Do acquirers only break even?

Preliminary and incomplete version

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Abstract

A major finding of the literature examining the stock price changes driven by merger announcements is that the combined firm gains significantly, the target firm captures all the stock market surplus and acquirers on average lose or break even. If all empirical evidence is correct the following questions arise: Why do firms volunteer as buyers if they cannot expect to gain? Why do acquirers systematically overpay the target firms? This paper argues that previous empirical investigations have only partially detected the effects of mergers. Following Hall (1999) I apply the propensity score method to a large dataset from Compustat with information on mergers and acquisitions. I find that the model predicts with high probability the value-creating mergers (i.e. those with high total factor productivity growth and R&D investment growth) and gives low probability to the value-destroying ones. This result suggests that investors should be able to predict profitable mergers already before the announcement is made and in efficient markets this information should be incorporated in the stock prices by the time of the merger announcement. I test this hypothesis by comparing the abnormal stock price returns before the announcement date for the different groups of mergers.

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1 Introduction

Mergers and acquisitions periodically reallocate massive resources of the economies and reshape the structure of industries. The value that changes ownership during peak activity periods may account for 5% of world-wide GDP. The three main merger waves since the early 1960s have revealed an ever increasing corporate interest in takeover activities measured both by the number and the value of the deals. During the 1980s nearly half of all major US corporations received a takeover offer and the M&A activity in the 1990s is even more dramatic and widespread, as reported by Mitchell and Mulherin (1996) and Andrade et al (2001). In light of this clear tendency it is surprising how little success empirical researchers have had in explaining why mergers take place, whether they create shareholder value and if they do, what the sources of the gains are.

Theoretical contributions have provided many possible reasons for why mergers might occur: improving efficiency by exploiting economies of scale or other synergies; attempts to create market power; gains from removing the incompetent management of the target firms; managerial hubris and empire building; diversification and reaction to unexpected shocks to industry structure. In order to identify empirically which of these reasons are the main drivers of takeover activities, a useful step would be to establish whether mergers and acquisitions create or destroy shareholder value. Despite the latter question has caught the attention of numerous scholars, univocal agreement has not been reached concerning the issue.

There have been two major approaches to the quantitative assessment of merger outcomes: event studies and operating performance studies\(^1\). Event studies build on the theory that in efficient markets stock prices quickly adjust following any public information incorporating the news’ entire expected future wealth effects. The standard short window event studies measure the announcement period abnormal returns for both acquirers and targets, as well as for the acquirer and the target combined. The stylized facts of this strand of research are that the combined firm gains significantly, the target firm captures all the stock market surplus

\(^1\) See section 3 for a discussion on operating performance studies.
and acquirers lose or break even. As for the magnitude of the announcement period stock price changes the following numbers are reported by surveys: the average announcement period abnormal returns over the three-five-day event window for the combined firms range from 1 percent to 3 percent suggesting that mergers do create shareholder value on average. While these returns may not seem extraordinary at first sight, the fact that they materialize in a very short period (3-5 days) clearly places corporate takeovers among the most profitable investment opportunities. A separate analysis of the same measures for the target firms and the acquirers reveals an unexpected pattern. The average announcement period abnormal return for target firms is in the range of 15-25 percent, while the corresponding number for the acquirers is between (-3)-1 percent. From these results, short window event studies generally conclude that mergers are on average profitable but the announcement period gains accrue entirely to the target firms’ shareholders leaving acquirers hardly break even. These results are puzzling especially because takeover decisions are in most cases brought by acquirers. Why do some firms volunteer as buyers if they cannot expect to gain from their investment? Why do acquirers systematically overpay the target firms?\(^2\)

The hypothesis proposed in this paper, which is based on the operating performance study of Hall (1999), is the following: the value-creating mergers are predicted and expected by the stock market participants, and thus their stock prices incorporate the gains from the merger already before the announcement is made. The value-preserving/destroying mergers, on the other hand, are unexpected, and it is their impact that traditional short window event studies measure. I test this hypothesis by analyzing the stock market returns of about 550 U.S. based companies that acquired another firm during the period 1975-1995.

The contribution of this paper to the literature is twofold. First, it gives a new explanation to the puzzling pattern of announcement date stock price returns observed by short window event studies. Furthermore, by connecting an operating performance and an event study, it is the first to bring together the two major methodologies applied in the literature, which allows to conclude on the basis of a largely extended information set.

