EFFECT OF LEGAL SANCTIONS ON TAKEOVER TARGET INSIDER PURCHASES

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ABSTRACT: This study presents evidence of decreases in purchase activity by corporate insiders during the month preceding public disclosure that the firm is a takeover target. This result supports the conclusion that legal sanctions deter corporate insider trading during the last month before takeovers. But, insider trading activity during the second and third month prior to announcement suggests that restrictions on corporate insider trading may be less effective in earlier periods.

INTRODUCTION

Whether corporate *insiders trade on the basis of private information is of 'interest for both regulatory and market researchers. (Our use of the term insider is limited, for purposes of this study, to corporate officers and directors who hold private and material value-relevant information. The legal definition of an '"insider" is much broader and more complex.) Two other recent studies (Sanders and Zdanowicz, 1992; Seyhun, 1992) have addressed the efficacy of regulatory authorities 'in controlling insider trading in the context of takeovers. Although not precisely comparable to one another, these studies seem to have developed conflicting evidence about the effectiveness of *insider trading sanctions. Our study reexamines the purchasing activities of target firm corporate 'insiders and is *intended to resolve the conflict in evidence presented by Sanders and Zdanowicz (1992) (hereafter, S&Z) and Seyhun (1992).

The remainder of this article is organized 'in four sections. First we review the problem, we then present the research method, the empirical results and analysis, and finally the conclusions.

REVIEW OF PROBLEM

S&Z and Seyhun (1992) suggest that they have developed some evidence of securities regulation effectiveness in controlling trading by 'insiders Just prior to takeovers. S&Z find no significant *increase 'in *insider purchases before takeovers. Seyhun (1992), by contrast, finds some evidence of declining levels of 'insider purchases before takeovers. Although these studies are not directly comparable because of methodological and research question differences, the results may be interpreted as contradictory.

Along with other issues, S&Z examine the reported target firm insider open market purchases in the period in which insiders could have traded based on private information. They find "no evidence that either the magnitude or frequency of reported trading by *insiders changes during the period between the initiation and public announcement dates relative to that *in the pre initiation period" (p. 110). Their pre *initiation* period begins 15 0 days before the date on which the first steps are taken that will culminate *in a takeover. The *informed period* begins on the initiation date and ends two trading days before the public announcement date. S&Z took the difference in the average number of trades by insiders per day (and also the average volume of shares per trade) between the two periods to determine whether the difference 'in the number of trades was significant. They conclude that there is no evidence of abnormal trading by 'insiders before the public announcement of the takeover bid. And, they say "Given the legal prohibitions against and the increased scrutiny of 'insider trades 'in the informed period, these results are not surprising" (p. 122). We find these results very surprising if legal sanctions against insider trading are effective. In this case, we would expect to find a decrease 'in purchase activity during the informed period.

S&Z use a 150 day *period* to develop the expected level of purchases. But the 150 day period is unlikely to be sufficient to develop a realistic expectation about the normal level of purchasing because of documented seasonality in insider trading (Seyhun, 1988), and because of the small number of trades per firm in their sample. In addition, it is possible that the S&Z sample size of 30 firms, limited as it was by other objectives more central to their study, was too small to yield significant results.

Seyhun (1992) investigated the effect of increases *in enforcement of *insider trading laws on insider trading just before takeover announcements. He concludes that insiders have become more reluctant to trade immediately before takeover announcements (p. 175). Seyhun examined the effect of case law by analyzing target firm insider activity for the 30 days prior to corporate takeover announcements. He finds a declining level of purchasing activity across three sub-periods over time. He also reports the absolute number of firms in his sample in which top executives purchased stock immediately before takeover announcements. But, absent a purchases expectation model it is difficult for Seyhun to draw strong conclusions. Furthermore, Seyhun's use of a 30 day period preceding the public announcement may not be adequate to capture changes in *insider trading patterns following receipt of advance information about a takeover. S&Z show, for their sample, that target firm insiders know of impending takeovers as much as 542 days, and on average 79.1 days in advance of the first public announcement.

In sum, if constraints on insider trading are effective, the result should be an observed abnormal decrease *in purchases preceding a takeover announcement. But Seyhun's study does not provide adequate evidence of such a decrease, and S&Z find no evidence of abnormally low levels of purchase activity.

THE RESEARCH METHOD

The Sample

This study *investigates whether stock purchases by target-firm officers and directors decrease 'in the six months prior to the day of the first public announcement of an expected takeover. A 2 1 -trading-day period is used to approximate one calendar month. We aggregate insider trading activity and abnormal returns for two reasons. First, it facilitates comparisons with other studies. Second, aggregation is necessary to capture enough 'insider trading activity to allow meaningful comparison to other periods.

