

# **Survivorship and the Economic Grim Reaper\***

George P. Baker

Robert E. Kennedy

*Harvard Business School*

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## **Abstract**

The ten year survival rate for firms trading on the New York and American Stock Exchanges between 1963 and 1995 is only 61%. This paper explores the process by which firms come to be delisted. We calculate the returns of firms from ten years before delisting to their delisting date and show that, on average, the economic grim reaper kills poorly performing firms. We document takeover and distress delisting rates through time, analyze pre-delisting equity market returns for both groups, and explore how firm characteristics and regulations governing corporate takeovers and bankruptcy affect the friction with which these processes operate. We believe this is the first analysis to document long-term equity market and operating performance of delisting firms. The study builds on research from both finance and industrial organization and is consistent with a Schumpeterian view of economic development.

## 1. Introduction

There is a large amount of churn—entry and exit—among firms in capitalist economies.<sup>1</sup> This turnover in the population of firms plays an important economic role: it is responsible for a large portion of industry-level productivity increases (Baldwin, [1995], Geroski [1989]); it is an important element of economic development (Roberts and Tybout [1996]); and it is an integral component of industry restructuring in transition economies (Kennedy [1997], and Ghemawat and Kennedy [1999]). Schumpeter (1942), arguing for a dynamic, as opposed to static, view of economic development, introduced his famous “creative destruction” metaphor, claiming that “the problem ... usually being visualized is how capitalism administers existing structures, whereas the relevant problem is how it creates and destroys them.”

Turnover in the population of firms is central to economic change and progress because it leads to the reallocation of productive resources from non-surviving to surviving firms, and to the reallocation of management rights from one set of executives to another. This reallocation of assets and management responsibility occurs through at least three mechanisms: takeovers of non-surviving firms by survivors, the liquidation of non-surviving firms, and asset sales between survivors. Firm disappearance is also important because it provides one of the main ways that a system of managerial capitalism deals with the problem of weak management. All economic systems are occasionally plagued with poor managers: takeovers, liquidations, and asset sales are important mechanisms by which capitalism reallocates decision rights from weak to strong management teams.

The process by which firms disappear and their productive resources are reallocated—the Grim Reaper of our title—is not well understood or documented in the literature.<sup>2</sup> While the literature contains the elements of a Schumpeterian story of economic change, the overall picture is a patchwork of findings and results. Research to date is consistent with a dynamic view of a market economy that reallocates resources from unproductive to more productive uses and from weaker to stronger management teams, but does not document this process very completely. In this paper, we attempt to bring a complete and consistent set of data to this question, generating results that shed

light on both the causes and consequences of firm disappearances. Our analysis examines the population of firms (7455) that traded on the New York and American stock exchanges at any time between 1963 and 1995, with special attention paid to those that delisted. We document several findings:

- Churn is high. Annual entry and exit rates averaged 6.66% and 5.11% respectively.<sup>3</sup> These annual rates lead to extensive turnover in the market population. In any given 10-year period, the ratio of the number of firms that traded for the entire 10-year period to the number that traded at all during the period varies from 26% to 49%. The ten-year forward-looking survival rate is only 61%.<sup>4</sup>
- Takeover delistings are far more common than delistings due to financial distress. Of the 3954 firms that delisted between 1965 and 1995, 66% were taken over and 19% were delisted due to financial distress.<sup>5</sup> The rates of takeover and distress delisting vary substantially through time.
- On average, the securities of delisting firms underperform the market in the years leading up to the last year of their lives. The mean (median) firm underperforms the market by 25% (48%) over the period from ten years before to one year before delisting. The economic grim reaper appears to kill, at least on average, underperforming firms, and to punish underperforming managers. However, in the last year of their lives, delisting firms regain much of the value lost in the previous nine years.
- Takeover delistings show a large increase in their stock returns in the last year before delisting, regaining (on average) more than the value lost in the previous nine years. Distress delistings show no such “kick”; they continue to decline in value up to their delisting date.
- The falling and then rising pattern of returns prior to takeover is robust—it holds in all time periods and for large and small firms. However, the depth of the decline in value shifts substantially through time, as does the size of the kick before takeover.