The rest of the paper is organized as follows. Section 2 details the hypothesis and explains the reasoning behind it. Section 3 contains the first step of the empirical strategy, the

\(^2\) There have been some attempts to answer these questions, that are discussed in section 2.
operational performance study. It describes the dataset and the methodology and summarizes the results. Section 4 briefs on the dataset and the methodology used for the event study. The next section analyzes the results of the empirical investigation and the last one concludes.

2 Hypothesis

This paper focuses on the findings of the short term event studies, i.e. that the combined firms gain significantly, the target firms capture the whole surplus brought about by the merger and the acquirers lose or break even. There have been some attempts to explain this pattern, that are briefly reviewed in the followings.

Some authors have suggested that the presence of competing bidders could allow targets to extract full value from the eventual acquirer. However, Andrade et al. (2001) mention two reasons why this may not be the case. First, the majority of acquisitions only feature one bidder. Second, if gains were to stem from synergy effects, then it should imply that there is a unique match between the target and bidder that would allow for such gains to arise.

Another explanation for the targets’ success may be conjectured from studies tracing insider trading. Information leaking before the announcement day allows investors to bid up the share prices of target firms and so capture the entire gain from the acquisition. Again, the same counter-argument applies as before. Insider trading is not so widely observed phenomenon that would allow for such generalization.

An important point concerning the distribution of gains between the merging parties is the size difference between targets and acquirers. As several authors have pointed out (Asquith et al (1983), Andrade et al (2001)), acquiring firms are on average significantly larger than their targets, thus one should expect a significantly lower percentage gain for the acquirers even in the case of equal distribution of the gains. This, however, still does not explain why event studies find negative or zero abnormal return for the acquiring companies.

The hypothesis advanced here builds on Hall (1999), who seeks to identify the effects of M&A activities on R&D and productivity. Using the propensity score method in order to construct an appropriate control sample, she estimates the probability of acquisition for each
firm based on some corporate characteristics (size, Tobin’s Q, R&D investment etc.)
Classifying the firms by their acquisition probability and comparing their outcomes (R&D investment, TFP growth) to those of the control groups, she finds the following:
1. Firms with a high predicted probability of making an acquisition have a significantly higher increase in their R&D and a significantly higher total factor productivity (TFP) growth when compared to the control firms. I will term this type of acquisitions “value-creating mergers”.
2. Firms with a low acquisition probability that actually make an acquisition have a significantly lower increase in their R&D when compared to the control firms that have not merged, and their TFP growth around the merger is about the same as for the non-merging firms. These acquisitions are called “value-preserving/destroying mergers” in the followings.
The hypothesis that I propose based on the above findings is the following: mergers that eventually bring about significant corporate performance improvements are predictable, and therefore expected by investors well before the announcement date. Consequently, event studies with a short window around the announcement date will be unable to trace down the impacts of the value creating mergers, these being already incorporated in the share prices. As for the value-preserving/destroying mergers, they are unexpected and it is their impact that short window event studies measure. Thus, the average change in the acquirers’ share prices at the announcement date will be negative or zero, but this finding only partially reflects the true merger effects. The abnormal stock price returns preceding the announcement date should be included in the analysis in order to account for the gains arising from value-creating mergers.

The result that acquirers do gain from corporate takeovers would also have important implications for the distribution of gains between the merging parties. In particular, it casts doubt on the finding that targets capture the whole stock market surplus, and, as discussed above, even a small percentage gain shown to be extracted by the acquirers could testify an equal distribution of the value created if size differences between the merging firms are large³.

³ One could argue that good mergers should be predictable for the target firms as well, and thus part of their gain might be incorporated in their share prices before the announcement. This is clearly a possibility that deserves attention, although Hall (1999) finds that predicting acquisition for target firms is much less powerful than for acquirers.
The following considerations support the view that profitable takeovers may be expected by the market before the announcement date. First, the M&A departments of large consultancy firms, funds and investment banks spend significant resources on developing models that are capable to predict M&A activities. Market participants’ effort to anticipate certain takeover activities are even documented in the Wall Street Journal Index by the comment “bid foreseen by analysts” that often accompany merger announcements. Moreover, it is not the takeover per se that needs to be predicted in order for the acquirers’ stock prices to rise already before the announcement of the merger. It is enough, for example, if investors see promising growth opportunities in a firm. How managers eventually materialize these opportunities, be it through mergers or building new plants etc., is unimportant concerning the stock market’s behavior.

Studies on insider trading build on a similar idea as the one proposed here, i.e. investors may have information about mergers already before the announcement date. They, however, mainly focus on the movements of the target firms’ stock prices preceding the announcement date and rarely on those of the acquiring firms.

