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The Intra-industry Effects of Acquisition Announcements

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Abstract

This paper investigates the intra-industry effect of acquisition announcements in Taiwan. We find that, on average, both the announcing firms and rivals experience significantly negative market reactions upon the acquisition announcements. The evidence suggests that the intra-industry contagious effect dominates competitive effect. In addition, cross-sectional tests indicate that the contagious effect is more pronounced for rival firms exhibiting stronger stock returns with the acquirers. The evidence also indicates the competitive effect is stronger in industries characterized by a lower degree of competition and leverage.

Keywords: Rivals; Acquisitions; Contagion Effect; Competitive Effect; Event Study.

Introduction

The announcement effects of acquisition have been well researched in the literature. Previous research generally find that stock markets respond strongly positively to share prices of target firms, but the results for acquiring firms are

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inconclusive (Lang, Stulz and Walking, 1989; Servaes, 1991; Bradley, Desai and Kim, 1988; Berkovitch and Narayanan, 1993; Loughran and Vijh, 1997). The wealth effects are often attributed to the signaling of new information about firms' future earnings prospects resulting from the unexpected change in existing operation or expansion into other business.

When acquisition announcements are perceived as signals of potential wealth changes to acquiring firms, the valuation effect may not be limited only to acquirers, it could be transmitted across rivals in the corresponding industry (Akhigbe and Madura, 1999). Depending the characteristics of revealed information, the acquisition announcements may have negative, positive or neutral influences on the rival firms.[1] For example, if the information reflects a positive (negative) change in the competitive positions of the acquiring firm at the expense of the competitors, acquisition announcements are then expected to have a negative (positive) impact on the share prices of the competing firms in the corresponding industry. This is usually referred as the competitive effect1. On the other hand, the information contents may reflect positive (negative) changes of the future growth prospects of the corresponding industry as a whole, such that the acquisition announcements may convey favorable (unfavorable) signals of the future change in expected earnings of the rival firms. This is referred as the contagion effect. Moreover, the revealed information may simply convey the firm specific wealth changes such that it has no effect on the rival firms.

The intra-industry effect has been examined in various finance issues [2], but there has been little research in acquisitions. Akhigbe and Madura (1999) study the intra-industry effect of acquisition on the corresponding industry rivals of the target firms. They find that both the targets and their competing rivals received positive significant abnormal returns upon acquisition announcements. A similar study by

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[1] For example, when Daimler-Benz acquired Chrysler in 1998, share price of Chrysler jumped sharply upon the announcement, while the prices of Ford and General Motors showed an immediate decline. The market might expect the competitiveness improvement of Chrysler by cooperating with Daimler-Benz would put a significant challenge on its competitors (Akhigbe and Martin, 2000).

[2] For example it has been investigated in dividend initiation (Howe and Shen, 1998), dividend change (Firth, 1996), bond rating adjustment (Akhigbe, Madura and Whyte, 1997), share repurchase (Hertzel, 1991; Erwin and Miller, 1998) and Bankruptcy (Lang and Stulz, 1992)

Akhigbe and Martin (2000) investigates foreign acquisitions in the US, and finds that competitors of the target US firms experience positive and significant announcement abnormal returns. These results suggest that the announcement of international and domestic acquisitions of the US firms indeed convey industry-wide, rather than firm-specific, favorable information to investors.

While these studies on the intra-industry effect of acquisition targets are insightful, no evidence is ever reported for the effect on acquiring firms' competitors. Acquisitions are among the most important corporate investment decisions. Acquiring firms may sense significant value hidden within the combined entity that is not known to outsiders. While the hidden wealth may be specific to the acquiring firms, it may alternatively be systematic to the corresponding industry as well. Therefore, it would be interesting to investigate how the acquisition announcements are influencing the competitors of acquiring firms.

Our study attempts to extend the research by investigating the intra-industry announcement effect of acquiring firms. We investigate a sample of Taiwanese listed firms that announced acquisitions during the period 1989 to 2001. We find that the announcements of acquisition are, on average, associated with negative abnormal returns to acquiring firms. This suggests that acquisitions generally do not create value for Taiwanese firms.

Our findings also indicate that the rival firms experience significant negative abnormal returns during the announcement period. This result is similar to the intra-industry effect of target firms in Akhigbe and Madura (1999) and Akhigbe and Martin (2000), that the contagion effect of acquisitions dominates the competitive effect. Acquisition announcements send unfavorable information not only for the acquiring firms, but also the corresponding industry as a whole.

We also find that the wealth effects on the rival firms are significantly related with the corresponding industry characteristics. The evidence indicates that the competitive effect of acquisition announcements is affected by industry leverage and concentration. Firms with lower leverage and doing business in more concentrated industries are found to receive a stronger competitive effect. This result is similar to those in Lang and Stulz (1992) and Erwin and Miller (1998). Consistent with Akhigbe and Martin (2000), the evidence also shows that firms exhibiting more

similar cash flow patterns with acquirers experience a more pronounced contagious effect. These findings hold even after controlling for other potential explanatory variables.

