.40%	-3.38%	*	-1.7976	0.0734
Acquiror & Target CAR(-10,+10)	5.55%	11.06%	15.52%	-9.97%	***	-2.9494	0.0035
Acquiror & Target CAR(-5,+5)	5.44%	10.42%	14.60%	-9.15%	***	-3.0229	0.0028
Acquiror & Target CAR(-3,+3)	5.21%	10.35%	13.36%	-8.14%	***	-2.8940	0.0041
Acquiror & Target CAR(-1,+1)	5.36%	10.88%	11.38%	-6.03%	***	-2.7591	0.0062

<b>Tender Offers</b>							
	<b>Acquiror V/P Rank</b>			Difference 1-3		<i>t-Statistics</i>	<i>p</i> -value (two-tailed)
	1	2	3				
Acquiror V/P	0.5174	1.046472	1.8672	-1.3498	***	-20.3614	0.0000
Acquiror B/P	0.7534	0.9533	0.8247	-0.0713		-0.6080	0.5442
Target V/P	1.1440	1.1027	1.0976	0.0464		0.1904	0.8493
Target B/P	1.3115	1.6741	1.4299	-0.1183		-0.5218	0.6027
Diversification	51.32%	49.35%	43.75%	7.57%		0.8927	0.3720
Acquiror ln equity	25.8917	26.1734	25.9903	-0.0986		-0.3140	0.7540
Target ln equity	23.22514	22.8289	22.7647	0.4605	*	1.8179	0.0713
Acquiror Leverage	0.6061	0.6505	0.6170	-0.0109		-0.2976	0.7664
Target Leverage	0.5966	0.5261	0.6017	-0.0051		-0.1299	0.8969
Acquiror ROE	-3.49%	3.89%	7.81%	-11.29%	*	-1.93	0.057
Target ROE	-92.14%	-4.38%	-13.80%	-78.33%		-1.2037	0.2323
Acquiror Cash Ratio	14.92%	10.19%	10.05%	4.86%	**	2.2665	0.0254
Target Cash Ratio	14.69%	12.68%	14.83%	-0.15%		-0.0620	0.9507
Acquiror Liquidity	7.34%	7.99%	13.57%	-6.23%	***	-3.1881	0.0018
Target Liquidity	6.09%	6.83%	8.87%	-2.77%	*	-1.7424	0.0837
Probability of Cash Payment	54.41%	42.42%	48.19%	6.95%		0.7819	0.4343
Probability of Tender Offers	100%	100%	100%				
Probability of Success	97.37%	96.10%	95.31%	2.06%		0.6530	0.5138
Acquiror CAR(-10,+10)	-1.90%	3.62%	3.18%	-5.08%	**	-2.2126	0.0287
Acquiror CAR(-5,+5)	-0.12%	2.86%	3.36%	-3.48%	*	-1.7849	0.0765
Acquiror CAR(-3,+3)	-0.74%	2.14%	3.65%	-4.39%	**	-2.4522	0.0156
Acquiror CAR(-1,+1)	0.57%	1.52%	2.25%	-1.67%		-1.3424	0.1823
Target CAR(-10,+10)	10.19%	16.78%	12.48%	-2.29%		-0.6175	0.5380
Target CAR(-5,+5)	11.77%	15.95%	10.58%	1.20%		0.3316	0.7408
Target CAR(-3,+3)	12.00%	15.27%	10.06%	1.94%		0.5503	0.5830
Target CAR(-1,+1)	10.47%	11.90%	9.82%	0.65%		0.2318	0.817
Acquiror & Target CAR(-10,+10)	8.54%	20.40%	15.57%	-7.03%		-1.5161	0.1319
Acquiror & Target CAR(-5,+5)	11.84%	18.81%	13.93%	-2.09%		-0.5137	0.6083
Acquiror & Target CAR(-3,+3)	11.20%	17.41%	13.78%	-2.58%		-0.6605	0.5101
Acquiror & Target CAR(-1,+1)	11.04%	13.42%	12.06%	-1.02%		-0.334	0.7389

