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PRESERVING FIRM VALUE THROUGH EXIT:
THE CASE OF VOLUNTARY LIQUIDATIONS

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Preserving Firm Value through Exit: The Case of Voluntary Liquidations

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Abstract

Voluntary liquidations offer an interesting example of efficient and orderly asset reallocation. This study examines why firms liquidate, and what happens to their assets. One important determinant of voluntary liquidation concerns asset performance and marketability: liquidating firms have low asset productivity, low market-to-book ratios, and high liquidity. Another important determinant concerns management having the proper incentives to liquidate: high inside ownership, takeover pressure, and low debt levels. Financial factors

thus establish whether a liquidation is value-increasing, while organizational factors determine whether management chooses to liquidate. The study also finds that many liquidating firm assets are sold to firms operating in the same industry. Returns to liquidating firm shareholders are significantly greater here, rather than when they are sold to firms in a different industry. Moreover, intra-industry liquidations tend to occur in superior performing industries when industry performance is at a peak.

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I. Introduction

Several authors, including Harrigan (1980), Porter (1980), and Gort and Klepper (1982), have documented a number of industries that experience a maturation process that ultimately yields consolidation and exit. Ghemawat and Nalebuff (1990) note that over 10 percent of U.S. manufacturing output in 1977 represented industries whose real output had shrunk over the 1967-77 period. Jensen (1993) argues that particularly rapid technological, political, regulatory, and economic changes over the past twenty years have led to large gains in productivity in many industries, creating overcapacity and a resulting need to downsize.

Jensen (1993) discusses four control mechanisms that operate on corporations to regulate the process of exit, but believes that none of these works efficiently. He maintains that:

- *internal control systems* fail to cause managers to maximize efficiency and value,
- the *legal/political/regulatory system* is too blunt an instrument to effectively handle the problems of wasteful managerial behavior,
- *capital markets* are ineffective, as court decisions and regulation have caused a shutdown in the market for corporate control, and
- *factor and product markets*, while effective, are slow to act as a control force.

Jensen concludes that the need for exit in an environment that is ill-suited to induce such action poses a major challenge to firms and their shareholders.

These difficulties notwithstanding, some firms choose to exit in an efficient and orderly manner through voluntary liquidations. A liquidation occurs when all firm assets are sold, creditors are paid off, and remaining funds are distributed to shareholders. A *voluntary* liquidation is a liquidation conducted largely at management's discretion, not one forced by creditors or the courts in bankruptcy proceedings. This study examines why firms choose to voluntarily liquidate. It also examines who buys liquidating firms' assets and the buyer's industry relationship to the liquidating firm.

The nature of the firm's assets and how they are performing is one important determinant of voluntary liquidation. Compared to a purely random sample of firms, liquidating firms have low asset productivity ratios, low market-to-book ratios, and high ratios of cash to assets. Therefore, many of the financial factors documented to help predict takeover targets (Dietrich and Sorensen 1984, Hasbrouck 1985, and Morck, Shleifer, and Vishny 1988a) are also important determinants of voluntary liquidation.¹

Capital and ownership structure is another important determinant. Compared to industry-matched firms, liquidating firms have low debt ratios, high inside ownership, and outside takeover pressure. These results conflict with those of studies that have found a positive relationship between debt levels and being a takeover target (Morck, Shleifer, and

¹ Ghosh, Owers, and Rogers (1991) find cash to assets, market value, and sales growth to be important financial characteristics of voluntary liquidations as compared to industry-matched firms. They do not explicitly look at asset productivity or market-to-book ratio, nor do they compare liquidating firms to purely random firms.

Vishny 1988a),² and a negative relationship between inside ownership and being a takeover target (Mikkelson and Partch 1989, and Song and Walkling 1993). The inside ownership and takeover pressure findings are consistent with prior work on voluntary liquidation by Ghosh, Owers, and Rogers (1991).³

The evidence therefore shows that both financial and organizational characteristics are important determinants of voluntary liquidations. Managers choose to liquidate when financial conditions make it value-increasing for firms and when organizational factors make it value-increasing for shareholders and managers. Differences in the comparisons of liquidating firms to match firms also demonstrate the importance of using two sets of match firms in comparative studies where industry factors are important.

The study also finds that a large fraction of liquidating firms' assets does not leave the firms' industry. Over 30 percent of liquidating firms' largest divestitures go to firms operating in the same industry. Even when assets are not sold to an industry buyer they are often sold to individuals, partnerships, or firms that will continue operating the firm's assets in the same industry. Just 20 percent of liquidating firms' largest divestitures go to firms operating in a different industry.

Moreover, financial performance is significantly greater in industries in which liquidating firms sell their assets intra-industry, evidence that the assets are going to the highest-value users. Surprisingly, however, industry

² Studies by Palepu (1986) and Dietrich and Sorensen (1984), however, find a negative relationship between debt levels and the likelihood of being a takeover target.

³ They do not find debt level to be a significant predictor of liquidation, however.

performance significantly deteriorates in these industries over the three years following the liquidation. Both findings are consistent with Shleifer and Vishny's (1992) hypothesis that industry peaks are the best time to sell assets. Returns to shareholders at liquidation announcement are significantly lower for firms that sell their assets outside their industries, evidence that firm assets are worth substantially less to inter-industry buyers than to intra-industry buyers.

The paper is organized as follows. Section II discusses the collection of sample and control firms and provides industry and announcement year frequency data. Section III examines the stock price performance of firms surrounding a liquidation announcement. Section IV presents various hypotheses and compares the characteristics of liquidating firms to match firms on a simple univariate basis and on a multivariate basis using logistic regression models. Section V examines what happens to the assets of the liquidating firms, and relates this to shareholder returns and industry performance surrounding the liquidation. Concluding remarks are presented in Section VI.

II. Sample Selection

To collect a sample of voluntary liquidations, all firms delisted due to liquidation on the Compustat and CRSP databases between 1974 and 1993 are identified. The *F&S Index of U.S. Corporations* and Mead's Lexis/Nexis database are then used to obtain the liquidation announcement date along

with the details of and circumstances surrounding the liquidation.⁴
Excluded from the sample are:

- financial firms (those whose primary SIC code begins with the number 6),
- partnerships,
- firms for which the announcement date precedes January 1, 1974,
- firms for which the liquidation cannot be confirmed through press reports,
- firms that liquidate after entering bankruptcy,
- firms that reorganize without asset sales,
- liquidations reported as a means to effect a previously announced take-over, and
- liquidations announced in conjunction with an announcement that all (or substantially all) assets will be sold to one party.

The last two screens eliminate transactions that are viewed as takeovers effected through an asset sale for legal, tax, and/or accounting considerations. The resulting sample consists of seventy firms that announced and completed voluntary liquidations between 1974 and 1993 (a list of the firms along with their main line of business and the liquidation announcement year is included in Appendix 1). The sample is comparable in size to

⁴ The *F&S Index* references articles from major newspapers, including the *Wall Street Journal* and the *New York Times*, as well as business magazines and trade publications. The Lexis/Nexis database includes full-text articles and references from major newspapers and business magazines, along with wire services. In a few cases, the *Capital Changes Reporter* liquidation date or the company proxy statement liquidation date is used as it indicates a liquidation date preceding that found in the other sources.

the samples found in studies of voluntary liquidations by Kim and Schatzberg (1987) and Hite, Owers, and Rogers (1987).⁵

For each liquidating firm, an industry-matched non-liquidating firm and a purely random non-liquidating firm are chosen as matching firms. Having the two sets of control firms enables the study to consider firm-specific effects as well as industry effects in the liquidation decision. The industry-matched firms are randomly chosen from among all Compustat firms with the same four-digit primary SIC code, with financial data in the year of and the year preceding the liquidation announcement. The purely random firms are chosen from among all Compustat firms with financial data in the year of and the year preceding the liquidation announcement, without regard to industry.⁶ Both sets of match firms are paired chronologically with the liquidating firms to control for temporal shifts in the examined financial and organizational variables.

Table 1, Panel A, examines the industry frequency distribution of liquidating firms and the purely random matching firms. Liquidating firms are found to be more common in industries where asset tangibility is high (mining, lumber, furniture and paper, petroleum and rubber, and leather and stone) and/or where assets are easily divisible (printing and publishing,

⁵ Using different sources and screens from this study and each other, Hite, Owers, and Rogers (1987) (and Ghosh, Owers, and Rogers 1991) generate a sample of forty-nine voluntary liquidations between 1962 and 1984, and Kim and Schatzberg (1987) generate a sample of seventy-three voluntary liquidations between July 1, 1963, and December 31, 1982.