Announcements of takeovers were identified using the Wall Street Journal Index and specific articles in the Wall Street Journal when clarification was needed. All NYSE and AMEX target firms with first announcements between January 1, 1985 and December 3 1, 1989 were included. Articles indicating the firm was believed to be a takeover target or '"in play" were treated as the public announcement date.

Any firm with two or more takeover attempts separated by less than two years was excluded from the sample. They were excluded because it is difficult to determine which of the takeover attempts are associated with price changes and insider purchase decisions. Management-led leveraged buyouts were also excluded from the sample set because their inclusion could improperly bias the result in the direction of finding a significant *increase in purchase activity by insiders. The resulting search identified 277 firms. Data on corporate officer and director open market purchases from June 30, 1980 to December 31, 1989 were obtained from the Insider Trading Monitor.

The Insider Trading Monitor is a data set that 'includes the Official Summary of Securities Transactions and Holdings. This Official Summary is supplied to the SEC 'in data form by CDA/Investnet who have a data set entitled the Insider Trading Monitor. All data entered *into the system from May 1, 1984 to December 31, 1989 was entered and reentered with verification of accuracy. Data prior to May 1, 1984 did not use these procedures and contained errors due to double count* of filings for Indirect and Direct Holdings. The pre- May of 1984 data has been examined and corrected for duplicate entries.

Of the original 277 target firms, 64 were eliminated because there were no 'insider transactions during the estimation period, leaving 213 firms. Return data was **obtained from** CRSP NYSE and AMEX Daily Return tapes. For firms to be included in the final sample, return data had to be available during the test period and for the 60-month estimation period. Of the 213 firms, a total of 62 firms did not meet this criterion and were excluded, leaving 151 firms *in our final sample set. Table I summarizes the sample characteristics.

TABLE 1
Data Set

Number of takeover target firms; January 1, 1985 to December 31, 1989	277
Less: Observations for which there were no insider actions	(64)
Number of target firms with insider actions	213
Less: Observations for which there was incomplete CRSP data	(62)
Final Sample Size	151

Insider Purchasing Activity

We measure the abnormal purchasing activity of each of the sample firms for each of the six months preceding the day of the first public announcement of a takeover (test-period). The use of a six-month test-period assured that a long enough period was employed to capture the expected effect on insider behavior resulting from the anticipated takeover announcement without compromising the length of the estimation period. For each test-period month, abnormal insider purchasing activity is measured for each firm by subtracting the expected purchasing activity from the actual purchasing activity. Expected purchasing activity is the mean monthly purchasing activity for the 48 months (estimation period) before the first test month.

$$AI_{ip} = I_{ip} - \bar{I}_i \qquad (1)$$

where:

$$\bar{I}_i = \frac{1}{48} \sum_{t=T-54}^{t=T-7} I_{it}$$

and,

I_{it} = Number of insider purchasing events (or volume of purchases by insider) for firm i for month t;

t = a period of 21 trading days (month) during the estimation or test periods;

T = the day preceding the day of the first public announcement of the merger or acquisition; and

p = any of the six test period months, T-6,…,T-1.

Next the average abnormal purchasing activity (AI_p) across all sample firms for each of the six test-period months p is calculated as:

$$AI_p = \frac{1}{N} \sum_{i=1}^{N} AI_{ip} \qquad (2)$$

where N is the number of sample firms.

An expectation model for *insider activity can be developed using either intra-firm. time series or a cross-sectional control portfolio approach. We chose the intra-firm time-series method as both the most appropriate and conservative alternative.

To our knowledge, only Gosnell, Keown, and Pinkerton (1992) have developed expectations models using *insider trading data and they elected to use cross-sectional control portfolios. They matched each bankrupt firm *in their sample with the NYSE or AMEX firm that was the closest 'in size within the same industry (as defined by the two-digit SIC code), and measured sales transactions as a percentage of total open market transactions (purchases and sales). This approach is inappropriate for our study for two reasons. First, the cross sectional control portfolio approach could confuse the effect of a decrease in sales activity with purchase activity, and our study is interested only in purchase activity. Second, there are many reasons that insider purchase activity of a control firm may be very different from that of the test firm. For example, firms are likely to have different numbers of insiders who purchase stocks. Furthermore, some firms have corporate policies that prevent insiders from purchasing or selling securities in the open market. Thus, a cross-sectional approach using control portfolios does not appear appropriate for our study.