<b>Tender Offers</b>							
	<b>Target V/P Rank</b>			Difference 1-3		<i>t</i> -Statistics	<i>p</i> -value (two-tailed)
	1	2	3				
Acquiror V/P	1.0821	1.0412	1.1911	-0.1090		-0.9991	0.3193
Acquiror B/P	0.7494	0.8166	0.9997	-0.2503	*	-1.8823	0.0626
Target V/P	0.0573	1.0147	2.6087	-2.5514	***	-13.6980	0.0000
Target B/P	1.3682	1.5706	1.5233	-0.1551		-0.6910	0.4907
Diversification	55.17%	48.44%	39.39%	15.78%	*	1.9343	0.0531
Acquiror ln equity	26.1244	26.4097	25.5070	0.6174	**	2.0893	0.0384
Target ln equity	23.0106	23.2155	22.6084	0.4022	*	1.7387	0.0841
Acquiror Leverage	0.6099	0.6372	0.6332	-0.0233		-0.6093	0.5432
Target Leverage	0.5642	0.5365	0.6203	-0.0561		-1.4589	0.1467
Acquiror ROE	5.97%	5.55%	-5.14%	11.11%		1.6271	0.1078
Target ROE	-55.43%	0.04%	-51.56%	-3.88%		-0.0614	0.9511
Acquiror Cash Ratio	14.37%	9.22%	10.93%	3.44%		1.5563	0.1217
Target Cash Ratio	14.17%	14.58%	13.26%	0.91%		0.4264	0.6704
Acquiror Liquidity	10.63%	9.48%	7.74%	2.89%	*	1.8000	0.0739
Target Liquidity	4.46%	9.08%	8.91%	-4.45%	***	-3.2928	0.0013
Probability of Cash Payment	50.00%	49.15%	44.83%	5.17%		0.5939	0.5526
Probability of Tender Offers	100%	100%	100%				
Probability of Success	95.40%	96.88%	96.97%	-1.57%		-0.4947	0.6208
Acquiror CAR(-10,+10)	-0.47%	1.90%	3.90%	-4.37%	*	-1.8902	0.0607
Acquiror CAR(-5,+5)	0.05%	2.14%	4.31%	-4.26%	**	-2.3299	0.0214
Acquiror CAR(-3,+3)	-0.60%	2.23%	3.81%	-4.41%	*	-2.6595	0.0087
Acquiror CAR(-1,+1)	0.05%	1.78%	2.82%	-2.77%	**	-2.2911	0.0233
Target CAR(-10,+10)	11.68%	14.06%	14.61%	-2.93%		-0.8222	0.4123
Target CAR(-5,+5)	12.18%	13.06%	13.79%	-1.61%		-0.4544	0.6502
Target CAR(-3,+3)	11.79%	12.98%	13.33%	-1.54%		-0.4396	0.6609
Target CAR(-1,+1)	9.48%	14.09%	9.28%	0.19%		0.0753	0.9401
Acquiror & Target CAR(-10,+10)	10.90%	16.61%	18.60%	-7.71%	*	-1.7161	0.0883
Acquiror & Target CAR(-5,+5)	12.18%	15.46%	18.10%	-5.92%		-1.4636	0.1454
Acquiror & Target CAR(-3,+3)	11.12%	15.22%	17.14%	-6.02%		-1.5656	0.1196
Acquiror & Target CAR(-1,+1)	9.53%	15.87%	12.11%	-2.57%		-0.8782	0.3813

The sample includes merger bids and tender offers in which both acquiror and target were listed on the Japanese Stock Market in order to eliminate small cases. We excluded cases where either acquiror or target was a financial institution, or cases with a bailout takeover where the transaction was a result of the target being in financial distress, etc., where the data is needed to (1) recognize the method of payment (cash vs. stock), and (2) calculate V/P and B/P available. V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. B/P is the book-to-price ratio.

\*\*\*, \*\*, \* denote that the difference in mean values between cash and stock offers, and acquirer and target is significant at the 1%, 5%, and 10% level (two-tailed), respectively, based on the two-sample t-test.