⁶ As with the liquidating firms, financial firms (those whose primary SIC code begins with the number 6), and partnerships are excluded from the selection process.

communication, transportation).⁷ In contrast, the random matching firms are more common in knowledge-intensive industries (chemicals, electronics, transportation equipment, measuring instruments) where asset tangibility is relatively low and assets cannot be easily divided. At the level of aggregation presented in Table 1, a chi-square value fails to reject the null hypothesis (at the .10 level) that both sets of firms come from the same industry distributions.⁸

Table 1, Panel B, examines the announcement year frequency distribution of liquidating firms. Announcements are much less frequent in the later part of the sample period, with sixty-two liquidations announced between 1974 and 1986 (averaging close to five per year) and only eight announced between 1987 and 1993 (averaging just over one per year). A chi-square value indicates that the distribution of liquidation announcement years between 1974 and 1993 differs significantly (at the .01 level) from a uniform distribution over these years. Part of the decline in the number of liquidations may be due to the sample selection method, which excludes, for example, a firm that announces a liquidation in 1993 but is not delisted from CRSP and/or Compustat until 1994. Changes in the market for corporate control and tax considerations may also explain the decline.⁹

⁷ The liquidated printing and publishing, and communication firms typically operated in many different markets with different newspapers, radio stations, or television stations, and are divisible by markets.

⁸ Similarly, a more powerful test involving all of the firms listed on Compustat between 1974 and 1993 fails to reject the null hypothesis that liquidating firms come from the same distribution as all Compustat firms.

⁹ Kim and Schatzberg (1987) discuss tax considerations as they apply to the liquidation decision.

III. Stock Price Performance of Liquidating Firms

An event study methodology is used to examine the stock price performance of liquidating firms, where event day zero (or day zero) refers to the day of announcement of the voluntary liquidation. Abnormal returns over various event intervals are estimated using the market-adjusted approach, where the market-adjusted return is the difference between each security's return and the return on the CRSP equal-weighted index. Standard errors are estimated over event days -250 to -40 employing the methodology set forth by Brown and Warner (1985).

Table 2 presents the market-adjusted returns for various intervals between event days -500 and 500. The first column examines the returns for the full sample of fifty-seven liquidations that are listed on CRSP (and traded) at announcement. In the twenty-one-day window surrounding announcement (event days -10 to 10) cumulative mean abnormal returns for liquidating firms are 17.6 percent, statistically significant at the 1 percent level. This finding is consistent both in sign and magnitude with previous studies on voluntary liquidations.¹⁰ The significantly positive returns at announcement are strong evidence that the liquidations lead to a more

¹⁰ Kim and Schatzberg (1987) find cumulative abnormal returns of 18.4 percent over event days -10 to 10 for their sample of voluntary liquidations, and Hite, Owers, and Rogers (1987) find cumulative abnormal returns of 14.0 percent over event days -4 to 0.

efficient allocation of firm assets.¹¹

The first column of Table 2 also shows that liquidating firms experience positive abnormal returns in the period preceding announcement. Cumulative mean abnormal returns are an insignificantly (at the .10 level) positive 11.1 percent over event days -500 to -251, a significantly (at the .05 level) positive 14.9 percent over days -250 to -41, and a significantly positive (at the .05 level) 6.3 percent over days -40 to -11.¹²

To investigate whether prior takeover activity is causing the positive returns before announcement, the sample of liquidating firms is split in two. The second column of Table 2 examines liquidating firms in which an outside control offer is made in the two years preceding liquidation announcement and the third column examines liquidating firms in which no such control offer is made. Abnormal returns preceding announcement are almost as positive for the subsample in which no prior control offer is made as for the full sample. When no offer is made, cumulative mean abnormal returns are 10.6 percent over event days -500 to -250, insignificant at the .10 level, and 14.0 percent over days -250 to -40, significant at

¹¹ Interestingly, Lang, Poulsen, and Stulz (1995) demonstrate that asset sales involving partial sell-offs of a firm's assets are only value-enhancing when the proceeds are returned to claimants of the firm. Transactions in which the proceeds of asset sales are not returned to claimants are associated with negative stock price responses. Voluntary liquidations are commitments by management to sell *all* firm assets and return the capital to claimants and are thus a special case of the value-enhancing asset sales noted by Lang et al. (1995).

¹² Hite, Owers, and Rogers (1987) find abnormal returns preceding announcement of similar magnitude (25.7 percent over event months -24 to -1) for their sample of liquidating firms.

the .10 level. Returns over event days -500 to -40 are 24.6 percent, significant at the .05 level.¹³

One explanation for the apparent positive stock price performance preceding the announcement day is that this study has not identified the announcement day accurately. However, the study searched two relatively comprehensive sources (the *F&S Index of U.S. Corporations* and Mead's Lexis/Nexis database), and the first story found mentioning the liquidation reads as if it is the first press report in nearly all cases. Furthermore, inaccurate identification of the announcement day would be more likely to explain the run-up in the *days* preceding announcement, rather than the months or years.

A more likely explanation is that the market anticipates the decision to liquidate and/or responds to other actual or anticipated actions that enhance firm value. Case in point, several liquidating firms disclosed plans to sell assets in the months and years preceding liquidation announcement. Another simple, yet plausible, explanation is that a firm's operating performance exceeds expectations in the period preceding announcement, yet the firm is still worth more liquidated.

¹³ In contrast, Hite, Owers, and Rogers (1987) find that the returns preceding announcement are a smaller and insignificantly positive 19.1 percent for their subsample of liquidating firms in which no control offer is made in the two years preceding announcement.

IV. Characteristics of Liquidating Firms versus Match Firms

This section begins by identifying hypotheses behind the comparison of liquidating and match firms, and the variables used to test these hypotheses. Liquidating firms are then compared to match firms on a univariate and a multivariate basis. The event study methodology is also used in this section, where event year zero (or year zero) refers to the year of liquidation announcement. Fiscal years are used for the financial variables and all dollar amounts are in 1993 Consumer Price Index adjusted dollars.

A. Liquidation Hypotheses

Financial Performance

The financial performance hypothesis argues that firms with poor financial performance are more likely to liquidate. These firms are more likely to have assets that are worth more managed by others, combined with other assets, or redeployed to other uses. Supporting evidence for this hypothesis comes from the literature on takeover targets which have been found to have low sales growth (Palepu 1986) and low asset productivity (Dietrich and Sorensen 1984) prior to the offer.

Three financial performance variables are examined, all of which are predicted to be negatively associated with the probability of liquidation:

- sales growth (-), defined as the annual geometric growth rate of net sales (calculated after sales levels have been inflation-adjusted with the Consumer Price Index),
- sales/assets (asset productivity) (-), defined as net sales divided by the book value of total assets, and

- operating margin (-), defined as operating income before depreciation divided by net sales.

Asset Liquidity

The asset liquidity hypothesis argues that firms with more liquid assets are more likely to liquidate. Liquid assets can be sold more easily to other buyers at higher and more competitive prices than illiquid assets. The literature on takeovers supports this hypothesis, as studies have found takeover offers more likely to occur as liquidity increases (Hasbrouck 1985).

Liquidity is measured by a single variable predicted to be positively associated with the probability of liquidation:

- cash/assets (liquidity) (+), defined as cash and short-term investments divided by the book value of total assets.

Market-to-Book

There are several reasons why a low market-to-book value of assets ratio might be associated with an increased likelihood of liquidation. Financial performance has already been hypothesized to be negatively related to the likelihood of liquidation. Poor financial performers are likely to have lower market values and hence lower market-to-book ratios. Market-to-book ratio, as it is affected by financial performance, is therefore predicted to be negatively related to liquidation probability.

Firms with low market-to-book ratios due to high asset tangibility may also be good liquidation candidates. Tangible assets are generally easier to split up and value than intangible ones and are therefore better suited for liquidation. Tangible assets also remain on the books after purchase, unlike some intangible assets (such as research and development, and marketing

expenses). Firms with tangible assets should therefore have higher book values and hence lower market-to-book ratios.

Tax considerations may also be a factor. Until the Tax Reform Act of 1986, if a firm's assets were sold in a liquidation or taxable merger, capital gains taxes were avoided at the corporate level. The newly acquired assets of liquidated firms could be re depreciated by the new owner at the stepped-up basis. Firms with depreciable assets and hence lower market-to-book ratios had greater incentive to liquidate or be acquired in a taxable merger than firms with few or no depreciable assets.

Evidence from the takeover literature also supports the market-to-book hypothesis. Hasbrouck (1985) and Morck, Shleifer, and Vishny (1988a) find that takeover targets have low Tobin's Q ratios. The hypothesis is tested with a single variable predicted to be negatively associated with the probability of liquidation:

- market-to-book (proxy for Tobin's Q) (-), defined as the sum of market value of common stock, carrying value of preferred stock, book value of long-term debt, and book value of debt in current liabilities, all divided by the book value of total assets.

Firm Structure

There are conflicting hypotheses regarding the relationship between firm market share and the probability of exit. Some papers (such as Jovanovic 1982) predict a negative relationship between firm size and likelihood of exit. Low-cost producers grow into large firms, while high-cost producers stay small and ultimately exit. However, Ghemawat and Nalebuff (1985) present a model where the largest firm is the first to exit a declining industry. Small firms are at a strategic advantage as they can remain profitable in

the industry longer than a large firm can.

