

April 1983

Corporate Acquisition Criteria: New Evidence

P.R. Chandy

North Texas State University

Richard T. Cherry

Lamar University

Follow this and additional works at: <https://digitalcommons.georgiasouthern.edu/sbr>



Part of the [Business Commons](#), and the [Education Commons](#)

Recommended Citation

Chandy, P.R. and Cherry, Richard T. (1983) "Corporate Acquisition Criteria: New Evidence," *Southern Business Review*: Vol. 9: Iss. 1, Article 5.

Available at: <https://digitalcommons.georgiasouthern.edu/sbr/vol9/iss1/5>

This article is brought to you for free and open access by the Journals at Digital Commons@Georgia Southern. It has been accepted for inclusion in Southern Business Review by an authorized administrator of Digital Commons@Georgia Southern. For more information, please contact digitalcommons@georgiasouthern.edu.

CORPORATE ACQUISITION CRITERIA: NEW EVIDENCE

P. R. Chandy

and

Richard T. Cherry

Tender offers for control of firms seem to be a dominant form of corporate takeover. The recent wave of merger activity and the interest shown by the media and the public at large indicate the importance of this area. From 1956 to 1980, there were 1,296 tender offers, with sharply increased activity beginning 1976. Cash tender offers seem to be the most prevalent form of tender offer, since they can be effected quickly without a registration of securities. For example, the 1979-80 period more than 90 of the tender offers were for cash [1]. Austin [3] points out that as long as corporations can either borrow funds or have sufficient corporate liquidity through internal cash flow, cash tender offers will continue to be the most prevalent and successful form of tender offer. Several studies have attempted to isolate financial characteristics of firms which were acquired through tender offers. The last of such studies include the Monroe and Simkowitz [13] analysis of conglomerate takeover targets in 1968, Stevens [17] analysis using multiple discriminant analysis for the period 1966-1970 and Wansley's study [18] using linear discriminant analysis for the period 1975-76. The purpose of this study is to use more recent data, (using 1978 as the year to collect sample firms) and to determine if our results tend to support or contradict previous research [5, 6, 9, 10, 11].

Twenty one firms which were acquired through cash tender offers in 1978 met the requirements of the sample. The non-acquired firms consisted of a sample of size twenty-seven. Thirty-two financial variables were drawn from the literature. They can be classified into categories such as firm size, liquidity, profitability, growth rate, debt utilization, P/E ratio, book value and dividend policy. Factor analysis and multiple discriminant analysis were performed on the data. Five of the thirty-two variables survived the analysis to appear in the discriminant function.

The result of this study should be of interest to several types of people. Individual investors, if they could identify the financial characteristics of firms which are acquired, could benefit substantially. Acquisition minded firms can use the results of this study to narrow the field of potential targets. The target firm's management could benefit by changing some of their financial characteristics in an attempt to prevent takeover attempts. Regulators who are in charge of enforcing antitrust policies of the government will be interested in understanding the financial profile of merged firms. This could help them identify the overall economic impact of antitrust policy as it affects mergers.

This study is divided into five sections. The first section describes some of the previous research done in this area. The second section describes the data and variable selection, followed by the third section explaining the methodology used in the study. The fourth section discusses the results and the last section contains conclusions and suggestions for further research.

Previous Research

Several studies have used multivariate analysis techniques to identify characteristics of firms which are potential takeover candidates. Stevens [17] compared 40 firms which were acquired in 1966 with a group of 40 non-acquired firms. A discriminant function was derived using the following four ratios: LT liabilities/assets, EBIT/sales, net working capital/assets and sales/assets. The model demonstrated a classification accuracy of 70 percent for the original sample. The author concludes that financial characteristics are either explicit decision variables or directly reflect non-financial reasons for acquisitions. The firm's capital structure turned out to be a very important variable in this study. Monroe and Simkowitz [13] compared samples of acquired and nonacquired firms based on a group of financial ratios and used a discriminant model to classify firms based on financial characteristics. They conclude that leverage is an important variable, but liquidity and profitability of the firms are not. The acquired firms were smaller, had low P/E ratios, low dividend payout ratio and low growth in equity.