We also find profitability, as measured by return on equity, positively influences rival firms' abnormal returns. This result supports Akihigbe and Madura (1999) that profitable firms are in a better position to take advantage of environmental changes from acquisitions. The evidence also suggests that acquiring firms' abnormal returns are positively correlated with rival firms' stock market reactions as predicted in Hertzel (1991) and Erwin and Miller (1998). In contrast, we do not find firm size and growth opportunity has any explaining power on the wealth effect of rival portfolios.

This paper proceeds as follows. In section 2, we discuss the intra-industry effects of acquisitions. Section 3 describes samples and methodology. Section 4 presents the empirical evidence. Section 5 concludes.

Intra-industry effects of acquisition announcement

Previous studies investigating intra-industry information impact shows that stock markets use the information released by a firm to make influence about the rival firms in the same industry (Lang and Stulz, 1992; Firth, 1996; Erwin and Miller, 1998; Howe and Shen 1998). The evidence indicates that a wide variety of corporate events not only reveal information about the announcing firms, but also signal an industry-wide phenomenon or a change in the competitive situation of the industry.

There are two competing hypotheses in the intra-industry valuation effect. Under the contagion effect hypothesis[3], acquisition announcements may signal to the market the industry-wide investment opportunity that may influence investors' assessment to the valuation of other firms in the same industry. We would expect, under the contagion effect, a positive correlation between announcement returns of acquiring firms and their competitors in the corresponding industry. In contrast,

[3] This is similar to the information-signaling hypothesis in Akihigbe and Martin (2000).

under the competitive effect hypothesis, acquirers may benefit from the created synergy of the acquisitions that enhance the competitive advantage of acquiring firms, and impose a serious threat to industry rivals. Alternatively, acquisition may destroy value of acquiring firms that may damage acquiring firms' competitiveness. Thus, under competitive effect hypothesis, we expect a negative relationship between announcement returns of acquiring firms and their competitors.

The intra-industry competitive effect may be also related with leverage. Lang and Stulz (1992) studies the intra-industry effect of bankruptcy announcements, and argue that leverage has important effect on intra-industry effect. Leverage are likely to reduces firms' ability in making further investment, and thus, to exploit the change in market conditions. (Bolton and Schartsein, 1990). Therefore, the competitive effect is expected to be stronger for firms with low leverage. In this study we also take leverage into consideration in analyzing the intra-industry effect of acquiring firms.

Sample and Methodology

We collect a sample Taiwanese listed firms that announced acquisitions during 1989 to 2001. The announcements are collected from the Excellent Business Database (EBD) and Securities and Futures Institute Database (SFID), which provide news-service abstracts from major Taiwanese journals and magazines. We then review the articles in the publications that refer to those announcements. When a repeat announcement is found in a different publication, the announcement that has the earliest date is chosen because this is the earliest date when the information about the domestic joint venture investments by Taiwanese firms is publicly available. Our definition of announcement date (day 0) is the date of the publication in which the company's initial announcement appears.

To be included in the final sample, the acquiring firms should be listed on Taiwan Stock Exchange, and financial data are available from the Taiwan Economic Journal (TEJ) Data Bank. The rival firms are defined as firms with the same four-digit Standard Industrial Classification code as the acquirer as reported in D&B Taiwan's Leading Corporation. We exclude industries with less than two rivals from

the sample. Our final sample comprises 86 announcements by 78 different Taiwanese firms.

Standard event-study methods are used to examine stock price responses to announcements of acquisitions. Data of share returns are obtained from TEJ. The abnormal return is calculated as the residual from the actual return and an expected return generated by the market model, with parameters estimated over a period from 200 to 31 days before the initial announcements. The value-weighted Taiwan Stock Exchange All-Share Index is used to measure market return. The cumulative abnormal return, *CAR (a, b)*, is calculated as the sum of the abnormal returns over the window period between day *a* and *b*.

$$CAR(a,b)_t = \sum_{a}^{b} AR_t$$

AR_t is the abnormal return based on the market model at time *t*.

Table 1 presents the sample distribution by year and industry profile. As shown in panel A, most of the acquisitions occurred in recent years. There are 18 acquisitions in year 2000, occupying about 21% of the sample firms. Panel B shows that the acquiring firms are distributed over a wide range of industries: 24 four-digit SIC code are represented in the sample. The most commonly represented industry is semiconductor and related device, which covered almost 19% of the sample.