Table 5 Logistic Regressions

		Dependent Variable (=1 [cash payment], 0 [stock payment])					
	expected sign	Tender Offers					
Target V/P		-0.0031 (0.979)	0.0241113 (0.855)	0.0452235 (0.733)	0.0417038 (0.769)	0.0323778 (0.818)	0.0245305 (0.864)
Acquiror V/P	[+]	-0.3697334 (0.183)	-0.6667436 ** (0.023)	-0.5705492 * (0.055)	-0.5840476 ** (0.049)	-0.5496064 * (0.072)	-0.570542 * (0.066)
Target B/P		-0.2264725 (0.208)	-0.1992353 (0.249)	-0.1785526 (0.292)	-0.1811177 (0.295)	-0.1012916 (0.570)	-0.1216618 (0.516)
Acquiror B/P		-0.2681805 (0.365)	-0.2190803 (0.444)	-0.2797828 (0.303)	-0.2867757 (0.306)	-0.4844921 (0.144)	-0.4940118 (0.137)
Acquiror liquidity		-	6.266713 ** (0.040)	7.381381 * (0.051)	7.663318 ** (0.040)	7.623909 ** (0.027)	7.705796 ** (0.023)
Acquiror cashratio		-	-	2.290243 (0.157)	2.325357 (0.154)	2.033143 (0.340)	1.936333 (0.366)
Diversification		-	-	-	0.4673404 (0.180)	0.5226982 (0.136)	0.5295488 (0.133)
ln relative equity		-	-	-	-	-0.1742426 (0.180)	-
Acquiror ln equity		-	-	-	-	-	-0.1881682 (0.167)
Target ln equity		-	-	-	-	-	0.1406655 (0.426)
Acquiror leverage		-	-	-	-	0.0602718 (0.962)	0.0532001 (0.966)
Intercept		0.2838318 (0.747)	0.0122465 (0.989)	-0.436364 (0.655)	-0.5564936 (0.491)	0.157442 (0.915)	1.329946 (0.759)
<i>N</i>		189	189	189	189	189	189
Pseudo- <i>R</i> <sup>2</sup>		0.1612	0.2028	0.2113	0.2182	0.2259	0.2263

In our sample, payment methods of merger bids are all stock payment, therefore we executed this logistic regression focusing on tender offers in which both acquirer and target were listed on the Japanese Stock Market during 1996-2007. However we excluded cases where either acquirer or target is a financial institution, or a bailout takeover where the transaction is as a result of the target being in financial distress etc., where the data is needed to calculate V/P and B/P available. V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. B/P is the book-to-price ratio. Liquidity is operating income plus depreciation minus interest, taxes, and all dividends, and is expressed as a ratio to total assets. The cash ratio is cash equivalent plus short-term investments, expressed as a ratio to assets. The diversification dummy=1 if the target is outside the acquirer's industry; diversification dummy=0 if they are both in the same industry. Relative equity is the ratio of the acquirer's market equity to the target's market equity. Equity is the market value of the common stock holders. Leverage is the ratio of total debt to total assets.

The first row reports coefficient, and the second row in parentheses reports the p-value. \*\*\*, \*\*, \* denote significant at the 1%, 5%, and 10% level (two-tailed), respectively.

