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Potential Corporate Takeovers and Market Efficiency: A Note

GERALD P. MADDEN*

THIS PAPER PROPOSES TO test the efficiency of the stock market reaction to public disclosure of partial corporate acquisitions. No previous studies have examined the efficiency of the stock market with respect to the announcement of partial acquisitions. If the returns to stockholders of the acquired companies are abnormal beyond the announcement month, then the failure of share prices to incorporate the information on the share purchases would be inconsistent with the semistrong form of the Efficient Market Hypothesis. The portfolio method of Hong, Kaplan, and Mandelker [9], used to test the returns for statistical significance, gave no indication that the returns were abnormal after the announcement months.

Partial acquisitions are announced informally in the financial press and formally in Schedule 13-D. Schedule 13-D must be filed with the U.S. Securities and Exchange Commission (SEC) by the acquirer of more than 5 percent of a class of common stock, within ten days of the open market cash purchase. Because purchases reported in the 13-Ds are often followed by merger proposals, such purchases may also reflect potential corporate takeovers.¹ In this paper the return behavior of the common stocks of 86 partly acquired New York Stock Exchange corporations has been examined.²

The presentation will proceed as follows. In Section I, this study is compared with previous studies of mergers and tender offers. In Section II the data and methodology are described and in Section III, the results. Finally, in Section IV, the results will be summarized and conclusions drawn.

I. Mergers, Tender Offers, and Market Efficiency

Studies of the price effects of mergers by Mandelker [13], Ellert [3], and Langetieg [12] have found statistically significant positive abnormal returns to the share-

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¹ Halpern [7] found that in 23 out of a sample of 77 mergers the buyers owned some of the seller's shares before the merger. The premerger ownership percentages ranged from 0.2 percent to 87 percent with an average of 38.1 percent and a median 31.2 percent. Although prior stockholding is not a necessary condition for a merger, one may reasonably infer that the potential for merger is greater given prior investment, other things the same.

² The source of the first public announcement of the acquisitions was usually the *Wall Street Journal* or the *Insiders' Chronicle* which was the initial source of 13-D data on the sample of target companies. We used the *Funk & Scott Index of Corporations* to find the date and source of the first public announcement of the purchase. The remaining first public announcements were obtained from other publications.

holders of target firms in the months preceding the effective dates of completed mergers. Halpern [7] and Franks, Broyles, and Hecht [6] found that the market began to anticipate mergers in the two or three months preceding the announcements. These studies have shown that the shareholders of the acquired firms received much larger returns than the shareholders of the acquiring firms.

Franks [5] showed that the gains to the shareholders of acquired corporations in which the acquiring corporations purchased shares prior to a bid announcement were far smaller than the gains to the shareholders of acquired corporations which were not subject to prebid share purchases. This result suggests that the gains to merger participants are partly realized prior to any formal public announcement of a merger proposal.

Studies of the price effects of tender offers by Kummer and Hoffmeister [11] and Dodd and Ruback [2] have found large positive abnormal returns to the shareholders of the acquired companies in the announcement months and in the immediately preceding months.

None of the above studies found any notable exception to the Efficient Market Hypothesis since there were no significantly large gains or losses to merger participants subsequent to the announcement dates of bid proposals in mergers or tender offers.

II. Data and Methodology

A. The Sample, Data, and Test of Portfolio Performance

The sample consists of eighty-six companies which (1) were partly acquired according to reports of Schedule 13-D filings as published in the *Insiders' Chronicle* between 10 November 1977 (first issue to contain 13-D data) and 29 June 1979; (2) were listed on the New York Stock Exchange for at least sixty-two months prior to and including the announcement month; and (3) had a complete set of data on the *Standard & Poor's Compustat* tapes through 31 December 1978. Closing month-end prices for 1979 and January to April 1980 were obtained from the *Wall Street Journal*; the cash dividends for the same 1979–80 period were attributed to the month-end on or after the exdividend date reported in *Moody's Dividend Record*.

For 31 of the 86 corporations, the first public announcement appeared in the *Wall Street Journal*. The *Wall Street Journal* date preceded the *Insiders' Chronicle* date in these 31 cases by an average of 37 days. Of the remaining first announcements, 49 appeared in the *Insiders' Chronicle* and 6 in miscellaneous publications. The average delay between the filing date of the Schedule 13-D and the date of the *Insiders' Chronicle* was 23 days.