Table 1 Sample distribution of acquisition announcements by year and industry

This table summarizes the distribution, by year and industry, of acquisition announcements made by Taiwanese firms from 1989 to 2001. The announcements are collected from the data bank of *Taiwan Securities and Future Institute* and *Excellent Business Database*. The four-digit Standard Industrial Classification codes are from *D&B Taiwan's Leading Corporation.*

Panel A: Sample distribution by year

Year	Announcements		Firms	
	Number	%	Number	%
1989	2	2.3	2	2.6
1990	3	3.5	3	3.8
1991	1	1.2	1	1.3
1992	5	5.8	5	6.4
1993	5	5.8	5	6.4
1994	3	3.5	3	3.8

1995	5	5.8	5	6.4
1996	12	14.0	9	11.5
1997	6	7.0	6	7.7
1998	3	3.5	3	3.8
1999	13	15.1	10	12.8
2000	18	20.9	16	20.5
2001	10	11.6	10	12.8
Total	86	100.0	78	100.0

Table 1 (Continued)

Panel B: Sample distribution by industry

SIC code	Industry	Number	%
1522	General contractors-single-family houses	1	1.2
1531	Operative builders	1	1.2
2033	Canned fruits, vegetable	1	1.2
2048	Papered feeds & Feed ingredients for animal	2	2.3
2086	Bottled soft drinks &carbonated waters	6	7.0
2211	Broadwoven fabric mills	2	2.3
2281	Yam spinning mills	2	2.3
2611	Pulp mills	7	8.1
2821	Plastic materials &synthetic resins	1	1.2
2824	Manmade organic fibers	2	2.3
2865	Cyclic organic crudes & intermediates	1	1.2
3241	Cement, hydraulic	1	1.2
3312	Steel works, blast furnaces & rolling mills	6	7.0
3357	Drawing & insulating of nonferrous wire	1	1.2
3571	Electronic computers	4	4.7
3575	Computer terminals	5	5.8
3577	Computer peripheral equipment	12	14.0
3612	Power, distribution & specialty transformers	2	2.3
3621	Motors & generators	4	4.7
3661	Telephone & telegraph apparatus	1	1.2
3674	Semiconductor & related devices	16	18.6
3679	Electronic computers	1	1.2
3711	Motor vehicles & passenger car bodies	3	3.5
3751	Motorcycles bicycles & parts	1	1.2
4412	Deep sea foreign	3	3.5
Total		86	100%

Table 2 reports the sample statistics on several explanatory variables used in this study. Data are obtained from TEJ and EBD. Herfindahl index has been widely used as a measure of industry concentration (Lang and Stulz, 1992; Comment and Jarrell, 1995; Firth, 1996; Erwin and Miller, 1998). We use sale-based Herfindahl Index estimated as the ratio of the squared sum of the fractions of industry sales as a measure of industry concentration. A returns correlation is to measure the operation similarity between acquiring and rival portfolio, where rival portfolio is an equally weighted portfolio of competing firms' shares with the same four-digit SIC code as the announcing firms. Following Erwin and Miller (1998), we estimate returns correlation as the correlation coefficient between the daily stock return of acquirer and the rival portfolio one year preceding the announcement. Leverage is measured by the median value of debt to equity ratio one year preceding the announcement in the industry portfolio. Following Akhigbe and Madura (1999) and Song and Walking (1993), we measure the profitability by return on equity, estimated as median of return on equity of corresponding rivals firms in the same industry. Firm size is median of rival firm's market value in the industry portfolio.

Table 2 Sample Characteristics

The sample consists of 86 acquisition announcements by 76 Taiwanese firms from 1989 to 2001. Data are obtained from the *Taiwan Economic Journal Data Bank* and the *Excellent Business Database*. Herfindahl Index is estimated as the ratio of the squared sum of the fractions of industry sales. Returns correlation is the correlation coefficient between the daily stock return of acquirer and the rival portfolio one year preceding the announcement. Leverage is the median value of debt to equity ration in the rival portfolio. Return on Equity is the median value of return on equity of corresponding rivals firms. Firm size is the median market value of corresponding rival firms. Firm size is median of rival firm's market value in the industry portfolio. Tobin's q is calculated as the sum of market value of common stock and preferred stock and book value of long-term debt divided by book value of total assets.

	N	Mean	Median	Max	Min	Standard deviation
Herfindahl Index	86	0.3294	0.2700	0.94	0.01	0.2179
Returns Correlation	86	0.4735	0.4450	0.79	0.20	0.1569
Leverage	86	0.7924	0.7400	1.72	0.40	0.3014
Return on Equity (%)	86	10.1386	11.5700	36.03	-9.16	7.4667
Firm size (NT, millions)	86	8,324	5,970	50,581	491	1,709
Tobin's q	86	0.9960	0.9600	1.97	0.26	0.3797

Empirical Results

1. Wealth Effect of Overall sample

Following Kang and Stulz (1996) and De Roon and Veld (1998), we examine the average abnormal returns for days -1 to +1 around the announcement date, as well as the cumulative average abnormal return for this announcement period.[4] We construct an equally-weighted portfolio of the rival firms for each announcement. The results of the event study for the entire sample are reported in Table 3.