Empirical evidence supports the hypothesis that smaller firms are more likely to exit than larger ones. In their panel study of manufacturing industries, Dunne, Roberts, and Samuelson (1988) find that exit is more common among smaller firms. Baden-Fuller (1989) finds exit more concentrated among small producers in his study of the United Kingdom steel casting industry. Focusing on chemical products, Lieberman (1990) finds that small plants are more likely to close than large ones.¹⁴

The relationship between firm diversification and the exit decision is straightforward. A firm operating in several industries is less likely to face conditions appropriate for complete exit than a firm operating in a single industry. Baden-Fuller (1989) finds that better diversified firms are more likely to close individual plants than other firms, but does not directly address the complete exit decision.

Two firm structural variables are examined, one predicted to be negatively associated with liquidation probability and one in which theories lead to conflicting predictions of the sign:

- market share (?), defined as net sales of firm divided by total industry net sales (where industry is defined as all firms on Compustat sharing the same primary four-digit SIC code),
- lines of business (firm diversification) (-), defined as the number of four-digit SIC codes in which the firm operates.

¹⁴ Lieberman (1990) also finds that firms with large shares are more likely to close *individual plants* first. This evidence supports Ghemawat and Nalebuff (1990), who predict that large firms will be the first to reduce capacity in a declining industry.

Agency Costs of Equity

Jensen and Meckling (1976) show that as the percentage of a firm owned by management decreases, management has greater incentive to consume perquisites at the expense of all shareholders. They therefore predict an inverse relationship between management ownership and firm value. Demsetz and Lehn (1985) fail to find a linear relationship between inside ownership and accounting profit rates.¹⁵ Other studies have found that low management ownership increases the likelihood of a takeover offer, but decreases the likelihood of such an offer being accepted (Mikkelson and Partch 1989, and Song and Walkling 1993), supporting the hypothesis that inside ownership serves to align management and shareholder interests.

Another factor that may induce managers to liquidate the firm is outside takeover pressure. Managers who would have otherwise avoided liquidation may liquidate due to outside pressure if maintaining the firm as a going concern is no longer a viable option. They may do this because liquidation value exceeds takeover value, they seek to thwart a hostile aggressor's takeover plans, or liquidation on their terms enables them to remain employed at a spun-off subsidiary.

Two agency costs of equity variables are examined, both predicted to be positively related to the probability of liquidation:

¹⁵ Morck, Shleifer, and Vishny (1988b) and McConnell and Servaes (1990) find a non-linear relationship between Tobin's Q and inside ownership.

- inside ownership (+), measured as the proportion of common stock owned by board members, officers, and their families,¹⁶
- control offer (+), defined as a dummy variable equal to one if the firm received an outside control offer (hostile or friendly) in the two years preceding liquidation announcement.

Agency Costs of Debt

Another agency hypothesis examined concerns the level of firm indebtedness. For firms with no debt, maximizing the value of the firm is equivalent to maximizing the value of the firm's equity (Jensen and Meckling 1976). In such cases it is in shareholder interests for the firm to liquidate whenever the value of the firm as a going concern is exceeded by its liquidation value. For firms with debt, firm value maximization is no longer equivalent to shareholder value maximization. If shareholders face a choice between a fixed payoff under liquidation and an uncertain payoff if the firm continues as a going concern, shareholder interests may be served by not liquidating, even in cases where liquidation maximizes total firm value.¹⁷ Related evidence on this topic from the takeover literature is mixed, with studies finding negative (Palepu 1986, Dietrich and Sorensen 1984) and positive (Morck, Shleifer, and Vishny 1988a) relationships between debt levels and the likelihood of being a target.

¹⁶ Includes shares owned by trusts where a director or officer is trustee (excluding charitable trusts) or where a director, officer, or family member is beneficiary. Also includes shares indirectly owned through partnerships or other corporations.

¹⁷ Others, including Titman (1984), have observed that firm equity holders are less likely to choose liquidation as the face value of the firm's debt increases.

A single agency costs of debt variable expected to be negatively related to the probability of liquidation is examined:

- debt/assets (-), defined as the book value of long-term debt divided by the book value of total assets.

Executive Age

The age of the top executive may also be a factor in the decision to liquidate. Morck, Shleifer, and Vishny (1988a) argue that the personal life-cycle decisions of management are an important motivation for friendly acquisitions. They find no significant difference in age of chairmen between control firms and hostile and friendly target firms. They do find, however, that friendly bids are more common when firms are run by founding families and that chairmen in these firms tend to be older.

One age variable expected to be positively related to liquidation probability is examined:

- age of top executive (+), defined as, in order of preference, age of the chairman of the board, the chief executive officer, or the president.

The previous discussion leads to the identification of eleven variables that may be related to a firm's decision to liquidate. The hypotheses and associated variables are listed in Table 3, which also lists whether the likelihood of a voluntary liquidation is hypothesized to increase or decrease with that variable. The variable definitions are consolidated in Appendix 2 along with the information sources for each of the variables.

B. Univariate Comparison

The financial and organizational characteristics of the liquidating firms and the match firms are presented in Table 4. The first four variables are descriptive size variables. The median liquidating firm has a market value of \$28.0 million preceding the liquidation announcement, assets of \$52.0 million, sales of \$55.6 million, and employs 485 workers. Columns 2 and 3 show that liquidating firms are about the same size as industry-matched firms, but are somewhat smaller than purely random firms.

The financial performance hypothesis is supported by the evidence on sales growth and asset productivity. Sales growth for liquidating firms is significantly negative (at the .05 level) when adjusted for industry-matched firms over years -3 to -1 and -2 to -1, and when adjusted for purely random firms over years -3 to -1. The ratio of sales to assets for liquidating firms is insignificantly less than that for industry-matched firms, but significantly less than that for purely random match firms (at the .05 level). Liquidations are more common in firms that have been growing slowly¹⁸ and in industries with low asset productivity.

¹⁸ There is weak evidence supporting an alternative argument that liquidating firms have low sales growth because they are selling off assets. For firms on Compustat in the year preceding liquidation announcement, 59 percent (40/68) of liquidating firms sold property, plant, and equipment, versus 39 percent (27/70) of industry-matched firms and 58 percent (40/69) of purely random firms. For those firms that disposed of assets, the median percentage of book assets sold was 1.0 percent for liquidating firms, 0.5 percent for industry-matched firms, and 0.4 percent for purely random firms.

The financial performance hypothesis gets little support from the operating margin variable. The median firm in the sample remains profitable on an operating margin basis before the liquidation announcement, with a margin of 9.9 percent. Median differences in margins are both insignificant at the .10 level.¹⁹ Together with the evidence on sales growth and asset productivity, the evidence suggests that lack of growth opportunities and low industry asset productivity motivate liquidations, but low profitability per unit of sales is not an important factor.

The asset liquidity hypothesis is supported by the findings in Table 4. Cash divided by assets is .113 for liquidating firms. The median difference is .030 versus industry-matched firms (significant at the .10 level) and .063 versus purely random firms (significant at the .01 level). Firms with high levels of cash balances are more likely to liquidate, presumably because the assets of these firms are generally more marketable and valued by other potential users.²⁰

The market-to-book hypothesis is not supported by the univariate findings in Table 4. Liquidating firms have a median market-to-book ratio of .711. The industry-matched difference is an insignificant -.108 and the purely random difference is an insignificant -.148.

¹⁹ When a more powerful test is conducted comparing liquidating firms to their entire industry (firms on Compustat sharing the same primary four-digit SIC code) differences are significant. Operating margins adjusted for industry are -.028, significant at the .01 level.

²⁰ One could also argue here that cash balances are high in liquidating firms because they choose to sell assets and invest less in anticipation of liquidation.

The firm structure hypotheses are also not supported by the findings. The market share of liquidating firms is 0.8 percent preceding liquidation announcement, with no difference from industry-matched firms, and an insignificant difference from randomly matched firms of -0.1 percent. The median number of lines of business for liquidating firms is two as it is for both sets of match firms. Firm market share and firm diversification are not related to the decision to liquidate.

The agency costs of equity hypothesis is not supported by the level of inside ownership in liquidating firms, which is 32.3 percent at the median. Relative to the inside ownership levels found in other studies, this figure is extremely high.²¹ Relative to the match firms, however, it is not. The median differences in inside ownership are both insignificant at

²¹ Morck, Shleifer, and Vishny (1988b) find that ownership by the board of directors for their sample of 371 Fortune 500 firms in 1980 is 3.4 percent at the median. McConnell and Servaes (1990) find median board ownership (including officers, as in this study) of 6 percent in 1979 and 5 percent in 1986 for a broader sample of firms. The difference in the inside ownership levels between this study and those mentioned can largely be explained by the size of the sample firms examined. While Morck, Shleifer, and Vishny (1988b) examine a sample of Fortune 500 firms and McConnell and Servaes (1990) examine a larger sample of NYSE- and AMEX-listed firms, this study examines firms taken from the entire Compustat database—a much larger pool of firms, with correspondingly smaller average size. The high inside ownership levels observed in this study largely reflect the small size of the firms studied.

the .10 level.²² The median value of the stake held by insiders (inside ownership x market value) for liquidating firms is \$6.6 million. Median differences from match firms are again insignificant. Alignment of manager and shareholder interests due to management's equity interest in the firm does not appear to explain which firms choose to voluntarily liquidate.