Table 6 Least Squares Regressions

	Dependent Variable (=Acquirer CAR [-3,+3]) expected sign	Tender offers & Merger bids						Tender offers					
		Target V/P	[+]	0.0082 ** (0.042)	0.0080 ** (0.041)	0.0075 * (0.060)	0.0075 * (0.060)	0.0076 * (0.056)	0.0079 ** (0.046)	0.0107 ** (0.043)	0.0101 ** (0.050)	0.0087 * (0.097)	0.0087 (0.101)
Acquirer V/P	[+]	0.0095 (0.104)	0.0121 ** (0.050)	0.0106 * (0.057)	0.0107 * (0.059)	0.0117 ** (0.040)	0.0125 ** (0.032)	0.0239 * (0.094)	0.0315 ** (0.041)	0.0257 ** (0.041)	0.0257 ** (0.039)	0.0260 ** (0.037)	0.0329 ** (0.021)
Target B/P	[+]	0.0107 ** (0.035)	0.0102 ** (0.042)	0.0094 * (0.067)	0.0094 * (0.069)	0.0117 ** (0.020)	0.0130 ** (0.014)	0.0145 ** (0.011)	0.0141 ** (0.014)	0.0134 ** (0.022)	0.0134 ** (0.022)	0.0167 *** (0.005)	0.0189 *** (0.004)
Acquirer B/P	[+]	0.0113 (0.123)	0.0094 (0.202)	0.0098 (0.177)	0.0099 (0.181)	0.0044 (0.561)	0.0064 (0.418)	0.0166 (0.194)	0.0135 (0.267)	0.0146 (0.219)	0.0145 (0.223)	0.0057 (0.552)	0.0020 (0.863)
Acquirer liquidity			-0.0958 (0.154)	-0.0910 (0.171)	-0.0908 (0.169)	-0.1078 (0.113)	-0.1163 * (0.099)		-0.1572 * (0.074)	-0.1681 * (0.064)	-0.1684 * (0.062)	-0.2189 ** (0.025)	-0.2178 ** (0.024)
Acquirer cash ratio				-0.0769 (0.264)	-0.0762 (0.264)	-0.1038 (0.169)	-0.0947 (0.208)			-0.1374 (0.115)	-0.1375 (0.115)	-0.2411 ** (0.011)	-0.2108 ** (0.034)
Diversification					-0.0035 (0.736)	-0.0051 (0.645)	-0.0048 (0.670)				0.0014 (0.923)	0.0044 (0.744)	0.0002 (0.988)
ln relative equity						-0.0036 (0.270)						-0.0080 * (0.072)	
Acquirer ln equity							-0.0022 (0.521)						-0.0072 (0.145)
Target ln equity							0.0063 (0.138)						0.0123 * (0.071)
Acquirer leverage						-0.0272 (0.317)	-0.024 (0.383)					-0.0860 ** (0.014)	-0.0682 * (0.060)
Intercept		-0.0168 (0.467)	-0.0130 (0.573)	-0.0038 (0.882)	-0.0014 (0.958)	0.0306 (0.441)	-0.074 (0.502)	0.1298 *** (0.000)	0.1298 *** (0.000)	0.1371 *** (0.000)	0.1410 *** (0.000)	0.1981 *** (0.000)	0.0826 (0.580)
<i>N</i>		372	372	372	372	372	372	217	217	217	217	217	217
Adj- $R^2$		0.0926	0.0999	0.1084	0.1087	0.1152	0.1179	0.1444	0.1648	0.1882	0.2438	0.2170	0.2202

Acquirer Announcement Period Cumulative Abnormal Returns (CAR) are measured over the 7 days (-3, 3) around the announcement (day 0) of the acquisition. The sample includes merger bids and tender offers in which both acquirer and target were listed on the Japanese Stock Market in order to eliminate small cases. We excluded cases where either acquirer or target was a financial institution, or cases with a bailout takeover where the transaction was a result of the target being in financial distress, etc., where the data needed to calculate V/P and B/P is available. V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. Liquidity is operating income plus depreciation minus interest, taxes, and all dividends, and is expressed as a ratio to total assets. The cash ratio is cash equivalent plus short-term investments, expressed as a ratio to assets. The diversification dummy=1 if the target is outside the acquirer's industry; diversification dummy=0 if they are both in the same industry. Relative equity is the ratio of the acquirer's market equity to the target's market equity. Equity is the market value of the common stock holders. Leverage is the ratio of total debt to total assets.

The first row reports coefficient, and the second row in parentheses reports the p-value. \*\*\*, \*\*, \* denote significant at the 1%, 5%, and 10% level (two-tailed), respectively.

Table 7 Four independent cell matrix based on valuation ratios [V/P and B/P]

		Target's V/P or B/P	
		high	low
Acquiror's V/P or B/P	high	Buy the acquiring firm's stock when both acquiring firms and target firm are relatively undervalued	
	low		Sell the acquiring firm's stock when both acquiring firms and target firm are relatively overvalued

V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. B/P is the book-to-price ratio.

Based on the medium valuation ratios of all listed firms, all M&A transactions were sorted into four groups:

The 1<sup>st</sup> Row, 1<sup>st</sup> Column in the Matrix represents cases where both the acquirers' and the targets' V/P or B/P ratios fall above the medium valuation ratios (V/P or B/P) of all listed firms.