Table 3 Abnormal return associated with acquisition announcements

The sample consists of 86 announcements of acquisitions by 78 Taiwanese firms from 1989 to 2001. Cumulative abnormal returns are estimated using the standard market model procedure with parameters estimated for the period 200 days to 31 days before the announcement. Day 0 in event time is the date of the publication in which the company's initial announcement appears. The abnormal returns of various event windows are the cumulative abnormal returns over the event window periods. The significance level of mean and median is based on t-statistic of student's t-test, and z-statistic of Wilcoxson test, respectively. "*", "**" and "***" represents a 10%, 5% and 1% significance level, respectively, using a two-tailed test.

Announcing firms				Rival firms portfolio		
Day relative to announcement	Average abnormal return (%)	Median	Proportion of Negative Abnormal Returns (%)	Average abnormal return (%)	Median	Proportion of Negative Abnormal Returns (%)
-1	-0.10	-0.32	59.3	-0.23	0.01	47.7
0	-0.61***	-0.32**	59.3	-0.12	-0.26	54.7
+1	-0.59**	-0.39***	64	-0.42***	-0.23***	62.8
(-10, -2)	-0.56	-0.62	53.5	-0.35	-0.47	53.5
(-1,0)	-0.71**	-0.40	53.5	-0.35	-0.19	58.1
(-1, +1)	-1.30***	-0.60***	64	-0.78***	-0.39***	59.3
(+2, +10)	-0.96***	-1.94***	68.6	-1.80***	-1.37***	59.3

The results indicate that the acquiring firms experience significant average (median) abnormal returns of –0.61% (-0.32%) at the announcement day, and –

[4] Including the day after announcement eliminates some of the microstructure effects that could arise because of order flow imbalances on the day of the announcement and because of the existence of price limits (Kang and Stulz, 1996).

0.59% (-0.39%) one day after. The average (median) cumulative announcement abnormal return from day -1 to day 1 is –1.3% (-0.6%), significant at the 1% level using a two-tailed test. Therefore, the shareholders of acquiring firms in Taiwan lose significant wealth on the acquisition announcements. Table 3 also exhibits the market reaction to the rival portfolio. The average (median) cumulative abnormal return for rival portfolio in the three-day event window is –0.78% (-0.39%) and significant at the 1% level, suggesting rival firms are negatively influenced by the acquisition announcements. The Pearson correlation coefficient of abnormal returns between announcing and rival portfolio is 0.41, significant at the 1% level using two-tailed test. These findings indicate that, on average, the contagion effect of acquisition announcement dominates competitive effect. This suggests that, in the aggregate, acquisition announcements reveal industry-wide unfavorable market information to investors such that both the announcing and rival firms experience significant value decline.

Table 3 also shows that the negative impact of acquisition continues for both acquiring and rival firms after the announcement day. The cumulative abnormal returns of acquiring firm and rival portfolio in the window of 2 to 10 days after the announcement are both significantly negative at the 1% level.

Although our analysis documents that acquisitions have significant negative effects on both acquiring and rival firms, the effect may vary across industries. That is, the contagious effect may dominate the competitive effect in some industries; while in other industries the competitive effect maybe more important. In the three-day event window of the rival portfolio, there is still 40% of the sample industry receive positive abnormal returns. The dispersion of rival returns implies that the intra-industry effect of acquisition is cross-sectionally heterogeneous.

2. Cross-sectional analysis of intra-industry abnormal returns

In order to investigate the heterogeneous intra-industry effect of acquisition, we examine various industry factors that may influence the contagion and competitive effects. Specifically, we examine the degree of similarity in the stock returns of the acquiring firm and its rivals, and degree of competition in the acquiring firm's industry. We also take leverage into account in determining the competitive effect. In

conducting the empirical tests, we use three-day cumulative abnormal return as the primary measure of wealth change. We have also tested by using the cumulative abnormal returns of event window day 2 to day 10, and day –1 to day 10, the results are very similar to those using three-day event window, the traditional window period of event studies. Therefore, we report only the results using three-day event window in the following sections.

(1)Analysis of subsamples

A. Contagious Effect

If the announcement of acquisitions reveals an unexpected declining future cash flow of acquiring firms because of the negative industry-wide phenomenon, the negative announcement effect may be contagious within the industry. Furthermore, the contagious effect is expected to be stronger for industries that rival firms experience a more similar pattern of cash flow to those of acquiring firms (Erwin and Miller, 1998; Akhigbe and Martin, 2000).

To test the contagious effect, we measure the similarity of cash flow between acquiring and rival firms by the daily market returns correlation between the acquiring firms and the corresponding rival portfolio (Erwin and Miller, 1998). Specifically, we compute the correlation coefficient between each rival and acquiring firms, and then compute the sample median of as the measure of similarity of the corresponding industry. We separate the sample based on whether the returns coefficient is greater than the median of the sample industries. Panel A, table 3 shows the average (median) three-day abnormal return for subsample of low returns correlation is –0.58% (0%), while the high returns correlation subsample experiences an average announcement returns of –1.1%. The evidence indicates that competing firms with more similar pattern of cash flow to acquirers experience stronger industry-wide contagious effect. The difference between high and low returns correlations, however, is not significant.