Outside takeover pressure is clearly a significant factor in predicting liquidation. Thirteen of the seventy liquidating firms (18.6 percent) received outside control offers in the two-year period preceding liquidation announcement. In contrast, no industry-matched firms and only one purely random firm received an outside control offer over the same period.

The agency costs of debt hypothesis is not supported by the evidence in Table 4. The median ratio of long-term debt to assets for liquidating firms is .118. The median difference versus industry-matched firms is -.026, and the median difference versus purely random firms is zero.

There is also little evidence that liquidations are more common with older top executives. The median age of the top executive in liquidating firms is fifty-six. The median difference from industry-matched firms is zero

²² These findings contrast sharply with the findings of Ghosh, Owers, and Rogers (1991), who find significantly higher levels of inside ownership in liquidating firms (24.1 percent) than in match firms (12.7 percent). The market value of the liquidating and the match firms in both studies helps explain this difference. In this study, the mean and median market values of liquidating and match firms are insignificantly different from one another at the .10 level. In Ghosh, Owers, and Rogers (1991), the mean difference is significant at the .05 level. Since ownership is inversely related to firm size (Demsetz and Lehn 1985, Mikkelsen and Partch 1989, or Song and Walkling 1993), differences in relative ownership levels between the two studies probably reflects methodological differences in choosing sample and control firms.

and the median difference from purely random firms is an insignificant 1.

In summary, the evidence in Table 4 suggests that liquidating firms can be distinguished by their low sales growth, low asset productivity, high liquidity, and takeover pressure.²³ There is little support for hypotheses that market-to-book, firm market share, firm diversification, inside ownership, debt level, or top executive age are important determinants of which firms liquidate. With the notable exception of outside takeover pressure, liquidating firms can be characterized by the nature of their assets and their performance rather than the firm's capital structure, ownership structure, or executive age.

C. Multivariate Analysis

A more rigorous analysis of factors influencing the liquidation decision is conducted in this section. Several logistic regression models are estimated to determine the importance of some of the previously discussed variables in predicting which firms liquidate voluntarily. In this analysis, the sample of liquidating firms as a fraction of the full sample is unrepresentative of the population. Palepu (1986) points out that when the population likelihood function is of the logistic form, estimates of the intercept term are biased and observed error rates in prediction overstate the model's true predictive ability. All other coefficients are unaffected, however, and represent unbiased estimates of the population parameters. Therefore, while this

²³ For the year preceding liquidation announcement, Ghosh, Owers, and Rogers (1991) find liquidating firms to be characterized by low sales growth, low market value, low debt repurchase, high liquidity, high inside ownership, and takeover pressure.

analysis may overstate the predictive ability of the models, multivariate tests of the explanatory power of variables that predict liquidation are valid.

Table 5 presents results from three models comparing liquidating firms to the purely random match firms. Model 5.1 includes all of the independent variables hypothesized to influence the liquidation decision. Model 5.2 excludes inside ownership percentage, but includes the value of the stake held by insiders (inside ownership x market value), along with the stake value squared. Model 5.3 includes both types of inside ownership variables. All of the models are statistically significant at the .01 level (based on the likelihood ratio statistic). A correlation matrix of the independent variables analyzed in Table 5 appears in Appendix 3, Panel A.

Significant determinants of liquidation in all three models, and all of the predicted sign, are sales/assets, cash/assets, market-to-book, debt/assets, and prior control offer. Market-to-book and debt/assets are the only significant variables that are not also significant in the univariate comparison. Sales growth is the only variable significant in the univariate comparison (over years -3 to -1) and not also significant in the logistic models (over years -2 to -1), although the sign on the coefficient is as predicted.

Other variables hypothesized to influence the liquidation decision, such as number of business lines and inside ownership, have the predicted sign, but are insignificant at the .10 level. Operating margin is insignificant and has a sign opposite of that predicted. Age of top executive has coefficient signs that vary depending on the regression model, but is always insignificant. Market share has a negative coefficient that is also insignificant.

The relevance of inside ownership on the liquidation decision was also tested by including variables that measure the value of the stake held by insiders. There is some weak evidence in Models 5.2 and 5.3 that liquidations become more likely at a decreasing rate as the value of the firm owned by insiders increases. Other attempts to model the influence of inside ownership, by including the square of inside ownership or by excluding the square of stake value, resulted in insignificant ownership coefficients and are not presented.²⁴

The importance of low asset productivity, low market-to-book ratios, and high asset liquidity is consistent with the findings on takeover targets.²⁵ The results are also broadly consistent with prior work on voluntary liquidations by Ghosh, Owers, and Rogers (1991) that finds liquidating firms have low sales growth and high asset liquidity. This is the first study (known to the authors) to look at asset productivity and market-to-book ratio in the context of voluntary liquidations, and it is the first to compare liquidating firms to purely random firms.

Table 6 presents results comparing liquidating firms to industry-matched firms for the same three models presented in Table 5. Again, all of the models are statistically significant at the .01 level (based on the likelihood ratio statistic). A correlation matrix of the independent variables analyzed in Table 6 appears in Appendix 3, Panel B.

²⁴ The Table 5 regressions were also reestimated including size (measured by the book value of total assets) as an independent variable. The size coefficient was insignificant in all three models and had no impact on the qualitative results.

²⁵ Dietrich and Sorensen (1984), Hasbrouck (1985), and Morck, Shleifer, and Vishny (1988a).

The coefficients in Table 6 are of the same sign as in Table 5 in every model for eleven of the thirteen variables. Only coefficient signs on lines of business and age of top executive are different in some or all of the Table 6 results, and both variables remain insignificant. Several of the significant financial variables in Table 5, including sales/assets, cash/assets, and market-to-book, are insignificant in most or all of the Table 6 results. Other variables significant in Table 5, including debt/assets and control offer, are also significant in Table 6. The ownership stake value variables, marginally significant in Table 5, are even less important in Table 6. Inside ownership as a percent, however, which was insignificant in Table 5, is significant in Table 6. The sales growth, operating margin, and market share coefficients remain of the same sign and remain insignificant.²⁶

The capital and ownership structure findings uncovered here are not consistent with the findings on takeover targets. Studies on takeover targets have found inconsistent results with regard to debt level,²⁷ and have found takeovers *less* likely as inside ownership increases.²⁸ A distinguishing feature of voluntary liquidations, however, is that *management* makes the

²⁶ The Table 6 regressions were also reestimated including size (measured by the book value of total assets) as an independent variable. The size coefficient was insignificant in Models 6.1 and 6.3 and significantly negative (at the .10 level) in Model 6.2. The inclusion of size also makes sales/assets significantly negative (at the .10 level) in Model 6.1, (inside ownership x market value)² significantly negative (at the .10 level) in Model 6.2, and market-to-book, inside ownership x market value, and (inside ownership x market value)² all significant (at the .10 level) and of the predicted sign in Model 6.3.

²⁷ Dietrich and Sorensen (1984), Palepu (1986), and Morck, Shleifer, and Vishny (1988a).

²⁸ Mikkelson and Partch (1989) and Song and Walkling (1993).

decision to liquidate, usually putting itself out of a job. Differences in findings between liquidations and takeover targets are therefore not surprising. The results are consistent with the Ghosh, Owers, and Rogers (1991) liquidations paper with regard to inside ownership and takeover pressure. Ghosh, Owers, and Rogers (1991) find debt level to be an insignificant factor, however, while this study finds it significant.

The lack of significance for financial variables in Table 6 demonstrates that much of the financial performance of liquidating firms is explained by the firm's industry. Comparing liquidating firms to industry-matched firms, inside ownership, debt/assets, and whether an outside control offer has been received are significant determinants of the liquidation decision. The decreased significance of these variables in Table 5 shows that organizational factors become more important in determining liquidation when industry conditions make liquidation the appropriate choice.

The results in Tables 5 and 6 also validate the methodology of comparing sample firms to two sets of match firms. Had liquidating firms been compared only to purely random firms, the importance of inside ownership in determining liquidation, when industry conditions are appropriate, would have been missed. Similarly, had liquidating firms been compared only to industry-matched firms, many of the financial variables important at predicting which firms liquidate would also have been missed.²⁹

²⁹ Industry effects could be examined in other ways, such as by comparing all of the firms in the sample firm's industry to those in a random firm's industry. This may not be practical when many of the variables considered (such as inside ownership) are hand-collected for each firm.