The 86 announcements occurring in 21 different months spanned the total period, June 1977 through June 1979; two announcements occurred in two different months prior to the first issue of the *Insiders' Chronicle*. Since the postannouncement history is very brief at the time of this writing, tests of significance on the average residuals and cumulative average residuals are limited to the 23 months $t = -12$ through $t = +10$ (10 months following $t = 0$, the announcement month).

In the tests to be described, there are 21 portfolios, one for each month in which an announcement was made.³ The Hong-Kaplan-Mandelker [9] portfolio method was used to test the statistical significance of average and cumulative average residuals.⁴ This method adjusts the estimate of the standard deviation of the regression residuals $\hat{s}(u_p)$ for the increase in the residual variance due to predicting over the 23 months following the regression intervals. $\hat{s}(u_p)$ is an unbiased estimate of $s(u_p)$ over the postregression period and it is used to calculate the average normalized residual or portfolio t -statistic $\hat{u}_t^*$ and a cumulative portfolio t -statistic $\hat{U}_t^*$.

The null hypotheses to be tested are $H_0: E(\hat{u}_t^*) = 0$ and $H_0: E(\hat{U}_t^*) = 0$. Rejection of these null hypotheses may be due to price pressure or to an announcement effect reflecting the increased probability of a subsequent bid.

B. The Market Model and Classes of Portfolios

Abnormal returns were estimated by means of the one-factor market model. Brown and Warner [1] have found no evidence that more complicated methods convey any additional benefit in measuring security price performance. The logarithmic form used is

$$\ln R_{pt} = \alpha_p + \beta_p \ln R_{mt} + u_{pt} \quad (1)$$

where $R_{pt} = 1 +$ the total rate of return on the p th portfolio at time t ; $R_{mt} = 1 +$ the rate of return on the Standard & Poor's 500 Composite Stock Index; and u_{pt} = the residual return.⁵ The assumptions usually associated with the error term in a simple linear regression model apply to u_{pt} . Each of the 21 portfolios consists of all partly acquired NYSE companies for which the share purchases were described in Schedule 13-D and had announcements in the same calendar month.

The parameters α_p and β_p were estimated for each portfolio using returns for an equally weighted portfolio of securities for months -60 to -13 relative to the announcement month. Portfolio residuals $\hat{u}_{pt}$ for months -12 to $+10$ were computed using

$$\hat{u}_{pt} = \ln R_{pt} - (\hat{\alpha}_p + \hat{\beta}_p \ln R_{mt}). \quad (2)$$

As Hong, Kaplan, and Mandelker [9] have noted, this portfolio method for testing the significance of average residuals avoids the bias in the estimate of the standard deviation of u_{jt} that is due to cross-sectional correlation among residuals for firms having common general market effects.⁶ The significance of the average

³ An announcement refers to the first public announcement of a purchaser's intentions with respect to the partial acquisition of the target. Like Haugen and Udell [8], this paper examines returns to the stockholders of the acquired since they would be most directly affected by an eventual takeover.

⁴ The method is described in detail in the appendix to the paper by Hong, Kaplan, and Mandelker [9]. To conserve space only a verbal description of the procedures for obtaining $\hat{u}_t^*$ is presented in footnote 7.

⁵ The rate of return (return) on each portfolio ($R_{pt} - 1$) is an equally weighted average of the returns on the stocks in the portfolio.

⁶ See Hong, Kaplan, and Mandelker [9, pp. 39-41] for a complete explanation of the benefits derived by the portfolio method to overcome the bias present in unadjusted estimates of the residuals' standard deviation. King [10] provided evidence that residuals are not independent.