The intra-firm time-series approach has the advantage of increased comparability and a conservative bias. First, the number of 'insiders eligible to purchase is likely to be more consistent over time. Second, on average, there was more purchasing 'in the test period than in the estimation period. Scyhun (1992) provides evidence that the average purchasing activity is higher during the period 1985-1989 than it was during the period 1981-1984. At least some of the 1981-1984 period is *included in the estimation period; the period in which expected levels of purchase activity are established for each firm. Thus, the

number of purchase actions predicted may be understated during the test periods (before mergers and acquisitions) making it less likely to find abnormally low levels of purchasing.
A t-test was used to test whether the average 'insider purchasing activity/volume was abnormal for each test period month p (T-6, . . . , T- 1). The t-statistic is calculated as:

$$t = \frac{AI_p}{s/\sqrt{n}} \qquad (3)$$

where:

$$s = \left[\frac{1}{N-1} \left(\sum_{i=1}^{N} AI_{ip} - \overline{AI}_p \right) 2 \right] \frac{1}{2}$$

Where two or more purchases are reported in a very short time period, they are likely to be the result of a single decision. Thus, to avoid over-counting of decisions to buy, purchases by the same *insider within a five day trading period are counted as a single action (decision). Hence, a purchase on Tuesday followed by a purchase on the subsequent Monday by the same individual, is counted as a single action representing a decision made on Tuesday. Since excessive variability *in the number of shares purchased could invalidate use of the number of insider actions as a measure of insider decisions, volume is also analyzed. That is, a decision to purchase 100 shares may not be equivalent to a decision to buy 10,000 shares. For that reason, the sample data includes the number of shares bought in each action and applies the same analytical tools to both sets of data.

Abnormal Returns

Abnormal returns are calculated to establish that there is value to the use of inside information. We hypothesize that the stock price of target firms will increase significantly prior to the public announcement of a planned takeover. The abnormal returns (unadjusted prediction errors) 'in period p, for firm i, are estimated using the market model and then adjusted for size-based-control portfolio abnormal returns (adjusted prediction errors). These adjustments are explained after the description of the market model. Ordinary least squares (OLS) is used to estimate the parameters of the market model. These parameters are used to determine the unadjusted prediction errors for each firm 'in the sample and in the size-based control portfolios.

There are a number of alternative testing procedures that can be used for estimation of prediction errors. Strong (1992) reviews alternative methodologies for calculating abnormal returns for event studies. Stones analysis considers alternatives such as size control portfolios and methods employing generalized least squares (GLS). He points out that evidence from Malatesta (1986) and McDonald (1987) suggest that ordinarily least squares (OLS) works as well as estimated GLS. Strong summarizes:

> If the sample securities have no unrepresentative exposure to extra-market factors and event dates are diffusely spread out in calendar time for the sample securities, then calculating abnormal returns using the OLS market model and using standard statistical tests appears to be a well-specified procedure (p. 550).

In this study, the event periods are very diff-use, spread over 5 years, and there is no reason to expect cross-sectional correlation, so the OLS method was used. However, our sample is mostly smaller firms and *in this case Strong (1992) recommends some form of size control portfolio. Kotari and Wasley (1989) also find that conventional t-tests using market model measures of abnormal performance result *in excessive Type I errors and are misspecified when the sample securities are exclusively small (or large) firms. However, they conclude that a conventional t-test, based upon size control portfolio abnormal returns, is valid (well specified) and of equal or greater power than alternative testing procedures. Several studies (e.g., Foster, et al (1984) and Dimson and Marsh (1986)) employ a size control portfolio as a benchmark for computing abnormal returns, and we have adopted the same approach.

$$r_{it} = \alpha_{it} + \beta_{it} * r_{mt} + \varepsilon_{it} \qquad (4)$$

for $t = p(T-_6, \ldots, T-_1)$ for the test period, and $t = T-_{68}, \ldots, T-_9$ for the estimation period, where:

r_{it} = return on stock I in event month t,
r_{mt} = the return on the CRSP value-weighted index of NYSE stocks in the event month t,
α_{it}, β_{it} = market model intercept and slop as of month t; and
ε_{it} = disturbance term assumed to be normally distributed with zero mean and constant variance.

The unadjusted prediction errors for each firm i are given by:

$$e_{ip} = r_{ip} - (a_{ip} + b_{ip} * r_{mp}) \text{ for } p = T-_6, \ldots, T-_1 \qquad (5)$$

where:

e_{ip} = abnormal returns (prediction errors) for firm I's common stock in period p, and,
α_{ip}, β_{ip} = estimated market model intercept and slope as of period p.