Nielson and Melicher [15] developed an MDA model for the period 1960-1969 and found that variables such as percent change in EPS, change in cash flow rate, acquiring firms premerger cash flow rate and operating profit rate were statistically significant. The Hayes and Taussig [8] study of a group of 50 firms subjected to cash takeover bids showed that factors such as low ROE, low dividend payout, high liquidity and shifts in stock ownership played an important role in the selection of firms for takeover by other companies. Austin [3] showed that the size of the target firm is not a deterrent in tender offers and when the market value of the stock was greater than the book value, the successful bids exceeded unsuccessful bids by firms by $2\frac{3}{4}$ times.

Bradley and Korn [4] indicate that the firms acquired in the 1970's seem to be: a) high in liquidity, b) low in P/E ratio, and c) using conservative accounting policies. In a study of firms acquired over the period 1975-77, Wansley [19] shows that merged firms have smaller P/E ratios, use less debt, are smaller in size and are growing more rapidly than a group of randomly selected non-merged firms. These studies seem to arrive at some common variables as well as reflect some contradictory results.

Data and Variable Selection

The sample of firms used to derive the predictive discriminant model consists of two distinct groups, acquired and non-acquired firms. Acquired firms had to meet the following criteria:

1. The offer must be a cash tender offer.
2. The outcome must have been completely successful.
3. The firm must have a NYSE or an ASE listing.
4. The firm must be classified as a manufacturer, retailer, wholesaler or service oriented firm as classified by the SIC classification.
5. The offers must be inter-firm in nature.

Some of the restrictions were necessary to ensure that financial data will be available in COMPUSTAT, and the firms are listed in the Austin Data Bank Compiled at the University of Toledo for the year 1978. Of the acquired firms listed in the Austin Data Bank for 1978, 21 satisfied the restrictions of this study. They are listed in Appendix A.

Non-acquired firms were randomly selected from the NYSE and ASE by developing a list of all the firms on the two exchanges and by using the table of random numbers [12]. Only firms which met the SIC classification restrictions indicated earlier were considered in the sample. A sample of 27 firms met the requirements and are listed in Appendix B.

Thirty-two variables were selected based on previous research, to identify the financial characteristics of acquired firms. Eighteen of the variables are 1977 year-end data and the remaining 14 provide an average of the three previous years' financial data. The variables were divided into eight categories such as size, liquidity, profitability, growth, leverage, P/E, book value and dividend policy and are listed in Appendix C.

Research Methodology

Compustat Annual Industrial Tapes and the PDE tapes were used to collect all the necessary financial data. The SPSS package was then used to derive the multiple discriminant function. The objective was to develop a model that best discriminated the acquired firms from the nonacquired group. Studies by Pinches and Mingo [16], Edmister [6] and Wansley [18] are examples of MDA application. MDA classifies entities correctly into the mutually exclusive groups by the statistical decision rule of maximizing the ratio of among-groups to within-groups variance-covariance from a set of independent variables. It reveals which of the variables have contributed the most to group discrimination.

The MDA function takes the following form:

$$Z = V_1X_1 + V_2X_2 + \dots + V_nX_n \quad (1)$$

where

V_1, V_2, \dots, V_n = discriminant coefficients

X_1, X_2, \dots, X_n = independent variables

Z = score of the discriminant function

First, all the variables were subject to a factor analysis to reduce the effect of multicollinearity present among the variables. In factor analysis, the factors were subjected to orthogonal varimax rotation so as to derive a small number of distinct factor constructs which may be used as substitutes for the variables themselves in the MDA phase. Factor scores were derived from the factor solution and used as inputs to multiple discriminant analysis. MDA is then used to classify and make predictions about merger candidates. Six factors were derived from the original 32 variables, which explained 93 percent of the total variance. The factors which were retained

had eigen values in excess of 1 and are listed in Table 1. The following variables had the highest factor loadings when they were subject to the orthogonal varimax rotation: Factor 1: var 13; Factor 2: var 6; Factor 3: var 22; Factor 4: var 24; Factor 5: var 4; Factor 6: var 3. These variables represent leverage, liquidity, dividend payout, profitability, growth rate in earnings and P/E ratio respectively.