B. Competitive Effect

Instead of revealing the industry-wide information, acquisition announcement may reflect unexpected information on acquiring firms' future cash flow that

derives from the change in the competitive position in the market. If an acquisition is a resource-wasting activity, rivals may benefit from the value-destroying investment of acquiring firm that the acquisition announcement may have a favorable effect on the rival firms. Moreover, the less competitive the industry, the more likely the rent can be extracted from the competitors because of the change in the competitive position of acquiring firms. Therefore, the competitive effect is expected to be stronger in industries with a lower degree of competition among the acquirer's rival firms (Lang and Stulz, 1992, Howe and Shen, 1998; Erwin and Miller, 1998; Akigbe and Martin, 2000)

To test the competitive effect, we measure degree of competition by the Herfindahl index calculated as the sum of the squared market shares of sale of the rival firms (Land and Stulz, 1992; Erwin and Miller, 1998). Since higher value of Herfindahl index suggests a lower degree of competition, we expect the competitive effect to be stronger in industries with greater value of Herfindahl index.

Panel B, table 4 shows the abnormal returns of rival portfolio upon acquisition announcements based on whether the Herfindahl index is greater than the sample median of the portfolio industry. The three-day abnormal return of low Herfindahl index subsample is –1.26%, significantly at the 1% level. In contrast, the high Herfindahl subsample receives insignificant market reaction of –0.28%. The t-statistic also shows the difference is significant at he 10% level. This result is robust to possible deviations from nonnormality, since it also holds for the nonparametric Kruskal-Wallis test statistic. These findings are consistent with the competitive effect hypothesis that acquisitions are associated with significant intra-industry competitive effect that are more pronounced in less competitive industry.

C. Interaction of leverage and competitiveness

Lang and Stulz (1992) argues that the interaction of leverage and competitiveness may be important in explaining the intra-industry competitive effects. They suggest that due to the financial constraints, high-levered firms are less able to exploit the change of market conditions, and thus, may gain fewer benefits at the expense of the competition firms. Therefore, it is expected

Table 4 Mean and median announcement-period abnormal returns for subsample

Three-day (-1,1) announcement period abnormal return are estimated using the standard market model procedure with parameters estimated for period 200 days to 31days before the announcement. High (low) returns correlation refers to industries with correlation coefficient between the acquiring firm and rival portfolio greater (less) than the median value of the sample. High (low) competition subsamples refer to the industries with Herfindahl index less (higher) than the sample median, where Herfindahl index is calculated as the sum of the squares of each firm's sale as a proportion of total sales in the industry with the same four-digit SIC code. For each cell we report the mean abnormal return, the median abnormal return and in parentheses, the t-statistic the p-value for the Wilcoxon Z-statistic. For the comparison of means, we report mean and median difference, the t-statistic in parentheses assuming equal variances and the p-value for the nonparametric Kruskal-Wallis statistic. The results are similar with the assumption of unequal variances. "***", "**" and "*" represent 1%, 5% and 10% significant levels using a two-tailed test.

Panel A: Analysis of rival portfolio based on returns correlations		
Low Returns Correlations	*High Returns Correlations*	*Difference*
Mean abnormal return = -0.58%	Mean abnormal return = -1.1%	Mean = -0.43%
Median abnormal return = 0%	Median abnormal return = 0%	Median = 0%
(-1.67, 0.12, 40)	(-1.96*, 0.07, 40)	(0.77, 0.38)
Panel B: Analysis of rival portfolio based on industry concentration		
Low Herfindahl Index *(Weak competitive effect)*	*High Herfindahl Index* *(Strong competitive effect)*	*Difference*
Mean abnormal return = -1.26%	Mean abnormal return = -0.28%	Mean = -0.98%
Median abnormal return = -0.97%	Median abnormal return = 0.02%	Median = -0.95%
(-3.57***, 0.00***, 44)	(-0.60, 0.70, 42)	(-1.68*, 0.04)
Panel C: Analysis of rival portfolio based on industry concentration and leverage		
Low Herfindahl Index and high leverage *(Weak competitive effect)*	*High Herfindahl Index and low leverage* *(Strong competitive effect)*	*Difference*
Mean abnormal return = -1.67%	Mean abnormal return = -0.15%	Mean = -1.52%
Median abnormal return = -1.5%	Median abnormal return = 0 %	Median = -1.5%
(2.46**, 0.05, 12)	(0.76, 0.87, 13)	(-1.81*, 0.09)

that the competitive effect should be more pronounced in industries with low leverage and low degree of competition (high Herfindahl index).

Panel C, table 4 compares the abnormal returns based on leverage and competition. High (low) levered industry portfolios are those with debt-to-equity ratio greater (less) than sample median. As expected, the average abnormal return for high-leverage and low-Herfindahl index subsample is –1.67%, significant at the 5% level, whereas the abnormal return for low-leverage, high-Herfindahl index industry portfolios is –0.15% and insignificant. The difference is statistically significant at the 10% level.