This paper is closest in spirit to Asquith et al. (1983) and Schipper and Thompson (1983), two studies that analyze the abnormal stock price returns of acquirers preceding the announcement date. Both test the hypothesis that when firms announce merger programs, i.e. are planning to undertake a series of takeovers, the gains of later acquisitions are capitalized in the beginning of the programs. They both find significant positive excess returns for different lengths of periods before the announcement of the mergers, which accords well with the hypothesis advanced in this paper. Contrarily to this study, however, their datasets include only firms announcing merger programs and in both cases the reason for examining the stock prices before the announcement date is the possible leakage of information, in other words: insider trading.
Operating performance studies attempt to measure the impact of mergers and acquisitions by comparing various corporate performance indicators of the merged firms to those of the control firms. These indicators may vary from profitability measures, such as return on assets or operating margins to growth measures such as rates of R&D investment and capital expenditure. In this study the effects of corporate takeovers on different measures of R&D investment and total factor productivity (TFP) growth are investigated.

3.1 Dataset

The dataset, constructed using various files of Compustat, contains approximately 6,000 United States-based publicly traded manufacturing firms that existed for some time between 1975 and 1995. The variables used in this analysis, such as employment, sales, capital to labor ratio, R&D investment, are described in Table 1, their means given in Table 2 and their distribution among industries in Table 3. The dataset includes 623 mergers with enough data for the analysis, their distributions in time and by industrial classification are shown in Table 4 and Table 5.

3.2 Methodology

The main methodological challenge of operating performance studies is “the lack of observable counter-factual”. In order to isolate the true effects of mergers one would ideally compare the change in the outcomes of a firm around the merger to that it would have experienced in case it did not merge. This is clearly not possible therefore an appropriate control group has to be constructed. One solution to this problem offered by Rosenbaum and Rubin (1985) is the “propensity score” methodology. In this approach, one computes the probability of an event (the “treatment”) for a sample of observations (in this case the probability of merger for the sample

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4 This section closely follows the discussion in Hall (1999) as I am using both her methodology and her dataset. The dataset has been cleared since she conducted her study, this accounts for the differences between the results reported in the two papers.
of firms) and compares the outcome after the event date (the growth in R&D investment or TFP growth) for firms that have the same probability of the event, but did or did not experience it.

In this case the probabilities of the mergers are estimated using a logit regression with explanatory variables such as the size of the firm measured by the logarithm of employment, the R&D intensity measured by the R&D to sales ratio, a dummy for zero or insignificant amounts of R&D, the capital-labor ratio, the logarithm of Tobin’s Q, a dummy for missing or implausibly small (below 0.1) Tobin’s Q, the earnings-sales ratio, and a dummy for very negative earnings (the ratio was set to zero in this case). All covariates are lagged one year with respect to the year of acquisition in order to avoid endogeneity problems. The regression is run on the data of approximately 10,000 firms with nearly 560 acquisitions. The results from this regression are shown in Table 6.

The first column in Table 6 shows the coefficients from a logit regression for the probability that a firm will acquire another public firm. Such firms are much larger than the others, have lower R&D intensities and higher Tobin’s Q. They are also less likely to have small cash flow – either more negative or more positive cash flow is associated with acquiring a public firm. The finding that higher probabilities of acquisition are assigned to larger firms further strengthens the hypothesis that stock market participants may foresee some types of mergers. Larger firms are under constant monitoring by analysts and investors alike who spend significant effort to anticipate the movements of the industry giants.

The predicted probabilities derived from this regression are shown in Box Plots for the two groups of firms in Figure 1 (the acquirers versus the rest). The boxes confirm that there are important differences between the firms that acquire and the ones that do not. In other words, the regression performs relatively well in terms of predicting the probabilities of acquisitions.

In the next step the growth rates (total factor productivity, R&D investment and the change in the R&D-to-sales ratio) are investigated. These outcomes are compared for two groups of firms that merge and don’t merge, but that have the same probability of merger. The comparisons are done using medians and using a distribution free Kruskal-Wallis or rank sum test. Table 6 shows the results for R&D investment and the change in the R&D-to-sales ratio.

In both cases the changes are measured between the average of up to three years’ worth of data before the merger to up to three years’ data after, adjusted for the average length of the
gap so that they correspond to annual rates. The pre-merger values used are the combined figures for the two merging firms (weighted by sales in the case of the R&D-to-sales ratio). Overall there is very little difference between the two groups of firms, and this is confirmed in Table 7. The Kruskal-Wallis test confirms that the hypothesis that there is no difference between the two distributions is not rejected at the 10 percent level.