The 2<sup>nd</sup> Row, 2<sup>nd</sup> Column represents cases where both the acquirers' and the targets' V/P or B/P ratios fall below the medium valuation ratios (V/P or B/P) of all listed firms.

The 1<sup>st</sup> Row, 2<sup>nd</sup> Column and 2<sup>nd</sup> Row, 1<sup>st</sup> Column positions are negligible for the purposes of this study. Table 7 shows four partition cells with breakpoints based on the median valuation ratios (V/P and B/P ratio) of all listed firms. All M&A transactions were assigned to one of four groups. We specifically were interested in the cases where the acquirors and targets were both *undervalued* compared to those cases where the acquirors and targets were both *overvalued*.

Table 8 Cumulative abnormal returns for (-10 to +10) produced by V/P and B/P Trading strategies

date	V/P ratio		B/P ratio	
	AR	CAR	AR	CAR
-10	-0.4411%	-0.4411%	-0.4384%	-0.4384%
-9	0.8178%	0.3767%	0.3055%	-0.1329%
-8	-0.4446%	-0.0679%	-0.2720%	-0.4050%
-7	-0.4336%	0.5016%	0.2958%	-0.1092%
-6	0.4908%	-0.0108%	-0.1028%	-0.2120%
-5	0.1673%	0.1565%	-0.9485%	** -1.1604%
-4	-0.5298%	-0.3734%	-0.3675%	-1.5279%
-3	0.5869%	0.2135%	0.4603%	-1.0676%
-2	0.6491%	* 0.8626%	0.0563%	-1.0676%
-1	1.0425%	1.9051%	1.5099%	** 1.0676%
0	0.7411%	2.6462%	0.5507%	1.0493%
1	1.2800%	* 3.9262%	* 0.0665%	1.1158%
2	0.4110%	4.3372%	* 0.8190%	* 1.9348%
3	0.8192%	5.1564%	* 0.5942%	2.5290%
4	0.5149%	5.6713%	* -0.2126%	2.3164%
5	-0.2568%	5.4145%	* 0.0828%	2.3992%
6	-0.3116%	5.1029%	* 0.1113%	2.5105%
7	0.4723%	5.5752%	* -0.5955%	* 1.9150%
8	-0.5941%	4.9811%	* 0.3429%	2.2579%
9	0.0499%	5.0310%	* 0.1156%	2.3735%
10	0.6186%	5.6496%	* -0.1306%	2.2429%
<i>N</i>	372	372	486	486

Table 8 shows abnormal returns (AR)/cumulative abnormal returns (CAR) over the twenty one days (-10, +10) around the announcement (day 0) of the acquisition, produced by V/P and B/P-based trading strategies. V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. B/P is the book-to-price ratio. For each valuation ratio, we require that both acquirer and target have known values.

The investment strategy is produced by buying acquiring firm's stock where both the acquirer's and the target's V/P or B/P ratios fall above the medium valuation ratios (V/P or B/P) of all listed firms [high V/P of Acquirer - high V/P of Target] and selling acquiring firm's stock where both the acquirer's and the target's V/P or B/P ratios fall below the medium valuation ratios (V/P or B/P) of all listed firms [low V/P of Acquirer - low V/P of Target].

The sample includes both successful and unsuccessful merger bids and tender offers in which both acquirer and target were listed on the Japanese Stock Market during 1996-2007, but excludes cases where either acquirer or target is a financial institution, or a rescue takeover where the transaction is as a result of the target being in danger of financial damage or difficulty in fulfilling commercial notes etc.

\*\*\*, \*\*, \* denote that the difference in mean values is significant at the 1%, 5%, and 10% level (one-tailed), respectively, based on the two-sample t-test.

Table 9 Cumulative Abnormal Returns for various periods produced by V/P and B/P Trading strategies

period	V/P ratio	t-test	B/P ratio	t-test	Difference between V/P and B/P strategy
CAR(-1,+1)	3.0636%	**	2.1271%		0.9365%
CAR(-10,+10)	5.6496%	*	2.2429%		3.4067%
CAR(-1,+10)	4.7870%	**	3.2542%	*	1.5328%
CAR(-5,+5)	5.4253%	**	2.6112%		2.8142%
CAR(-1,+5)	4.5519%	**	3.4105%	**	1.1414%
CAR(-1,+3)	4.2939%	**	3.5403%	**	0.7535%
CAR(-3,+3)	5.5298%	***	4.0569%	***	1.4729%

Table 9 shows cumulative abnormal returns produced by V/P and B/P based trading strategies. V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. B/P is the book-to-price ratio. For each valuation ratio, we require that both acquirer and target have known values.