Comparison of the results with those in panel B shows that the abnormal return of the low Herfindahl index subsample (-1.26%) is greater than that of the low-Herfindahl index AND high-leverage subsample (-1.67%), This finding indicates leverage indeed adds to the reduction of the competitive effect. Similar evidence can also be found in the comparison of the results of high Herfindahl index subsample in panel B with that in panel C. When high Herfindahl index is coupled with low leverage, we observe s stronger competitive effect. In conclusion, our findings are consistent with Land and Stulz (1992) that leverage has a negative impact on the competitive effects.

(2)Cross-sectional regression analysis

Although the univariate results support that acquisition announcements have important intra-industry effects influenced by industry characteristics, the tests do not control for other important determinants to the effects.

Hertzel (1991) and Erwin and Miller (1998) suggest that the degree to which intra-industry effect influencing competing firms in the same industry may depend on the magnitude of the signals of announcing firms. Following Akhigbe and Martin (2000), we use three-day announcement abnormal returns as the measure of signal magnitude. Akhigbe and Madura (1999) and Akhigbe and Martin (2000) argue that poor-performing rivals prior to acquisitions are unlikely to be positioned to effectively competing under the market changes, and thus, should be more adversely affected by the acquisitions. We use return on equity as the measure of performance (Song and Walking, 1993). Previous research indicate

Table 5 Cross-sectional regression analyses of industry rival portfolio three-day period abnormal returns around the acquisition announcements on industry characteristics

Three-day (-1, 1) announcement-period abnormal returns are estimated using the standard market model procedure with the parameters estimated for the period 200 days to 31 days before the announcement. The Herfindahl index is calculated as the sum of the squares of each firm's sale as a proportion of total sales in the industry with the same four-digit SIC code. The returns correlation is the correlation between the industry rival portfolio and the acquiring firm's stock return for the year preceding the announcements. Leverage is the median value of debt-to-equity ratio one year preceding the announcement for firms in the industry rival portfolio. Announcement CAR is the three-day cumulative abnormal returns of acquiring firm to the announcement of acquisitions. Return on equity is net income divided by common shareholders' equity one year preceding the announcement. Log of firm size is estimated by the logarithm value of assets for the year preceding the announcement.

Tobin's *q* is estimated as the average ratio of the market value of the firm's assets to the book value of the firm's assets for the three fiscal years before the announcement, where the market value of assets is estimated as the book value of assets minus the book value of common equity plus the market value of common equity. Values in the parenthesis are t-statistics. "***", "**", and "*" represent 1%, 5%, and 10% significance levels, respectively.

Variable	Model			
	1	2	3	4
Constant	0.0130	0.0114	-0.0156	-0.0062
	(0.18)	(0.12)	(-3.06)***	(-0.51)
Herfindahl Index / leverage			0.0181	0.0239
			(1.87)*	(2.45)**
Herfindahl Index	0.0234	0.0349		
	(1.63)*	(2.06)**		
Correlation		-0.0333		-0.0312
		(-1.73)*		(-1.67)*
Leverage	-0.0087	-0.0121		
	(-0.91)	(-1.03)		
Announcement CAR	0.2730	0.2890		0.2890
	(3.83)***	(3.66)***		(3.74)***
Return on Equity	0.0007	0.0008		0.0008
	(1.94)**	(2.06)**		(2.18)**
LOG of firm size	-0.0011	-0.0003		
	(-0.35)	(-0.72)		
Tobin's Q		-0.0029		-0.1740
		(-0.30)		(-0.24)
Adjusted R-square	0.197	0.215	0.028	0.234
F value	5.175***	4.095***	3.484*	5.829***
No. of Observations	86	80	86	80

stock market reactions is a negatively related with firm size. Large firms may have less unanticipated information than those of small firms, as information production and dissemination is a positive function of firm size (Atiase, 1985; Hertzel and Smith, 1993; Kang and Stulz, 1996; and others). We measure firm size by the market value of equity plus book value of debt. Growth opportunity has been found to be an important factor in explaining the market reactions to acquisition announcements and joint venture (Lang, Stulz and Walking, 1989, 1991; Howe, He and Kao, 1992; Doukas, 1995; Kang and Stulz, 1996; Chen and Ho, 1997). To measure the growth opportunity, Tobin's q has been widely used to distinguish firms with good investment opportunities from those with poor investment opportunities.[5] The theoretical Tobin's q is defined as the ratio of the market value of a firm to the replacement costs of its assets. Because of data availability, we estimate q as the ratio of the market value of the firm's assets to the book value of the firm's assets. This simple measure of q for investment opportunities has been widely used in previous studies.[6] Our Tobin's q variable is the average value for the two fiscal years prior to the announcement.[7]

The results of various specifications of the regression models with three-day abnormal returns of rival portfolios as the dependent variable are presented in table 5.[8] Consistent with findings in table 4, the results in model 1 shows that Herfindahl index is positively correlated with the abnormal returns of rival firms that support that more concentrated industries receive stronger competitive effects. Model 2 includes returns correlation between acquiring and rivals firms. We find returns correlation is significant with the predicted sign, while the Herfindahl

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[5] See, for example, Lang, Stulz and Walking (1989, 1991), Howe, He and Kao (1992), Doukas (1995), Kang and Stulz (1996), Chen and Ho (1997), Abhyankar and Dunning (1999), Lewis, Rogalski and Seward (1999), and Chen, Ho, Lee and Yeo (2000).