However, when the firms are ranked by their probability to acquire, significant differences emerge. The observations are classified into 6 groups based on their estimated propensity to acquire other firms; the groupings are designed so that the number of acquired firms is approximately equal across them. Both measures of the change in R&D around the time of merger give essentially the same result: firms with a lower propensity to merge (between 2 to 4 percent) that actually make an acquisition have a significantly lower increase in their R&D when compared to firms that have not merged. On the other hand, firms with a propensity in the three higher classes (above around 6.5 percent) that actually make an acquisition have a significantly higher increase in their R&D than the control groups. The results of the analysis of total factor productivity growth show essentially the same pattern: for the merging firms that have higher predicted probability of acquisition it is significantly higher than that of the control group, while for the firms that have lower predicted probability of acquisition it is about the same as for the firms that did not merge.

The implications of these results are the following: observing certain characteristics of the firms, such as size, Tobin’s Q, capital/labor ratio and cash flow, one can predict the probability that a firm will acquire another one and can expect that the acquisition will create value in case of high predicted probabilities. In the followings I examine whether the stock price movements of the different groups of merging firms allow to suspect that stock market participants use such technique.
4 Abnormal returns at and before announcement

Standard event studies measure the impact of an economic event on the value of firms using security prices observed over a relatively short time period. They usually restrict their attention to the stock price returns in the 3-5 days around the merger announcement date, building on the theory that in efficient markets stock prices quickly adjust following any public information incorporating the news’ entire expected future wealth effects. The hypothesis that profitable mergers are predictable and therefore their impacts are incorporated in the share prices before the announcement date are tested by analyzing the stock price returns of the merging firms in a longer period (20-100 days) preceding the announcement date.

4.1 Dataset

For the same firms analyzed in the previous section the announcement date of acquisitions have been collected from the Wall Street Journal Index. Furthermore, the dataset includes daily stock price returns for the acquiring firms 300-300 days before and after the announcement date, and the same returns for the control groups and for the market index for the entire period between 1976-1995. The source of the information on stock prices was the Center for Research in Security Prices (CRSP).

4.2 Methodology

In order to gauge the event’s impact a measure of the abnormal return needs to be constructed. The abnormal return is the actual ex post return of the security over the event window minus the normal return of the firm over the event window. The normal return is defined as the expected return without conditioning on the event taking place. The expected return is calculated on the basis of a market model, a statistical model which relates the return of any security to the return of the market portfolio. The model’s linear specification follows from the assumed joint normality of asset returns. For any security $i$ the market model is:
\[ R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_i. \]  

The term \( R_{it} \) is the realized logarithmic return at time \( t \) for firm \( i \) (\( i = 1, \ldots, 550 \)); \( R_{mt} \) is the CRSP value-weighted market index logarithmic return at time \( t \); \( \varepsilon_{it} \) is the residual which is assumed to be serially independent and normally distributed with a zero mean and standard deviation of \( \sigma_i \).

To obtain the parameters of the market model OLS regressions are run for each firm separately and use daily-returns data starting 300 days before the announcement date and ending 100, 50 or 20 days before the announcement date. The abnormal return for firm \( i \) on date \( t \) is given by:

\[ AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i \times R_{mt}), \]

where \( \hat{\alpha}_i \) and \( \hat{\beta}_i \) are the predicted parameters of the market model. The cumulative abnormal returns are given by a summation of the abnormal returns over the selected period. Classifying the firms into different groups based on their acquisition probabilities calculated in the previous section, the abnormal returns both preceding and on the announcement date are compared. To be completed.
References


Mitchell and Mulherin


Rosenbaum and Rubin

Table 1
U.S. Manufacturing Sector Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Source</th>
<th>Description</th>
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<tr>
<td>Sales</td>
<td>CS # 12</td>
<td>Sales (net) ($M)</td>
</tr>
<tr>
<td>Employment</td>
<td>CS # 29</td>
<td>Number of employees (1000s)</td>
</tr>
<tr>
<td>R&amp;D Spending</td>
<td>CS # 46</td>
<td>R&amp;D expense ($M)</td>
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<tr>
<td>Capital Expend.</td>
<td>CS # 30</td>
<td>Property, Plant &amp; Equipment – Cap. exp. ($M)</td>
</tr>
<tr>
<td>Capital Expend.</td>
<td>CS # 30</td>
<td>Property, Plant &amp; Equipment – Cap. exp. ($M)</td>
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<tr>
<td>Net Plant</td>
<td>constructed</td>
<td>Net plant adjusted for inflation ($M)</td>
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<tr>
<td>Net Capital Stock</td>
<td>constructed</td>
<td>Plant, inventories + other assets adjusted for inflation ($M)</td>
</tr>
<tr>
<td>Market Value</td>
<td>constructed</td>
<td>Common equity + market value of long term debt + short term assets less short term liabilities + preferred</td>
</tr>
</tbody>
</table>