TABLE 1
Summary of Factor Analysis

Factor	Eigen Value	Pct. Var. Explained	Cum. Pct. Var. Explained
1	7.913	31.1	31.1
2	5.615	22.1	53.2
3	4.471	17.6	70.8
4	2.815	11.2	82.0
5	1.706	6.7	88.7
6	1.106	4.3	93.0
7	0.912	3.6	96.6
8	0.863	3.4	100.0

Before subjecting the factored data into discriminant analysis, the following two hypotheses were tested.

H₁: The variance-covariance matrices of the two groups are equal.

H₂: Group means are not equal.

Hypothesis 1 was tested using Box's M statistic. The statistic, with a value of 16.606, indicated that the hypothesis cannot be rejected at the 0.01 level of significance. Had the hypothesis been rejected, a quadratic, instead of a linear discriminant model, would have been used. The second hypothesis was tested for the "acquired" and "non-acquired" groups using the F statistic. The means of the two groups were found to be statistically different (at the 0.01 level). Hence, MDA is an appropriate technique to use here.

Having determined that a linear MDA is an appropriate technique to use, two different MDA's were applied to the data. 1: the factor scores corresponding to the six factors which were selected were used as inputs to MDA. 2: Raw data corresponding to each factor for which a particular variable had the highest factor loading was used as input to MDA. The two models were tested for their predictive ability on data corresponding to the subsequent year (1979). The models were developed using 1978 and prior years data. The results were interesting. The MDA model using factor scores had an overall classification rate of 67.39%, while the MDA using raw data had an overall accuracy of 77.08%. We also did a straightforward stepwise MDA on the entire data (without subjecting it to any factor analysis) and the final results showed an overall accuracy of 72.39%. Stevens'

study [17] had a classification accuracy of about 70%, while the Monroe and Simkowitz study [13] had an accuracy of about 63 percent. Our results seem to indicate a model with significantly improved predictive ability. We will describe in the next section the model which had the highest overall accuracy.

Results

The MDA model was derived with five of the six ratios entering the equation. The variables and their mean values are shown in Table 2. The table indicates that firms which were acquired seem to have smaller P/E ratios, higher dividend payout, higher levels of liquidity, higher profit margin, and lower levels of debt in relation to the group of randomly selected non-acquired firms. Some of these results agree with results of studies by Bradley and Korn [4] and Stevens [17]. Monroe and Simkowitz [13] indicated that liquidity and profitability were not important discriminators which is contrary to our results.

TABLE 2
F-Test of Variable Means for the
Discriminant Function Variables

No.	Variable Description	Acq. Firm Mean	Non-Acq. Firm Mean	F
3	P/E	4.14	6.82	4.9245*
13	Tot. Debt/Equity	41.2%	61.2%	5.0843*
22	Avg. Payout	34.5%	19.5%	4.0938*
6	Avg. Cur. Ratio	2.51	1.74	4.7156*
24	Avg. Profit Mrg.	15.35%	11.23%	4.8942*

*Significant at the 0.05 level.

In order to evaluate the relative importance of the individual variables, several statistical techniques were used, most of which came from the program "MULDIS" developed by Avery and Eisenbeis [7]. Table 3 shows the result of these tests. The approach used to rank the variables were: 1) F Ratio 2) Wilk's Lamda 3) scaled coefficient 4) conditional deletion and 5) forward stepwise. The results indicate that var. 13 (debt/equity) is the most important variable, reinforcing the fact that capital structure is normally a critical variable in merger activities. There is some conflict in ranking of variables 3, 6 and 24 while var. 22 (dividend payout) ranked as the least important of the five variables. Var. 3 (P/E ratio) seems to receive the second rank in most of the ranking techniques. The relative importance of var. 6 (current ratio) and 24 (profit margin) seem to be quite mixed. These results indicate that leverage and P/E ratios are the most important financial char-

acteristics distinguishing acquired firms from non-acquired firms, followed by variables liquidity, profit margin and dividend payout.