[6] See, for example, Denis (1994), Perfect and Wiles (1994), Barclay and Smith (1995a, 1995b), Agrawal and Knoeber (1996), Kang and Stulz (1996), Chen and Ho (1997), Abhyankar and Dunning (1999), Holderness, Kroszner and Sheehan (1999), Lewis et al. (1999), and Chen et al. (2000). Chung and Pruitt (1994) show that at least 96.6% of the variability of Tobin's q (based on Lindenberg and Ross, 1981) is explained by this simple measure of q.

[7] This follows the approach used in Lang et al. (1991), Chen and Ho (1997), and Chen et al. (2000). A three-year average gives a better estimate of a firm's true q (Lang et al., 1989).

[8] We also test the regression results by using CAR (2, 10) and CAR (-1,10) as the dependent variables, the results are very similar to those using CAR (-1,1).

index remains consistently significant at the 5% level. The regression results provide support for both the contagious and competitive effect hypotheses.

We also find announcing firm's abnormal returns positively influence the rivals' abnormal returns, supporting that the magnitude of signals conveyed in acquisitions have an important impact on the market reactions received by competing rivals. The prior performance is found to be positively associated with abnormal returns of rivals. Other variables are found to have no explaining power in the regressions. Thus, the findings suggest that even after controlling for other prospective effects, the competitive and contagious intra-industry effects remain as important determinants in explaining the abnormal returns of rival portfolios.

To test the interaction effect of leverage and competition in the competitive effect, we compute the ratio of Herfindahl index to leverage to measure he interaction effect. Since the competitive effect are expected to be more pronounced for high-Herfindahl- index/low leverage firms, this ratio is expected to be positively related with the abnormal returns of rival portfolios. Regression model 3 shows that the leverage/competition ratio is significantly positively influence the rival abnormal returns. This result becomes even stronger after controlling for other effects in model 4. Again, we find the findings in table 4 remain robust after controlling other potential influences on the intra-industry effect of acquisition announcements.

Some firms in our sample made repeated announcements. If the later announcement is made too close to the previous one, then the period of parameter estimation in the market model may include the previous announcement day. In this case, the results may be biased.[9] To check this possibility, we delete five observations that have the overlapping problems, and redo regressions in table 5. The results remain essentially the same. We also replace the cumulative abnormal returns in the three-day window period with that in the window of (-1, 10), since table 3 shows that the cumulative abnormal return of the event window of day 2 to day 10 is statistically significant. We conduct the tests again, and the results remain unchanged.

[9] We thank anonymous reviewers for this comment.

Conclusion

This paper investigates the intra-industry effect on the rival of acquiring firms for acquisition announcements in Taiwan. We find that, on average, shareholders of both the announcing firms and rivals experience significant wealth loss upon the acquisition announcements. The evidence also suggests that acquisition announcement convey industry-wide, instead of firm-specific, information to the market, and the intra-industry contagious effect dominates the competitive effect.

The findings show that the intra-industry effect varies across industries. The contagious effect is found to be stronger for rival portfolios with similar stock returns as the acquiring firms. Furthermore, the intra-industry competitive effect is found to be more pronounced for rivals in more concentrated industries. In addition, the results also show that leverage has negative impact on the competitive effect. These findings hold even after taking control of other effects in the regression analysis. Therefore, the intra-industry information of acquiring firms' industry conveyed by acquisition announcements is influenced by the corresponding industry characteristics.

Reference

Abhyankar, A and A. Dunning. 1999. Wealth effects of convertible bond and convertible preference share issues: An empirical analysis of the UK market. ***Journal of Banking & Finance,*** 23: 1043-1065.

Agrawal, A., C. R. Knoeber. 1996. Firm performance and mechanisms to control agency problems between managers and shareholders. ***Journal of Financial and Quantitative Analysis***, 31: 377-397.

Akihgbe, A., J.Madura and A.M. Whyte. 1997. Intra-industry effects of bond rating adjustments. ***Journal of Financial Research***, 4: 545-561.

Akhigbe, A. and Anna D. Martin. 2000. Information-signaling and competitive effects of foreign acquisitions in the US. ***Journal of Banking & Finance***, 24: 1307-1321.

Akhigbe, A. and J. Madura. 1999. The industry effects regarding the probability of takeovers. ***Financial Review***, 34(3): 1-18.

Atiase, R. 1985. Predisclosure information, firm capitalization, and security price behavior around earnings announcements. ***Journal of Accounting Research,*** 23: 21-36.