V. Acquirers of Liquidating Firms' Assets

This section examines who acquires the assets of liquidating firms. The industry performance of liquidating firms is then examined for subsets of firms that sell their assets within the industry and outside the industry. The abnormal stock price performance of liquidated firms is also examined according to the relationship between the liquidating firms and the acquirers of the liquidating firms' assets.

A. Acquirers of Liquidating Firms' Assets

Evidence presented in this section suggests that a large fraction of liquidating firm assets remains within the industry. To identify acquirers of the assets of liquidating firms, the study first examines press reports listed in the *F&S Index of U.S. Corporations* and Mead's Lexis/Nexis database. Primary and secondary SIC codes are then obtained from Standard & Poor's *Directory of U.S. Corporations* and Dun & Bradstreet's *Million Dollar Directory* to determine the degree of industry relatedness between the liquidating firms and the acquirers.

For each liquidating firm, the asset sales to any given acquirer are then ranked according to their sales value. Assets that go to an acquirer for the largest sales amount are termed the *largest divestitures*, those assets that go for the second largest sales amount are termed the *second largest divestitures*. Acquirer identity for the largest divestitures is determined for sixty firms and acquirer identity for the second largest divestitures is determined for forty-four firms.

Table 7 categorizes the acquirers by their relationship to the liquidating firm. In 31.7 percent of the liquidations, the selling and acquiring firms

share a primary or secondary SIC code at the four- or three-digit level among the set of transactions involving the largest divestitures. A smaller fraction (18.2 percent) of the second largest divestitures involves acquirers with the same primary or secondary four- or three-digit SIC code.

When assets are not acquired by a related firm, they do not necessarily leave the industry. Forty-five percent of the largest divestitures and 56.7 percent of the second largest divestitures involve assets acquired by management, private investors, or corporations for which a SIC code cannot be determined, or assets that are distributed to shareholders.³⁰ Only in a minority of cases (19.8 percent of largest divestitures, 25.0 percent of second largest divestitures) are assets sold to firms related at the two-digit SIC level or below.

These findings are consistent with those of Bhagat, Shleifer, and Vishny (1990) who examine hostile takeover bids and the resulting asset sales. They find that most hostile bidders are in the same or a closely related business and that a majority of the assets sold after a takeover are also sold to firms in the same or a related industry. They argue that hostile takeovers are a means by which assets are reallocated to higher-value industry buyers and represent a return to corporate specialization.

B. Industry Performance by Acquirer Relationship with Liquidating Firm

This section examines how the acquirer relationship with the liquidating firm is related to industry performance. The hypothesis is that liquidating

³⁰ Instances in which all assets are distributed to shareholders without any asset sales are considered reorganizations and are therefore excluded from the sample (see Section II).

firms are more likely to sell their assets within the industry (or intra-industry) when the industry is profitable, and outside the industry (or inter-industry) when it is not.

Chart 1 examines industry operating margin in a seven-year period surrounding liquidation announcement.³¹ Median industry operating margins are presented for firms whose largest divestiture is intra-industry (four- or three-digit SIC code relatedness), for firms whose largest divestiture is inter-industry (one-digit or no industry relatedness), for other liquidating firms, and for random firms. Firms that sell their assets intra-industry come from industries performing substantially better than other industries. The difference in industry operating margin in year zero between intra-industry liquidating firms and all other sets of firms is statistically significant at least at the .10 level. This evidence supports the hypothesis that liquidating firms sell their assets intra-industry when the industry is profitable, and inter-industry when it is not.

Chart 1 also shows that industries of intra-industry liquidating firms are improving before the liquidation and deteriorating afterward. Conversely, industries of inter-industry liquidating firms are deteriorating before the liquidation, but improving afterward. The increase for intra-industry firms before the liquidation is insignificant at the .10 level, both on an absolute basis and relative to inter-industry liquidating firms. However, the decrease for intra-industry firms after the liquidation is significant (at the .05 level or better), both on an absolute basis and relative to inter-

³¹ Industry operating margins are calculated as total industry operating income before depreciation divided by total industry net sales where industry is defined as all Compustat firms with the same primary four-digit SIC code.

industry liquidating firms. These results are surprising, as one might think that assets would be flowing out of industries that are about to experience a decline in profitability and into industries that are about to experience an improvement in profitability. Instead, firms liquidating intra-industry are exiting at an industry peak, while firms exiting inter-industry are exiting at an industry trough.³²

Shleifer and Vishny (1992) argue that when a firm sells assets, the assets are typically worth substantially more to intra-industry buyers than to other buyers. If a firm sells assets when the industry is in a downturn, however, an intra-industry buyer may not have the funds to make the acquisition, so the liquidating firm may be forced to sell its assets at a discount. In equilibrium, they predict that firms will choose to liquidate when their industry, or the economy, is doing well, so that they can receive full value for their assets. Consistent with their hypothesis, this study finds that liquidating firms sell their assets intra-industry when their industry is performing exceptionally well.

C. Stock Price Performance by Acquirer Relationship with Liquidating Firm

The study now examines whether it matters to liquidating firm shareholders whether their firm sells its assets intra-industry or inter-industry. Cumulative mean market-adjusted returns in the period surrounding announcement are presented in Table 8, broken down by the acquirer's relationship with

³² The rise in industry operating margin over years zero to three for inter-industry liquidating firms does not appear to be caused by the exit of the liquidating firms themselves. These firms had a median market share of just 2.9 percent, and a median operating margin (10.0 percent) close to that of their industries.

the liquidating firm.

Firms that sell their assets intra-industry show significantly larger increases in firm value surrounding a liquidation announcement than firms that sell their assets inter-industry. The differences are 5.9 percent when measured over event days -1 to 1 (significant at the .05 level), 10.5 percent over days -10 to 10 (significant at the .10 level), and 29.2 percent over days -40 to 40 (significant at the .05 level). The other liquidating firms show returns very similar to those of intra-industry liquidating firms.

The differences in returns between intra-industry and inter-industry liquidating firms persist when controlling for firm characteristics before the liquidation. When a cross-sectional regression is run with the return over event days -10 to 10 as the dependent variable and the independent variables are those included in Model 5.1 (see Table 5), a dummy variable on inter-industry liquidation is -18.7 percent, with a p-value of .05.³³

The differences in returns also persist when controlling for industry performance. When a cross-sectional regression is run with the return over event days -10 to 10 as the dependent variable and an independent variable of industry operating margin in year zero, a dummy variable on inter-industry liquidation is -14.6 percent, with a p-value of .09. The coefficient on industry operating margin is insignificant at the .10 level.³⁴ Good

³³ The other significant coefficient (at the .10 level or better) in this regression is cash/assets (coefficient = 0.59, p-value = .02). The R^2 and adjusted R^2 for this regression are .31 and .10, respectively, and the F-statistic is 1.44, with a p-value of .19.

³⁴ The R^2 and adjusted R^2 for this regression are .06 and .02, respectively, and the F-statistic is 1.54 with a p-value of .22.

industry performance does not therefore explain the higher returns for intra-industry liquidations. These liquidations are more value-enhancing precisely because they are intra-industry, not because of any other identifiable factors.

These results support the hypothesis that assets are worth substantially more to firms in the same industry than they are to unrelated buyers. A remaining question, however, is why do firms choose to liquidate if they end up selling their assets outside of their industry? Hypotheses that these firms were forced to liquidate by poor operating performance or outside takeover pressure are not supported by the cross-sectional regressions mentioned above. Another possibility is that the benefits to shareholders of an inter-industry liquidation are still greater than the only alternative of continuing the firm as a going concern.

VI. Conclusion

Managing firm downsizing and exit has become an increasingly important issue in recent years. A primary concern of investors is that management may not make value-maximizing decisions when it is not in its own interest to do so. In spite of potential conflicts, a small number of firms has chosen to exit voluntarily. This study documents why firms voluntarily liquidate and what happens to liquidating firms' assets.

Financial factors are one set of liquidation determinants. Firms that liquidate can be characterized by low asset productivity, low market-to-book ratios, and high ratios of cash to assets. These characteristics are indicative of inefficient asset use, few growth opportunities, and high asset liquidity. The financial characteristics of liquidating firms are fairly similar

to other firms in the same industry, suggesting that financial variables are important in determining which industries are good candidates for liquidation at a particular point in time.

Another important set of liquidation determinants is the capital and ownership structure of the firm. Liquidations become more likely as the percentage of a firm's capital comprised of debt declines. Low debt levels ensure that shareholder value maximization is closely related to firm value maximization. Controlling for industry, liquidations become more likely as the percentage of equity owned by insiders increases. High inside ownership aligns management interests with those of shareholders. Outside control pressure, which can also align management and shareholder interests, is also shown to boost the likelihood of a voluntary liquidation.