The investment strategy is produced by buying acquiring firm's stock where both the acquirer's and the target's V/P or B/P ratios fall above the medium valuation ratios (V/P or B/P) of all listed firms [high V/P of Acquirer - high V/P of Target] and selling acquiring firm's stock where both the acquirer's and the target's V/P or B/P ratios fall below the medium valuation ratios (V/P or B/P) of all listed firms [low V/P of Acquirer - low V/P of Target].

The sample includes both successful and unsuccessful merger bids and tender offers in which both acquire and target were listed in Japanese Stock Market during 1996-2007, but excludes cases where either acquirer or target is a financial institution, or a rescue takeover where the transaction is as a result of the target being in danger of financial damage or difficulty in fulfilling commercial notes etc.

\*\*\*, \*\*, \* denote that the difference in mean values is significant at the 1%, 5%, and 10% level (one-tailed), respectively, based on the two-sample t-test.

Figure 1 Cumulative Abnormal Returns (-10 to 10) produced by V/P and B/P Trading strategies

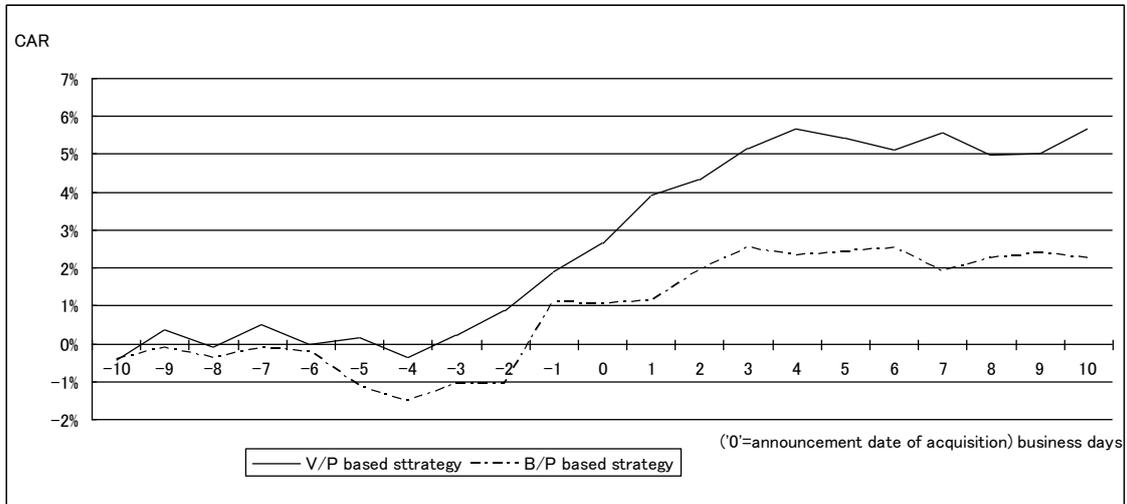


Figure 1 shows cumulative abnormal returns produced by V/P and B/P based trading strategies. V/P is the fundamental value-to-price ratio. The fundamental value V is estimated using the residual income model (RIM) where the discount rate is based on firm-specific CAPM. B/P is the book-to-price ratio. For each valuation ratio, we require that both acquirer and target have known values.

For each investment strategy, this graph depicts the cumulative abnormal returns produced by buying acquiring firms where M&A transactions are in the case of [high V/P or B/P of Acquirer - high V/P or B/P of Target] and selling acquiring firms where M&A transactions are in the case of [low V/P or B/P of Acquirer - low V/P or B/P of Target].

The sample includes both successful and unsuccessful merger bids and tender offers in which both acquirer and target were listed on the Japanese Stock Market during 1996-2007, but excludes cases where either acquirer or target is a financial institution, or a rescue takeover where the transaction is as a result of the target being in danger of financial damage or difficulty in fulfilling commercial notes etc.