TABLE 3
Ranking of Individual Variables

Var. Number	F	Rank	Wilks		Scaled		Cond. Del. Rank	Forward Stepwise Rank
			Lamda	Rank	Coeff.	Rank		
3	4.9245	2	0.923	2	14.12	3	2	2
13	5.0843	1	0.904	1	18.75	1	1	1
22	4.0938	5	0.9974	5	11.14	5	5	5
6	4.7156	4	0.9345	3	16.42	2	4	3
24	4.8942	3	0.9412	4	12.31	4	3	4

Validity Tests

The MDA model was used to classify each firm in the original sample. The results are presented in Table 4. The total classification accuracy was 77.08% which was statistically significant at the 0.001 level indicating that the model does possess discriminating power. Since the potential for upward bias exists when the model is used to classify firms from the original sample, another test of predictive ability was done. Two new samples of 12 firms each, one group representing acquired firms, another representing non-acquired firms, were selected for the year 1979 from the data provided by Austin [2]. The same ratios developed in the earlier model were used on these firms and the results are shown in Table 5. The classification accuracy was about 80 percent and the model was significant at the 0.001 level indicating that the original model is stable and has good predictive power. The model can be used to isolate firms whose financial profiles are similar to merged firms, but not yet been acquired. This would make this model very valuable in takeover activities by firms. It should be pointed out that over a long period of time, the magnitude of many of the variables will change dramatically and this will necessitate some adjustments to be made in the discriminant model.

TABLE 4
Classification Accuracy of the MDA model:
Original Sample*

Actual Group Membership	Predicted Group Membership				
	Acquired		Non-acquired		
	No.	%	No.	%	
Acquired	21	16	76.2	5	23.8
Non-acquired	27	6	22.2	21	77.7

*Discriminant Function:

$$Z = -0.665(\text{Var. 22}) + 0.214(\text{Var. 13}) + 0.247(\text{Var. 3}) - 0.199(\text{Var. 6}) - 0.291(\text{Var. 24})$$

TABLE 5
Classification Accuracy of the MDA model:
New Data (1979)

Actual Group Membership		Predicted Group Membership			
		Acquired		Non-acquired	
		No.	%	No.	%
Acquired	12	9	75	3	25
Non-acquired	12	2	16.6	10	83.4

NOTE: In both cases the model was significant at the 0.001 level

Conclusions and Suggestions for Future Research

The purpose of this study has been to identify and analyze financial characteristics of acquired firms (subject to cash tender offers). A multivariate framework was developed using six financial dimensions derived from a factor analysis of a larger data set to determine which financial qualities best distinguished firms acquired in mergers from similar firms not acquired. A discriminant model was developed using five financial dimensions incorporating several variables developed in previous studies. The final discriminant function contained the following variables: average current ratio (for years 1975, 76, 77), average profit margin (for 1975, 76, 77), P/E ratio for the previous year (1977), total debt to equity ratio for the previous year (1977), and average dividend payout ratio for the past three years (1975, 1976, 1977). The model demonstrated a classification accuracy of about 77 percent.

The results imply that financial characteristics provide a means by which acquired firms can be separated from others. The test results suggest a profile of a firm that is a merger candidate as having a low P/E, low leverage, high dividend payout, liquidity and profit margin. Leverage and P/E ratios seem to be the most important variables.

This study gives further insight to the understanding of the merger phenomenon. The results of this study have implications for individual investors, security analysts, financial managers, regulatory agencies and others.

This study did not look at nonfinancial characteristics, as they are more difficult to measure and reliable data is difficult to obtain. Examples are state takeover statutes, supermajority rules, term of board of directors, shareholder relations, geographic location, industry entrance costs and others. There are several firms which are not listed on the NYSE or ASE, which undergo mergers. If reliable data can be obtained on such smaller firms, an analysis such as above can be done on them to get a better understanding of the merger phenomenon.