Liquidations therefore occur when financial factors make liquidation firm value-increasing and when organizational factors make liquidation shareholder and management value-increasing. Financial conditions may be appropriate for liquidation, but management will not choose to liquidate if it is not in its interest. Similarly, management interests may be closely aligned with firm value maximization, but liquidation will not be chosen if the financial conditions do not make it value increasing. The rarity of voluntary liquidations suggests that appropriate financial conditions and organizational alignment do not often occur simultaneously.

When a firm liquidates, the firm's assets do not necessarily leave the industry. The study finds that a large fraction of liquidating firms' assets are sold to buyers in the same industry. Industries in which assets are sold intra-industry have significantly higher profitability than those in which assets are sold inter-industry, and are also at a profitability peak in the year

of liquidation. Shareholders also benefit more when assets are sold intra-industry rather than inter-industry. The evidence suggests that liquidating firm assets are worth substantially more to industry buyers than to non-industry buyers, and that the time to sell assets within an industry is during a profitability peak.

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Table 1

Industry and Announcement Year Frequency for Seventy Voluntary Liquidations, 1974-93

Panel A: Industry Frequency^a

Industry (two-digit SIC codes)	Liquidating Firms	Random Firms
Agriculture, Forestry and Fishing (01-09)	1	1
Mining (10-14)	6	3
Construction (15-17)	1	0
Food and Tobacco (20-21)	1	2
Textiles and Apparel (22-23)	3	4
Lumber, Furniture and Paper (24-26)	4	2
Printing and Publishing (27)	4	1
Chemicals (28)	1	4
Petroleum and Rubber (29-30)	4	2
Leather and Stone (31-32)	2	0
Primary and Fabricated Metals (33-34)	4	3
Machinery (35)	4	4
Electronics (36)	1	5
Transportation Equipment (37)	1	4
Measuring Instruments (38)	3	6
Transportation (40-47)	5	2
Communication (48)	4	2
Electric, Gas and Sanitation (49)	1	3
Wholesale Trade (50-51)	4	2
Retail Trade (52-59)	6	12
Services (70-89)	10	8

Panel B: Announcement Year Frequency

Year	No. of Observations	Year	No. of Observations
1974	1	1984	8
1975	5	1985	4
1976	5	1986	5
1977	3	1987	2
1978	3	1988	2
1979	10	1989	1
1980	5	1990	0
1981	5	1991	3
1982	4	1992	0
1983	4	1993	0

a As determined by Compustat SIC code, where available, and CRSP SIC code otherwise.

Table 2
Stock Price Performance for Fifty-Seven Voluntary Liquidations, 1974-93

Days in Relation to Liquidation Announcement	<u>All Firms</u>		<u>Control Offer^a</u>		<u>No Control Offer^b</u>	
	CAR (%)	No.	CAR (%)	No.	CAR (%)	No.
-500 to -251	11.1	56	12.7	13	10.6	43
-250 to -41	14.9**	57	18.5	13	14.0*	44
-40 to -11	6.3**	56	5.2	13	6.6**	43
-10 to -2	4.2***	57	-0.8	13	5.8***	44
-1 to +1	12.5***	57	15.1***	13	11.7***	44
+2 to +10	0.9	57	-2.0	13	1.7	44
+11 to +40	2.4	57	1.5	13	2.6	44
+41 to +250	2.2	57	2.0	13	2.2	44
+251 to +500	-0.0	33	1.5	8	-1.6	25

Note: Cumulative mean market-adjusted returns (CAR) in percent in 1001-day period beginning 500 days before announcement of voluntary liquidation. Market-adjusted returns are calculated as difference between firm returns and CRSP equal-weighted index.

- a Press report indicating outside control offer in two years preceding liquidation announcement.
- b No press report indicating outside control offer in two years preceding liquidation announcement.
- *** Mean significantly different from zero at .01 level (using two-sided t-test).
- ** Mean significantly different from zero at .05 level (using two-sided t-test).
- * Mean significantly different from zero at .10 level (using two-sided t-test).

Table 3
Voluntary Liquidation Hypotheses and Independent Variables

Hypothesis	Variable	Expected Sign
Financial performance	Sales growth	-
	Sales/assets	-
	Operating margin	-
Asset liquidity	Cash/assets	+
Market-to-book	Market-to-book	-
Firm structure	Market share	?
	Lines of business	-
Agency costs of equity	Inside ownership	+
	Control offer	+
Agency costs of debt	Debt/assets	-
Executive age	Age of top executive	+

Table 4
Firm Characteristics Surrounding Seventy Voluntary Liquidations, 1974-93

	Liquidating Firms	Liquidating vs. Industry-Matched Firms	Liquidating vs. Purely Random Firms
Market value (year -1)	28.044 (63)	-5.927 (47)	-16.821 (51)
Assets (year -1)	52.034 (68)	2.219 (68)	-10.086* (67)
Sales (year -1)	55.566 (69)	.052 (69)	-17.021** (69)
Employees (year -1)	485 (61)	38.5 (60)	-103* (56)
Sales growth (years -3 to -1)	-.003 (59)	-.079** (51)	-.084** (50)
Sales growth (years -2 to -1)	-.010 (65)	-.086** (61)	-.008 (60)
Sales/assets (year -1)	1.122 (68)	-.044 (68)	-.374** (67)
Operating margin (year -1)	.099 (68)	-.008 (67)	-.040 (67)
Cash/assets (year -1)	.113 (68)	.030* (68)	.063*** (67)
Market-to-book (year -1)	0.711 (63)	-.108 (47)	-.148 (51)
Market share (year -1)	.008 (69)	.000 (69)	-.001 (69)
Lines of business	2 (70)	0 (70)	0 (70)
Inside ownership	.323 (70)	.053 (70)	.001 (70)
Inside ownership x market value	6.573 (63)	0.480 (47)	-1.026 (51)
Control offer (mean)	.186 (70)	.186*** (70)	.171*** (70)
Debt/assets (year -1)	.118 (68)	-.026 (68)	0 (67)
Age of top executive (year 0)	56 (70)	0 (70)	1 (69)

Note: Median levels and changes of various financial and organizational characteristics of liquidating firms on an absolute basis and relative to industry-matched and purely random-matched firms. All stock variables are measured at fiscal year-end. All dollar values are expressed in millions of 1993 dollars. Number of observations in parentheses.

- *** Median significantly different from zero at .01 level (using two-sided Wilcoxon sign-rank test).
- ** Median significantly different from zero at .05 level (using two-sided Wilcoxon sign-rank test).
- * Median significantly different from zero at .10 level (using two-sided Wilcoxon sign-rank test).

Table 5
Logistic Regressions for Voluntary Liquidations versus Purely Random Firms

Explanatory variable	<u>Model 5.1</u>	<u>Model 5.2</u>	<u>Model 5.3</u>
Constant	1.70 (1.59)	1.76 (1.64)	1.50 (1.66)
Sales growth (years -2 to -1)	-0.35 (1.01)	-0.63 (1.06)	-0.56 (1.06)
Sales/assets	-0.63** (0.31)	-0.64** (0.31)	-0.76** (0.33)
Operating margin	2.48 (2.06)	2.51 (2.14)	2.92 (2.18)
Cash/assets	5.61** (2.43)	5.59** (2.41)	5.36** (2.46)
Market-to-book	-1.55** (0.67)	-1.78** (0.71)	-1.65** (0.73)
Market share	-0.61 (2.13)	-1.24 (2.44)	-0.79 (2.49)
Lines of business	-0.02 (0.07)	-0.05 (0.07)	-0.02 (0.08)
Inside ownership	0.84 (1.12)		1.64 (1.24)
Inside ownership x market value ^a		0.51* (0.31)	0.49 (0.31)
(Inside ownership x market value ^a) ²		-0.06** (0.03)	-0.06** (0.03)
Control offer	2.88** (1.14)	5.04* (2.62)	5.15** (2.44)
Debt/assets	-3.56* (1.87)	-4.13** (1.99)	-4.07** (2.03)
Age of top executive	-0.00 (0.02)	0.00 (0.02)	-0.00 (0.03)
Likelihood ratio	41.40***	48.15***	49.96***
No. of liquidating/non-liquidating firms	60/55	60/55	60/55

Note: Regressions estimated using maximum likelihood methods with seventy liquidating and seventy random-matched firms, subject to data availability. All financial variables (except sales growth) for year preceding announcement with stock variables measured at fiscal year-end. Standard errors are presented below coefficients in parentheses.

- a Market value is measured here in tens of millions of 1993 dollars.
- *** Significantly different from zero at .01 level (using Wald statistic).
- ** Significantly different from zero at .05 level (using Wald statistic).
- * Significantly different from zero at .10 level (using Wald statistic).