Table I
Residual Returns about the Announcement Month

Relative Month (<i>t</i>)	AR ^a		CAR ^b		^{***c} $\hat{u}_t$		^{***d} U_t	
	(<i>i</i>)	(<i>j</i>)	(<i>i</i>)	(<i>j</i>)	(<i>i</i>)	(<i>j</i>)	(<i>i</i>)	(<i>j</i>)
-12	0.012	0.022	0.012	0.022	0.546	1.193	0.546	1.193
-11	-0.000	0.011	0.012	0.032	-0.384	0.326	0.114	1.074
-10	0.023	0.031	0.035	0.063	1.268	1.707	0.825	1.863
-9	0.016	0.022	0.051	0.085	0.533	0.976	0.981	2.101*
-8	0.004	0.015	0.055	0.100	-0.246	0.577	0.768	2.137*
-7	-0.006	0.007	0.049	0.107	-0.844	-0.013	0.356	1.946
-6	0.027	0.033	0.076	0.139	1.050	1.318	0.727	2.300*
-5	-0.004	0.003	0.072	0.142	-1.019	-0.607	0.319	1.937
-4	0.044	0.056	0.115	0.198	1.145	1.868	0.683	2.448*
-3	0.031	0.040	0.146	0.238	1.717	2.316*	1.191	3.055*
-2	0.015	0.023	0.161	0.261	0.270	0.861	1.217	3.173*
-1	0.058	0.067	0.218	0.328	3.096*	3.611*	2.059*	4.080*
0	0.104	0.114	0.322	0.442	5.331*	5.904*	3.456*	5.558*
1	-0.019	-0.010	0.303	0.432	-1.828	-1.255	2.842*	5.020*
2	-0.009	0.000	0.294	0.432	-0.947	-0.412	2.501*	4.744*
3	0.005	0.015	0.300	0.447	0.146	0.741	2.458*	4.778*
4	0.007	0.024	0.306	0.471	-0.364	0.855	2.296*	4.843*
5	-0.010	0.002	0.296	0.473	-1.286	-0.530	1.929	4.582*
6	-0.005	0.005	0.291	0.478	-0.792	-0.239	1.696	4.405*
7	-0.002	0.007	0.289	0.484	-0.721	-0.150	1.491	4.259*
8	-0.002	0.011	0.287	0.495	-0.286	0.491	1.393	4.264*
9	-0.002	0.011	0.285	0.506	-0.676	0.090	1.217	4.185*
10	0.006	0.015	0.291	0.521	-0.471	0.066	1.092	4.107*

^a AR = Average Residual = $\sum_{p=1}^{21} \hat{u}_{pt}/M$ where $\hat{u}_{pt}$ is estimated by Equation (2) and t is the month relative to the announcement.

^b CAR = Cumulative Average Residual = $\sum_{t=-12}^{+10} \text{AR}_t$

^c $\hat{u}_t^*$ = Portfolio t -statistic (with 46M degrees of freedom). The 46 refers to the number of observations in the regression time series (48) less the number of parameters estimated (2).

^d $U_t^* = \sum_{s=-12}^t \hat{u}_s^* / \sqrt{t+12}$

* Null hypothesis rejected at the 0.05 level.

Note: The data in Columns (*i*) employ the actual regression parameter estimates and the data in Columns (*j*) employ $\alpha = 0$ and $\beta = 1$ in their computation.

portfolio residual in any month and of the cumulative average residual through any month may be assessed by a standard t -test.

III. Empirical Results

The estimates of α_p were significant at the 0.05 level for only two of the 21 portfolios. However, the simple average of these values was equal to 0.0095, which corresponds to 12.0% per annum and seems implausibly high. As a result, residuals were calculated using both the estimated regression parameters and the prior estimates, $\alpha = 0$ and $\beta = 1$.

Table I shows the average residual (AR), the cumulative average residual

(CAR), the average normalized residual ($\bar{u}_t^*$), a portfolio t -statistic, and the cumulative portfolio t -statistic ($\bar{U}_t$) for the months $t = -12$ through $t = +10$.⁷ The residuals were averaged across portfolios in each of the months, -12 to $+10$. The $\bar{u}_t^*$ are standardized values of the u_{pt} in Equation (2). The $\bar{u}_t^*$ are corrected to reflect the increase in error variance due to predicting beyond the estimation period, months -60 through -13 . The $\bar{U}_t$ are a time-weighted average of the $\bar{u}_t^*$. The use of $\bar{u}_t^*$ and $\bar{U}_t$ to test the significance of the performance measures, average residuals, and cumulative average residuals presupposes normality and serial independence for portfolio returns.

The figures in Columns (i) were derived using the estimated regression parameters and the Column (j) figures using the prior estimates, $\alpha = 0$ and $\beta = 1$. The largest values of the statistics AR, $\bar{u}_t^*$, and $\bar{U}_t$ occurred in the announcement month 0.

The significantly positive abnormal returns in the first pre-announcement month (Columns (i) and (j)) and the third pre-announcement month (Column (j)) may reflect the information conveyed by earlier communications about the share purchases or by public disclosures earlier than those cited in the *Funk & Scott Index of Corporations and Industries*.

No statistically significant abnormal returns are observed after the announcement months. However, the estimated postannouncement returns do depend on the estimates of α and β used; the cumulative average residual (CAR) in Column (j) which is calculated assuming $\alpha = 0$, $\beta = 1$ increases by 8 percent in the postannouncement period whereas the corresponding figure using the estimated parameter values is -3 percent.