References

1. Austin, Douglas and Mandula, Mark "Updating Tender Offers," Paper presented at the Financial Management Association meeting, 1981.
2. _____, "Tender Offer Update: 1978-79" *Mergers and Acquisitions* (Summer 1980), pp. 13-32.
3. _____, "The Financial Management of Tender Offer Takeovers," *Financial Management*, (Spring, 1974) pp. 37-43.
4. Bradley, James and Korn, Donald, "Acquisition and Merger Trends Affecting the Portfolio Manager," *Financial Analysts Journal*, (Nov.-Dec. 1977), pp. 65-70.
5. Ebeid, Fred, "The Inter-Firm Corporate Cash Tender Offer: Operating, Market and Bid Characteristics of Target Firms," Ph.D. Dissertation, University of Illinois, Urbana, 1974.
6. Edmister, Robert, "An Empirical Test of Financial Ratio Analysis for Small Business Failure Prediction," *Journal of Financial and Quantitative Analysis*, (March 1972), pp. 1477-1494.
7. Eisenbeis, R.A. and Avery, R.B. "Discriminant Analysis and Procedures: Theory and Applications, D.C. Heath Co. 1972.
8. Hayes, S.L. and Taussig, R.A. "Tactics of Cash Takeover Bids," *Harvard Business Review* (March-April 1967), pp. 141-149.
9. Kummer, D.R. and Hoffmeister, J.R., "Valuation Consequences of Cash Tender Offers," *Journal of Finance* (May 1978), pp. 505-516.
10. Lewellen, W.G., "A Pure Financial Rationale for the Conglomerate Merger," *Journal of Finance* (May 1971), pp. 521-537.
11. Lintner, J. "Expectations, Mergers and Equilibrium in Purely Competitive Securities Markets," *American Economic Review* (May 1971), pp. 101-111.
12. *Million Random Digits with 100,000 Normal Deviates*, The Rand Corporation, The Free Press, 1955.

13. Monroe, R.J. and Simkowitz, M.A., "Investment Characteristics of Conglomerate Targets: A Discriminant Analysis," *Southern Journal of Business* (Nov. 1971), pp. 27-42.
14. Morrison, D.G. "On the Interpretation of Discriminant Analysis," *Journal of Marketing Research* (May 1969), pp. 156-163.
15. Nielson, J.F. and Melicher, R.W., "A Financial Analysis of Acquisitions and Merger Premiums," *Journal of Financial and Quantitative Analysis* (March 1973) pp. 139-148.
16. Pinches, G. and Mingo, K. "A Multivariate Analysis of Industrial Bond Ratings," *Journal of Finance* (March 1975), pp. 201-206.
17. Stevens, D.L., "Financial Characteristics of Merged Firms: A Multivariate Analysis," *Journal of Financial and Quantitative Analysis* (March 1973), pp. 149-158.
18. Wansley, J.W. "Classification of Merger Candidates and Market Efficiency," Ph.D. Dissertation, University of South Carolina, 1980.
19. _____, "Financial Profile of Merged Firms," Paper presented at the Financial Management Association Meeting, 1981.

APPENDIX A
1978 Listing of Acquired Firm

Acquired Firm	Bidder	Offer (\$/Share)	SIC Code
Columbia Pictures	Tracind Investment	24.00	7810
Inland Containe	Time	35.00	2850
CCI Life Systems	Dialco	3.25	3713
Cutler Hammer	Eaton	58.00	3622
Globe Union	Johnson Controls	40.00	3699
Servomation	GDV	49.00	5962
Medusa	Crame	50.00	3241
Green Giant	Pillsbury Dev'p.	37.25	2030
Olinkraft	J.M. Capital	65.00	2600
Simmons	Gulf & Western	19.00	2510
W.R. Grace	Friedrich Flick	35.00	2800
Hanes	Consolidated Foods	61.00	2300
Ridson Manu.	MB America	20.00	3499