Table 6

Logistic Regressions for Voluntary Liquidations versus Industry-Matched Firms

Explanatory variable	Model 6.1	Model 6.2	Model 6.3
Constant	1.65 (1.98)	2.99 (1.98)	2.18 (2.07)
Sales growth (years -2 to -1)	-1.24 (0.89)	-1.32 (0.88)	-1.28 (0.92)
Sales/assets	-0.57 (0.35)	-0.40 (0.33)	-0.63* (0.36)
Operating margin	2.25 (1.58)	1.43 (1.31)	2.04 (1.60)
Cash/assets	1.35 (1.74)	1.68 (1.66)	1.29 (1.76)
Market-to-book	-0.70 (0.52)	-1.27** (0.60)	-0.94 (0.60)
Market share	-0.84 (2.19)	-3.16 (2.32)	-1.69 (2.42)
Lines of business	0.09 (0.11)	0.00 (0.11)	0.06 (0.11)
Inside ownership	3.37*** (1.26)		3.33** (1.31)
Inside ownership x market value ^a		0.52* (0.31)	0.43 (0.32)
(Inside ownership x market value ^b) ²		-0.05 (0.03)	-0.05 (0.03)
Control offer	39.67*** ^b (0.00)	39.80*** ^b (0.00)	39.93*** ^b (0.00)
Deb/assets	-3.69** (1.78)	-4.15** (1.90)	-4.12** (1.87)
Age of top executive	-0.02 (0.03)	-0.02 (0.03)	-0.03 (0.03)
Likelihood ratio	42.48***	38.41***	45.51***
No. of liquidating/non-liquidating firms	60/50	60/50	60/50

Note: Regressions estimated using maximum likelihood methods with seventy liquidating and seventy industry-matched firms, subject to data availability. All financial variables (except sales growth) are measured for year preceding announcement with stock variables measured at fiscal year-end. Standard errors are presented below coefficients in parentheses.

a. Market value is measured here in tens of millions of 1993 dollars.

b. Parameter estimates obtained after one hundred iterations; parameter estimates are regarded to be infinite, however, as none of the industry-matched firms received a control offer in the two years preceding announcement; model results are very similar with this variable omitted.

*** Significantly different from zero at .01 level (using Wald statistic).

** Significantly different from zero at .05 level (using Wald statistic).

* Significantly different from zero at .10 level (using Wald statistic).

Table 7**Acquirers of Assets from Seventy Voluntary Liquidations, 1974-93**

Relationship	<u>Largest Divestiture</u>		<u>Second Largest Divestiture</u>	
	No. of Obs.	% of Sample	No. of Obs.	% of Sample
Share four-digit SIC code	15	25.0	8	18.2
Share three-digit SIC code	4	6.7	0	0.0
Share two-digit SIC code	1	1.7	2	4.5
Share one-digit SIC code	5	9.8	4	9.1
Unrelated SIC codes	8	8.3	5	11.4
Management/employees	6	10.0	1	2.3
Shareholders (distribution)	3	5.0	11	25.0
Other ^a	18	30.0	13	29.5
Total transactions identified	60	100.0	44	100.0

Note: Frequency of acquirers categorized by level of SIC code relatedness or other relationship with liquidating firms. Table includes data from press releases on the liquidating firms' two largest divestitures. Both primary and secondary SIC codes are considered for targets and acquirers.

a Includes individuals and partnerships (excluding management) as well as corporations for which no SIC code(s) found.

Table 8

Stock Price Performance of Liquidating Firms by Asset Acquirer Relationship

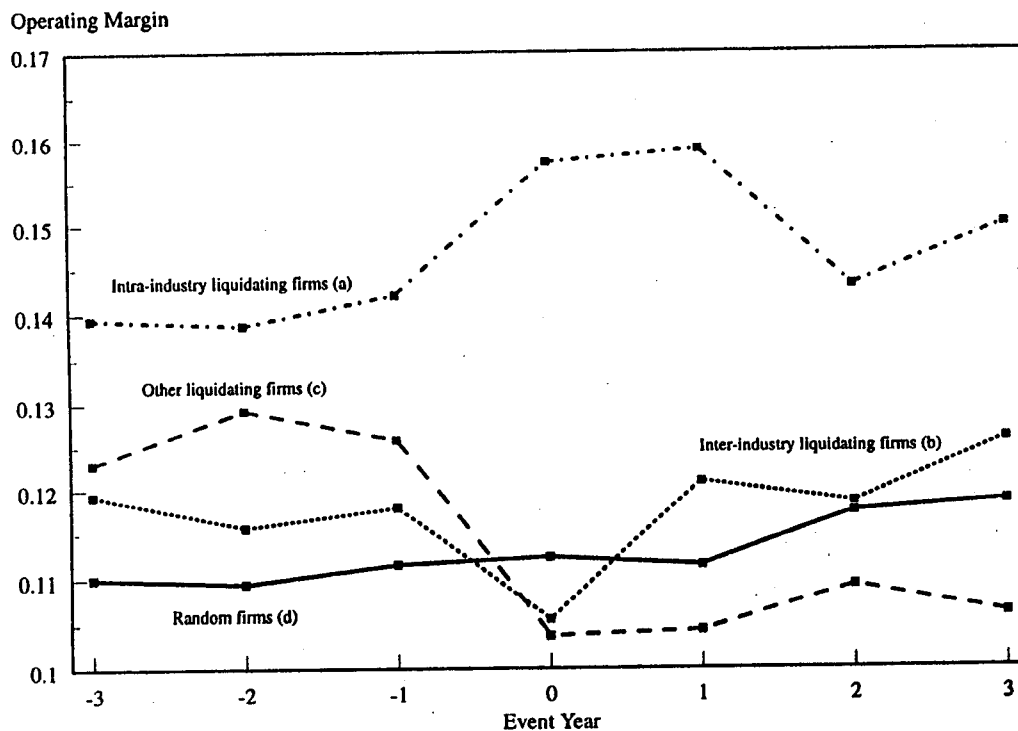
	Intra-Industry Liquidating Firms ^a		Inter-Industry Liquidating Firms ^b	Other Liquidating Firms ^c
Event days -1 to 1	15.1*** (19)	##	9.2*** (12)	12.2*** (26)
Event days -10 to 10	17.0*** (19)	#	6.5 (12)	23.2*** (26)
Event days -40 to 40	30.5*** (19)	##	1.3 (12)	34.9*** (26)

Note: Cumulative mean market-adjusted returns (CAR) in percent in specified intervals surrounding announcement of voluntary liquidation, broken down by the industry relationship of the acquirer of the largest piece of the liquidating firm. Market-adjusted returns are calculated as difference between firm returns and CRSP equal-weighted index.

- a Acquirer of largest divestiture shares primary or secondary three- or four-digit SIC code with liquidating firm.
- b Acquirer of largest divestiture shares primary or secondary one-digit or no SIC codes with liquidating firm.
- c All other liquidating firms.
- ## Column 1 and column 2 figures significantly different from one another at .05 level (using two-sided t-test).
- # Column 1 and column 2 figures significantly different from one another at .10 level (using two-sided t-test).
- *** Mean significantly different from zero at .01 level (using two-sided t-test).

Chart 1

Median Operating Margin of Liquidating Firms' Industry by Asset Acquirer Relationship



Note: Median operating margin of liquidating firms' industry by asset acquirer relationship for seven-year period surrounding liquidation announcement. Industry operating margin is defined as operating income before depreciation divided by net sales for all firms on Compustat with the same primary four-digit SIC code.

- (a) Acquirer of largest divestiture shares three- or four-digit SIC code with liquidating firm (no. of obs. = 19).
- (b) Acquirer of largest divestiture shares one-digit or no SIC codes with liquidating firm (no. of obs. = 13).
- (c) All other liquidating firms (no. of obs. = 38).
- (d) Purely random match firms (no. of obs. = 70).