The size-adjusted-prediction errors are given by subtracting the average prediction errors of portfolios of control firms with equivalent size from the unadjusted prediction errors. That is:

$$u_{ip} = e_{ip} - e_{cp} \qquad (6)$$

where:

u_{ip} = adjusted average prediction errors (abnormal returns) for firm i for events periods p,
e_{ip} = estimated prediction errors for firm I for the event period p, and
e_{cp} = estimated prediction errors for control portfolio c for the event period p,

where the prediction error for each control portfolio c (c=1,…,10) in period p is given by:

$$e_{cp} = \sum_{i=1}^{N} \qquad (7)$$

and j represents the individual firms comprising the control portfolio. A one-tailed standard t-statistic is used for statistical tests.

The control portfolios were created on the basis of NYSE firm capitalization as of December 31, 1984 for all sample firms with first takeover announcement dates *in 1985, 1986, or 1987. The control portfolios were recreated at the end of 1987 for all sample firms with first announcement dates 'in 1988 and 1989. Reforming the control portfolios helps ensure the firms are matched with appropriate control portfolios. Using the CRSP tapes to obtain the year-end price and number of shares and to find firm size, all stocks that had at least 60 previous periods of data were ranked into ascending order of market value. These stocks were divided into ten portfolios based on firm size. Then the market model was estimated for each control portfolio stock for the same periods as the test stocks using the same procedures discussed above. Prediction errors were calculated for each control firm and the average prediction errors were calculated for each of the ten portfolios.

EMPIRICAL RESULTS AND ANALYSIS

Table 2 presents the purchasing activities of target-firm corporate insiders for each of the six months preceding the day the takeover is announced. Purchase activity for each of these test months is measured *in terms of the number of times stocks were purchased by 'insiders (purchasing actions are shown in Panel A) and by the volume of shares purchased (the number of shares purchased are shown in Panel B). This data is presented in terms of both (1) the average abnormal purchasing activity, and, (2) the percentage abnormal purchasing activity. In addition, the total purchasing actions/volume of purchases is presented in Table 2. For the sample of 151 target firms, the number of selling actions ranges from 12 to 21 per month. Further, during the estimation period, there were on average only 22.6 total purchasing actions per month for the 151 sample firms, or about 0. 149 per firm month. This is approximately the same as the 0. 100 purchasing actions per day reported by S&Z for their sample of 30 firms. Since, on average, there is less than one purchase action per firm per month, it would be impossible to detect an abnormally low amount of purchasing activity for a single firm.

The results shown 'in Table 2 demonstrate that 'insiders do reduce their purchasing activity in the period before a takeover announcement. In the last month before the first public announcement of a pending takeover, both abnormal purchasing actions and volume of purchases by *insiders were significantly low at the 0.01 level. In absolute terms, the last month before public disclosure had the lowest level of purchasing actions and volume for our sample of firms in over 3 years. Figure I illustrates the comparatively constant relationship between the number of actions and the volume of shares purchased for each of the six months before the first announcement date.

TABLE 2

Purchasing Activity by Target Firm Corporate Insiders for the Six Months Before Takeover Announcement January 1, 1995 to December 31, 1989

Panel A
Purchasing Actions

		Abnormal Purchasing Actions		
Period	Actual Purchasing Actions	Mean Per Firm	Standard Error	Percent Abnormal
T-1	12	-5.78% ** (-2.25)	0.0252	-40.0%
T-2	13	-5.0% (-1.43)	0.0348	-35.0%
T-3	18	-1.7% (-0.43)	0.0354	-10.0%
T-4	15	-3.7% (-1.18)	0.0312	-25.0%
T-5	26	3.7% (0.88)	0.0414	30.0%
T-6	21	0.3% (0.10)	0.0309	5.0%

Panel B
Purchasing Volume

		Abnormal Purchasing Actions		
Period	Actual Purchasing Volume (Shares)	Mean Per Firm	Standard Error	Percent Abnormal
T-1	140,000	-701 ** (-2.22)	316	-41.7%
T-2	160,000	-565 (-1.30)	436	-33.4%
T-3	190,000	-368 (-0.91)	403	-20.9%
T-4	190,000	-368 (-0.86)	426	-20.9%
T-5	320,000	499 (0.82)	612	33.2%

T-6	240,000	-35 (0.09)	366	- 0.1%

sample size = 151 firms
** significant at the 0.01 level
other statistics insignificant at the 0.05 level
t statistics are in parenthesis

The results shown in Table 3 document the presence of significant abnormal returns for our sample beginning three months before takeover announcements. These abnormal returns are significant at the 0.0 1 level for T-3 and at the 0.00 1 level for T-2 and T- I and demonstrate the potential for profit to purchasers of stock during these periods.