Barclay, M. J and C. W. Jr. Smith. 1995. The priority structure of corporate liabilities. ***The Journal of Finance***, 50: 899-917.

Barclay, M. J and C. W. Jr. Smith. 1995. The maturity structure of corporate debt. ***The Journal of Finance***, 50: 609-631.

Berkovitch, E. and M.P. Narayanan. 1993. Motives for takeovers: An empirical investigation. ***Journal of Finance and Quantitative Analysis***, 28(3): 347-362.

Bolton, P. and D. Scharfstein. 1990. A theory of prediction based on agency problem in financial contracting. ***American Economic Review***, 80: 93-106.

Bradley, M.A, A. Deasi and E.H. Kim. 1988. Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms. ***Journal of Financial Economics***, 21(1): 3-40.

Chen, S.S, and K. W. Ho. 1997. Market response to product-strategy and capital expenditure announcements in Singapore: Investment opportunities and free cash flow, ***Financial Management***, 26: 82-88.

Chen, S.S., K. W. Ho, C.F Lee and G. H. H. Yeo. 2000. Investment opportunities, free cash flow and market reaction to international joint ventures. ***Journal of Banking & Finance***, 24: 1747-1765.

Chung, K. H, Pruitt, S. W. 1994. A simple approximation of Tobin's q. ***Financial Management***, 23: 70-74.

Comment, R. and G. A. Jarrell. 1995. Corporate focus and stock returns. ***Journal of Financial Economics***, 37: 67-81.

De Roon Frans A., Theo E Nijman and Chris Veld. 1998. Pricing term structure risk in futures markets. ***Journal of Financial and Quantitative Analysis***, 33: 139-157

Denis, D.J. 1994. Investment opportunities and the market reaction to equity offerings. ***Journal of Financial and Quantitative Analysis***, 29(2): 159-177.

Doukas, J. 1995. Over investment, Tobin's q and gains from foreign acquisitions. ***Journal of Banking and Finance*** 19: 1285-1303.

Erwin, G. R. and James M. Miller. 1998. The intra-industry effects of open market share repurchases: Contagion or competitive? ***Journal of Financial Research***, 21: 389-406.

Firth, M. 1996. Dividend changes, abnormal returns, and intra-industry firm valuations. ***Journal of Financial and Quantitative Analysis***, 31: 189-210.

Hertzel, M. G. 1991. The effects of stock repurchases on rival firms. ***Journal of Finance***, 46: 707-15.

Hertzel, M. and R.L. Smith. 1993. Market discounts and shareholder gains for placing equity privately. ***Journal of Finance***, 48: 459-485.

Holderness, C. G., R. S.Kroszner and D. P.Sheehan. 1999. Were the good old days that good? Changes in managerial stock ownership since the great depression. ***Journal of Finance***, 54: 435-469.

Howe, K. M., He, J., G. W. Kao. 1992. One-time cash flow announcements and free cash-

flow theory. ***The Journal of Finance***, 47: 1963-1975.

Howe, J.S., and Yang-pin Shen. 1998. Information associated with dividend initiations: Firm-specific or industry-wide? ***Financial Management***, 27: 17-26.

Kang, J.K. and R.M. Stulz. 1996. How different is Japanese corporate finance? An investigation of the information content of new security issues. ***Review of Financial Studies,*** 9: 109-139.

Lang, L.H.P., R.M., Stultz, and R.A. Walkling. 1989. Managerial performance, Tobin's q and the gains from successful tender offers. ***Journal of Financial Economics***, 24: 137-154.

Lang, L.H.P., R.M., Stultz, and R.A. Walkling. 1991. A test of the free cash flow hypothesis: The case of bidder returns. ***Journal of Financial Economics***, 29: 315-335.

Lang, L.H.P., and R.M. Stulz. 1992. Contagion and competitive intra-industry effects of bankruptcy announcements. ***Journal of Financial Economics,*** 32: 45-60.

Lewis, C. M, R. J. Rogalski and J. K. Seward. 1999. Is convertible debt a substitute for straight debt or for common equity? ***Financial Management***, 28: 5-27.

Lindenberg, E. and Stephen Ross. 1981. Tobin's q ratio and industrial organization. ***Journal of Business***, 54: 1-32.

Loughran, T. and A.M. Vijh. 1997. Do long-term stockholders benefit from corporate acquisitions. ***Journal of Finance***, 52: 1765-1790.

Perfect, S.B. and K.W. Wiles. 1994. Alternative constructions of Tobin's q: An empirical comparison. ***Journal of Empirical Finance***, 1: 313-341.

Servaes, H. 1991. Tobin's q and the gains from takeovers. ***The Journal of Finance***, 46: 409-419.

Song, M.H. and R.A. Walking. 1993. The impact of managerial ownership on acquisition attempts and target shareholder wealth. ***Journal of Financial and Quantitative Analysis***, 28: 439-457.