Appendix 1

Liquidating Firms, Line of Business, and Announcement Year

Firm Name	Line of Business	Announcement Year
Advanced Drilling Systems	Equipment Rental & Leasing, NEC	1986
Advanced Manufacturing Systems	General Industrial Machinery & Equipment, NEC	1991
American Controlled Industries	Converted Paper & Paperboard Products	1986
American Manufacturing	Textile Mill Products	1979
Anta Corp.	Rolling, Drawing & Extruding of Nonferrous Metals	1984
Apco Oil Corp.	Petroleum Refining	1975
Arcata Corp.	Commercial Printing	1981
Artco Industries Inc.	Sawmills & Planing Mills, General	1982
ATE Enterprises Inc.	Management Services	1986
Austral Oil Inc.	Crude Petroleum & Natural Gas	1977
Barber Oil Corp.	Bituminous Coal & Lignite Mining	1980
Bates Manufacturing Co.	Bituminous Coal & Lignite Mining	1979
Bayuk Cigars Inc.	Tobacco Products	1981
Braden Industries Inc.	General Industrial Machinery & Equipment	1976
Bristol Brass Corp.	Rolling, Drawing & Extruding of Nonferrous Metals	1979
Canadian International Power	Electric Services	1976
Cardiff Communications Corp.	Cable & Other Pay Television Services	1987
CHC Corp.	Miscellaneous Publishing	1977
Columbia Corp.	Lumber & Wood Products, Except Furniture	1976
Conroy Inc.	Household Furniture	1983
Consolidated Refining	Rolling, Drawing & Extruding of Nonferrous Metals	1981
Cooper Laboratories	In Vitro & In Vivo Diagnostic Substances	1984
Dairy Queen Stores Inc.	Eating Places	1977
DCL Inc.	Computer Rental & Leasing	1979
DeJur Amsco Corp.	Machinery, Equipment & Supplies	1976
Diversified Earth Sciences	Heavy Construction Other than Bldg. Construction - Contractors	1978
Drewry Photocolor	Photofinishing Laboratories	1988
Dyneer Corp.	Motor Vehicle Parts & Accessories	1985
Education Systems & Publications	Commercial Printing	1991
Electronic Tabulating Corp.	Computer Processing & Data Preparation & Processing Services	1984
Fair-Tex Mills	Broadwoven Fabric Mills, Manmade Fiber & Silk	1981
Federated Natural Resources	Crude Petroleum & Natural Gas	1988
Gemtec Corp.	Orthopedic, Prosthetic & Surgical Appliances & Supplies	1985
Glasrock Medical Services	Miscellaneous Equipment Rental & Leasing	1982
Gold Medallion Corp.	Drugs, Drug Proprietaries & Druggists' Sundries	1981
Great Basins Petroleum	Crude Petroleum & Natural Gas	1979
Gross Telecasting	Television Broadcasting Stations	1984
Gulf Broadcasting Co.	Television Broadcasting Stations	1984
Handyman Corp.	Lumber & Other Building Materials Dealers	1986
Hines (Edward) Lumber Co.	Lumber, Plywood, Millwork & Wood Panels	1984
Hittman Corp.	Electronic Components, NEC	1982
HS Group Inc.	Agricultural Production - Crops	1984
Imark Industries Inc.	Machinery, Equipment, & Supplies	1987
Jefferson Corp.	Concrete Products, Except Block & Brick	1985
Kaiser Industries Corp.	Steel Works, Blast Furnaces (Inc. Coke Ovens) & Rolling Mills	1976
Kirby Industries Inc.	Water Transportation	1974
Liberty Bell Park	Racing, Including Track Operation	1985
National Student Marketing	Local & Suburban Transit & Interurban Highway Passenger Trans.	1979

Appendix I (continued)

Liquidating Firms, Line of Business, and Announcement Year

Firm Name	Line of Business	Announcement Year
OKC Corp.	Petroleum Refining	1979
Overseas National Airways	Air Transportation, Non-scheduled	1978
Panax Corp.	Newspapers: Publishing, or Publishing & Printing	1980
Pasco Inc.	Petroleum Refining	1975
Putnam Gellman Corp.	Textile Mill Products	1980
R H Medical Services	Ophthalmic Goods	1979
Raymond Industries Inc.	Computer Storage Devices	1983
Reeves Telecom Corp.	Radio Broadcasting Stations	1979
Rockower Brothers Inc.	Apparel & Accessory Stores	1979
Royal Castle System Inc.	Eating Places	1975
Sage International Inc.	Variety Stores	1983
San Juan Racing Association	Racing, Including Track Operation	1980
Sporto Corp.	Rubber & Plastics Footwear	1989
Synthemed Corp.	Electromedical & Electrotherapeutic Apparatus	1982
Telecor Inc.	Equipment Rental & Leasing, NEC	1978
Tempest Technologies Inc.	Electronic Computers	1991
Transworld Corp.	Air Transportation, Scheduled	1986
Trans-Air Freight System Inc.	Arrangement of Transportation of Freight & Cargo	1980
United Western Corp.	Hotels & Motels	1984
Unity Buying Service	Catalog & Mail-Order Houses	1983
Westates Petroleum Co.	Crude Petroleum & Natural Gas	1975
Westminster Corp.	Footwear, Except Rubber	1975

a As determined by Compustat four-digit SIC code, where available, and CRSP SIC code otherwise.

Appendix 2

Variables, Definitions, and Sources

Variables	Definitions	Sources
Sales growth	Annual geometric growth rate of net sales (calculated after sales levels have been inflation-adjusted with Consumer Price Index).	Compustat, annual reports, and 10-Ks
Sales/assets	(net sales)/(book value of total assets)	Compustat
Operating margin	(operating income before depreciation)/(net sales)	Compustat
Cash/assets	(cash and short-term investments)/(book value of total assets)	Compustat
Market-to-book	(market value of common stock + carrying value of preferred stock + book value of long-term debt + book value of debt in current liabilities)/(book value of total assets)	Compustat
Market share	(net sales of firm)/(total industry net sales) where industry is defined as all firms on Compustat sharing the same 4-digit SIC code	Compustat, annual reports, and 10-Ks
Lines of business	Number of four-digit SIC codes in which the firm operates.	<i>S&P's Register of U.S. Corporations and Dun & Bradstreet's Million Dollar Directory</i>
Inside ownership	Proportion of common stock owned by board members, officers, and their families including shares owned by trusts where director or officer is trustee (excluding charitable trusts) or where director, officer, or family member is beneficiary; also includes shares indirectly owned through partnerships or other corporations.	Proxy statements and 10-Ks
Control offer	Dummy variable = 1 if firm received outside control offer (hostile or friendly) in two years preceding liquidation announcement; = 0 otherwise.	<i>Wall Street Journal Index</i>
Debt/assets	(book value of long-term debt)/(book value of total assets)	Compustat
Age of top executive	In order of preference, age of the chairman of the board, the chief executive officer, or the president.	Proxy statements and 10-Ks

Appendix 3

Correlation Coefficients of Independent Variables for Liquidating and Randomly Chosen Firms

Panel A: Correlation Coefficients for Sixty Liquidating and Fifty-Five Purely Random Firms

	sales growth	sales/assets	oper. margin	cash/assets	mkt./book	mkt. share	lines bus.	inside own.	i.o. x m.v.	(i.o. x m.v.) ²	cntrl. offer	debt/assets	age exec.
Sales growth	1.00	-0.15	-0.72	-0.09	0.01	-0.05	-0.05	-0.01	-0.03	-0.01	-0.03	-0.07	0.01
Sales/assets		1.00	0.11	-0.09	-0.13	0.03	0.06	0.22	-0.05	-0.05	-0.15	-0.12	0.12
Operating margin			1.00	-0.23	-0.24	0.06	0.06	-0.10	0.07	0.04	0.10	0.21	0.06
Cash/assets				1.00	0.32	-0.04	-0.13	0.18	-0.06	-0.06	-0.04	-0.39	-0.16
Market-to-book					1.00	0.09	0.06	-0.10	0.13	0.00	-0.10	-0.14	-0.09
Market share						1.00	0.13	-0.11	0.22	0.11	-0.02	0.11	0.00
Lines of business							1.00	-0.18	0.17	0.10	-0.05	0.00	0.03
Inside ownership								1.00	0.14	0.11	-0.25	-0.26	0.10
Ins. own. x mkt. val.									1.00	0.93	-0.03	0.02	0.16
(Ins. own. x mkt. val.) ²										1.00	-0.03	0.03	0.14
Control offer											1.00	0.15	-0.12
Debt/assets												1.00	0.08
Age of top executive													1.00

Panel B: Correlation Coefficients for Sixty Liquidating and Fifty Industry-Matched Firms

	sales growth	sales/assets	oper. margin	cash/assets	mkt./book	mkt. share	lines bus.	inside own.	i.o. x m.v.	(i.o. x m.v.) ²	cntrl. offer	debt/assets	age exec.
Sales growth	1.00	-0.13	0.42	-0.20	0.11	0.00	-0.13	-0.19	0.02	0.03	-0.02	0.22	-0.18
Sales/assets		1.00	-0.19	-0.02	-0.31	-0.01	0.04	0.27	-0.08	-0.05	-0.13	-0.32	0.26
Operating margin			1.00	-0.28	0.10	0.02	-0.05	-0.22	0.07	0.05	0.14	0.21	-0.06
Cash/assets				1.00	0.06	-0.19	-0.20	0.23	-0.08	-0.04	-0.04	-0.32	-0.07
Market-to-book					1.00	-0.05	0.02	-0.19	0.28	0.23	-0.10	0.07	-0.17
Market share						1.00	0.39	-0.25	0.08	0.01	-0.03	0.01	0.02
Lines of business							1.00	-0.18	0.00	-0.08	-0.08	-0.04	-0.01
Inside ownership								1.00	-0.05	-0.06	-0.26	-0.22	0.15
Ins. own. x mkt. val.									1.00	0.97	-0.06	0.10	-0.09
(Ins. own. x mkt. val.) ²										1.00	-0.04	0.13	-0.13
Control offer											1.00	0.11	-0.07
Debt/assets												1.00	-0.28
Age of top executive													1.00