Carrier	United Technologies	28.00	3580
P.R. Mallory	Dart Holdings	51.00	3679
Uarco	DDI	48.00	5140
MBPXL	Cargill Holdings	27.00	2010
Dictaphone	PB Holding	28.00	3570
Compac	Masco	21.00	2890
Prudential Bldg. Maintenance	ISS-Int'l Svcs.	14.00	7349
Chemplast	Norton	9.375	3079

Source: Austin Data Bank, University of Toledo

APPENDIX B
1978 Listing of Non-acquired Firm

Non-acquired Firm	SIC Code
Diversified Industries	5093
Combined Communication	7311
Iroquois Brand	2082
Adams Drug	5912
Uniroyal	3000
Pat Fashions Industries	5199
Pier 1 Imports	5999
Treadway	7990
Peabody International	3568
Combustion Engineering	3510
DiGiorgia Corp.	5140
Ametek	3811
General Employment	7399
Lamson and Sessions	3452
ATCO Industries	2499
Tasty Banking Co.	2050
Kirsh Co.	2510
American Medical Int'l.	8060
General Tire	3000
Masters Inc.	5600
Certainfeed Corp.	2950
Martin Processing	2300
Palm Beach	2300
Data Products	3573
Compugraphic	2790
Black and Decker	3550
Gaynor-Stafford	2200

APPENDIX C

List of Variables Investigated

Variable No.	Description
1.	Natural Log of sales volume for 1977 (\$000,000).
2.	Average percentage growth in sales volume between the years 1974 through 1977 (%).
3.	Price/earnings ratio for the end of 1977.
4.	Average percentage growth of earnings per share between the years 1974 and 1977 (%).
5.	The current ratio for 1977.
6.	Average of the current ratios for 1975, 1976 and 1977.
7.	Ratio of cash and equivalent to total assets for 1977.
8.	Average of the ratio, cash and equivalent to total assets, for the years 1975, 1976 and 1977.
9.	Natural log of book value at the end of 1977 (\$).
10.	Average book value for the years 1975, 1976 and 1977 (\$).
11.	The ratio long-term debt to stockholder's equity for 1977 (%).
12.	The average of the long-term debt to stockholder's equity for the years 1975, 1976 and 1977 (%).
13.	The ratio, total debt to stockholder's equity for 1977 (%).
14.	The average of the total debt to stockholder's equity for the years 1975, 1976 and 1977 (%).
15.	Natural log of net worth at the end of 1977 (\$000,000).
16.	Natural log of total assets at the end of 1977 (\$000,000).
17.	Rate of return on equity for 1977 (%).
18.	The average of the rate of returns on equity for the years 1975, 1976 and 1977 (%).
19.	Rate of return on total assets for 1977 (%).
20.	The average of the rate of returns on total assets for the years 1975, 1976 and 1977 (%).
21.	The dividend payout ratio for 1977 (%).
22.	The average of the dividend payout ratio for the years 1975, 1976 and 1977 (%).
23.	The profit margin for 1977 (%).
24.	The average of the profit margins for the years 1975, 1976 and 1977 (%).
25.	The dividend yield for 1977 (%).
26.	The average of the dividend yields for 1975, 1976 and 1977 (%).
27.	The ratio of stock price appreciation plus dividend for the year 1977, over the 1976 year-end price (%).
28.	The average of the stock price appreciation plus dividend for a year, over the previous year-end market price, for the years 1975, 1976 and 1977 (%).

29. The ratio of stock, price appreciation during 1977 over the 1976 year-end market price (%).
 30. The average of the stock price appreciation for a year, over the previous year-end market price for the years 1975, 1976 and 1977 (%).
 31. Natural log of the number of shares of common stock outstanding at the end of 1977 (000).
 32. Natural log of the value of the outstanding common stock times the market price at the end of 1977 (\$00).
-

NOTE

1. This is based on the t statistic [14].

$$t = \frac{p - 0.5}{\left[\frac{0.5(1-0.5)}{n} \right]^{1/2}}$$

P. R. Chandy is an Assistant Professor of Finance at North Texas State University. Richard T. Cherry is Professor of Finance, College of Business, Lamar University.