TABLE3

Target Firm Abnormal Returns for the Six Months Before Takeover Announcement
January 1, 1985 to December 31, 1989

Percent Abnormal Period	Returns	Percent Standard Deviation	Percent Cumulative Abnormal Return
T-1	13.8% *** (7.33)	23.1%	24.5%
T-2	10.0% *** (6.87)	17.6%	10.8%
T-3	2.6% ** (2.26)	14.1%	0.8%
T-4	-1.2% (-1.40)	10.5%	-1.8%
T-5	1.3% (1.49)	10.9%	-0.6%
T-6	-1.9% ** (-2.40)	10.5%	-1.9%

sample size = 151 firms
*** significant at the 0.001 level
** significant at the 0.01 level
other statistics insignificant at the 0.05 level
t statistics are in parenthesis

The abnormally low levels of purchasing *in T- I imply that insiders have reduced their purchasing activity 'in response to legal risks; a result that should be important to regulators and market researchers. It is the first statistical evidence, to our knowledge, of decreases 'in purchases by corporate 'insiders in the month before takeovers. This is consistent with Seyhuds (1992) conclusions about the effect of legal constraints on *insider trading during the final month and may be 'interpreted as inconsistent with S&Z's results.

The cumulative percentage average abnormal returns and the percentage abnormal insider purchasing actions are presented for each of the test period months 'in Figure 2. This graph shows that, on average, abnormal returns *increased significantly in T-3, T-2, and T- 1, while purchasing activity did not significantly decline until T- 1. Our results for periods T-2 and T-3 show no significant decrease in purchasing activity by corporate 'insiders.

Our failure to find significant decreases 'in purchasing activity by corporate *insiders for periods T-2 and T-3 may be 'inconsistent with effective legal constraints on 'insider trading if the corporate insider informed period frequently and substantially exceeds 30 days. This result may, at least to some extent, be a function of averaging together of firms with

informed periods that are longer than 30 days with those of less than 30 days. But, it may also be a function of less effective regulations (as a deterrent to 'insider trading) when the trading occurs farther away from the first announcement date. Our evidence of significant positive abnormal returns during T- 1, T-2, and T-3 is consistent with informed periods greater than 3 0 days, and, as previously discussed, S&Zs data suggests that longer informed periods may be common.

Significant positive abnormal returns are not unusual; they are a common and well documented phenomena for takeover target securities just prior to public announcements. Jensen and Ruback (1983) and Jarrell and Poulsen (1989) suggest a rational anticipation theory; a theory that would not require informed insiders. To the contrary, other proposed explanations for this phenomena range from suspected illegal insider trading (Keown, et. al., 1985), to information leakage (Keown and Pinkerton, 1981), and the copying of insider trading decisions (Givoly and Palmon, 1985). Importantly, each of these latter theories is based on the presumed existence of informed insiders *in advance of public disclosure. If any of these theories have explanatory power, they add to the weight of evidence in support of generalizability of S&Z's findings of informed periods longer than 30 days. In sum, our sample of takeover target firms exhibit significant abnormal returns for each of the three months prior to a takeover. These results, *in conjunction with S&Z's data, suggest that the informed period for this sample of firms is longer than the 30 days. But we find no significant decrease in purchasing activity by *insiders during T-2 and T-3. These results are 'inconsistent with effective legal constraints against misider trading during periods earlier than 3 0 days prior to takeovers.

CONCLUSIONS

This study is, to our knowledge, the first statistical evidence that identifies abnormal decreases *in purchasing activity by 'insiders during the one-month period before a takeover is announced. This evidence is consistent with Sevhun's (1992) conclusions about the effect of legal constraints on *insider trading during the final month and may be 'interpreted as inconsistent with S&Z's results.

We do not find abnormally low levels of purchasing activity earlier than one month before takeovers are made public. However, S&Z showed that the insiders informed period is often substantially longer than a month. Our evidence of significant positive abnormal returns beginning three months before announcements is consistent with longer informed periods. We conclude that the evidence is inconsistent with an effective deterrent to insider trading prior to the final month before takeover announcements.

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