Source: Hall (1999)

CS = Standard and Poor’s Compustat variable number
Table 2
Variable means and medians

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<th></th>
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<td>2478</td>
<td>2472</td>
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<td>Employment (numbers)</td>
<td>Mean 1120</td>
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<td></td>
<td>Median 1024</td>
<td>990</td>
<td>625</td>
<td>584</td>
<td>674</td>
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<tr>
<td>R&amp;D to sales ratio (per cent)</td>
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<td>5.66%</td>
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<tr>
<td></td>
<td>Median 0.33%</td>
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<td>Capital-labor ratio (87$K per worker)</td>
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<td>Cash flow-sales ratio (per cent)</td>
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<td></td>
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<td>Tobin’s Q</td>
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<td>D (R&amp;D Missing)</td>
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<td>D (Negative earnings)</td>
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<td>0.103</td>
<td>0.193</td>
<td>0.200</td>
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Source: Hall (1999)
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<th>Industry</th>
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<td>Tobacco</td>
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<td>Apparel</td>
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<td>Wood</td>
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<td>Furniture</td>
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<td>Drugs</td>
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<td>Computer Equip.</td>
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<td><strong>Total</strong></td>
<td><strong>5,938</strong></td>
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Table 4  
Mergers & Acquisitions by Year

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<td>1994</td>
<td>8</td>
<td>1.28</td>
</tr>
<tr>
<td>Total</td>
<td>623</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Table 6  
Probability of acquisition for buyers  
Number of acquisitions (559)

| Variable                              | Coefficient | Standard error | z     | P>|z| |
|---------------------------------------|-------------|----------------|-------|-----|
| Log employment                        | 0.430       | 0.021          | 20.31 | 0.000 |
| R&D – sales ratio                     | -3.816      | 1.900          | -2.00 | 0.045 |
| D (no R&D)                            | -0.165      | 0.125          | -1.31 | 0.189 |
| D (R/S>0.5)                           | 0.878       | 0.992          | 0.89  | 0.376 |
| Log of capital-labor ratio            | 0.033       | 0.045          | 0.74  | 0.458 |
| Log Tobin’s Q                         | 0.313       | 0.076          | 4.11  | 0.000 |
| D (Q missing)                         | -2.862      | 0.581          | -4.92 | 0.000 |
| D (Q>10)                              | -0.295      | 0.557          | -0.53 | 0.595 |
| Log (cash flow/sales) c.f.>0          | 0.188       | 0.073          | 2.56  | 0.010 |
| Log (cash flow/sales) c.f.<0          | 0.273       | 0.098          | 2.78  | 0.005 |
| D (cash flow negative)                | -0.340      | 0.203          | -1.68 | 0.093 |

Log pseudo-likelihood = -2567.1205  
Number of obs. = 44,614  
Wald chi2(20) = 719.32  
Prob > chi2 = 0.0000  
Pseudo R2 = 0.1314  

* a full set of two year dummies was included
Table 7
Changes in R&D at Merger Controlling for Propensity to Merge

<table>
<thead>
<tr>
<th>Estimated propensity to merge</th>
<th>Change in R/S</th>
<th>Change in real R&amp;D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Acq.</td>
<td>Acq.</td>
</tr>
<tr>
<td>0.0-0.01 (33)</td>
<td>0.0005</td>
<td>0.0026</td>
</tr>
<tr>
<td>0.01-0.02 (42)</td>
<td>0.0009</td>
<td>-0.0022</td>
</tr>
<tr>
<td>0.02-0.04 (79)</td>
<td>0.0008</td>
<td>-0.0006</td>
</tr>
<tr>
<td>0.04-0.1 (212)</td>
<td>0.0007</td>
<td>0.0028</td>
</tr>
<tr>
<td>&gt; 0.1 (92)</td>
<td>0.0008</td>
<td>0.0031</td>
</tr>
<tr>
<td>All (458)</td>
<td>0.0007</td>
<td>0.0012</td>
</tr>
</tbody>
</table>

Source: Hall (1999)
Figure 1
Box Plots for the probabilities that a firm will make an acquisition

1 = merging firms
0 = non-merging firms