The CAR remained large over the months $+1$ to $+10$, but they changed little from month to month. The small positive and mostly negative values of the t -statistic $\bar{u}_t^*$ revealed no statistically significant abnormal returns (AR) in individual postannouncement months. This evidence is consistent with the semistrong form of the efficient market hypothesis.

Figure 1 shows the estimated cumulative abnormal returns using the estimated regression parameters. No exceptional returns are found subsequent to the announcement months. The hypothesis that the information contained in the announcement is impounded immediately in the price cannot be rejected.

⁷ The average normalized residual or portfolio t -statistic $\bar{u}_t^*$ has a t -distribution which approaches the normal distribution because the number of degrees of freedom is $46M$, a large number. The t -distribution has a standard deviation of $46/(46 - 2)$ (see Mood and Graybill [14]). The value M is the number of portfolios, 21. See Hong, Kaplan, and Mandelker [9, pp. 44–45 and esp. p. 45 footnotes] for an explanation of the detailed computation of $\bar{u}_t^*$ and $\hat{s}(u_p)$ and related statistical references. The $\bar{u}_t^*$ is a weighted average of the normalized residual u_{pt}^* . The u_{pt}^* is defined as $u_{pt}/\hat{s}(u_p)$. Under the null hypothesis $H_0: E(u_{pt}^*) = 0$, u_{pt}^* has a t -distribution with 46 degrees of freedom. The $u_{1t}^*, u_{2t}^*, \dots, u_{pt}^*, \dots$, thus represent independent drawings from the t -distribution. They are independent because they correspond to different calendar months (see Fama [4]). The $\hat{s}(u_p)$ which was recomputed for each portfolio is corrected to reflect the increase in error variance due to predicting beyond the regression period. The $\hat{s}(u_p)$ is an unbiased estimator of the standard deviation of the portfolio residuals measured over $t = -12$ to $t = +10$. The $\bar{U}_t$ is a cumulative portfolio t -statistic that is computed as $\bar{U}_t = (1/\sqrt{t}) \cdot \sum_{i=1}^T \bar{u}_i^*$ where T is the number of months over which the t -statistic $\bar{u}_i^*$ is summed.

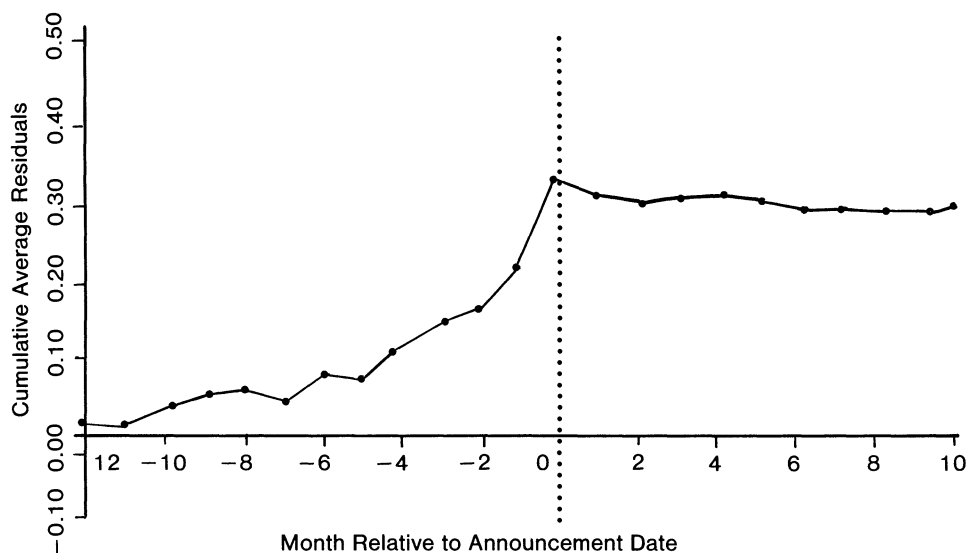


Figure 1. Cumulative abnormal returns on portfolios of partly acquired New York Stock Exchange corporations relative to first announcement (month = 0) of acquirers' purchases.

IV. Summary and Conclusions

The examination of the return behavior for 86 firms subject to partial acquisitions over the 22 months surrounding the announcement month of the acquisition has found significant positive abnormal returns in the announcement month and the immediately preceding month; evidence is also found of positive abnormal returns in Month -3. These abnormal returns may be attributable to the buying pressure exerted by the acquiring firm or to the information associated with an increased volume of trading and, in the announcement month, to the information contained in the announcement itself. The lack of significant abnormal returns in the postannouncement months is consistent with the semistrong form of the efficient market hypothesis.

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