- The pattern of returns preceding delisting is affected by firm characteristics. Small firms and firms with low market-to-book ratios experience smaller declines in value preceding takeover and distress delisting.
- There is some evidence to suggest that takeover and distress delistings serve as substitute mechanisms for redeploying the productive resources of underperforming firms.

Some of these results are new, while others have been reported elsewhere. We believe that we are the first to document the consistent and robust pattern of declining then rising market value for delisting firms. We interpret this pattern as an indication that the market anticipates and reacts to changes in the *management* of assets. The fact that the market bids down the values of firms that will delist, and whose managers will be replaced, and then reacts positively (at least on average) in anticipation of those assets being reallocated to new managers is an indication that management matters.

Our second new finding concerns the average performance decline of firms that delist from one of the major exchanges. We show that this performance decline is consistent and robust: it holds over the past three decades, and varies in magnitude through time and across firms in ways that are consistent with a theory of firm death mediated by various institutions (e.g. takeover and bankruptcy procedures) that affect the process by which assets are redeployed in the economy.

Finally, our methodological approach (which examines the universe of firms trading at any time on the two largest exchanges) allows us to make general statements about the dynamics of the economy. The firms in our “sample” have sales and assets equal to roughly 35% of the total for the entire corporate sector, and represent almost all of the largest firms in the economy. As such, patterns evident for these firms give an accurate and general picture of how the American corporate sector changes and develops.

While these particular findings are new, we believe that our primary contribution is to present an overall set of results—based on a complete and consistent data set—that provides novel insights into

the processes by which a capitalist economy redeploys productive resources. We report that the churn rate is high (39% of firms overall, and almost 50% in the 1980s, fail to survive a decade), even for firms trading on the two largest American stock exchanges. This finding alone suggests that the Schumpeterian metaphor of creative destruction is apt, and that the process of reallocating assets from one set of managers to another is a recurring and routine process. It also suggests that policies (such as plant closing laws, restrictive takeover statutes, or cumbersome bankruptcy procedures) which attempt to hinder the process of firm death and asset reallocation should be carefully considered: firm death is not an unusual or aberrant phenomenon, but a common feature of a capitalist economy.

The paper proceeds as follows. In the next section, we review the literature on firm turnover and performance, and present a brief conceptual framework that we will use to examine our data and frame our analysis. In Section 3, we document the extent of turnover on NYSE and AMEX, providing evidence on the variability in entry and exit through time and the cross-sectional composition of delistings. In Section 4 we construct a market benchmark and examine the performance of firms in the periods prior to delisting. In Section 5, we explore the differences between takeover and distress delistings. In Section 6 we examine how environmental factors influence the pattern of returns prior to delisting. The pattern of returns shifts through time, and these shifts appear to be associated with changes in the regulations governing takeover activity and bankruptcy reorganization. In Section 7 we analyze how firm characteristics affect the pattern of returns prior to delisting. Section 8 concludes.

## **2. Literature Review and Conceptual Framework**

Previous research provides insights into the causes and consequences of firm turnover. These studies fall into three broad categories. First, there is extensive documentation of poor operating and financial market performance in firms and plants prior to exit. Altman (1968) used accounting measures to construct a bankruptcy prediction model. Baldwin (1995), Lichtenberg and Siegel (1987), and Bailey, Hulten, and Campbell (1992) all find that low productivity plants are more likely to

experience ownership change than average or high productivity plants. Palepu (1986) reports that to-be-taken-over firms have negative excess returns from five years before to one year before being acquired. Finally, Shleifer and Vishney (1988) find that Fortune 500 firms who became targets of hostile takeover bids in the 1980s had much lower Tobin's  $q$  than did firms in a control sample (0.524 vs. 0.848 in 1980). They conclude that the targets "have many characteristics indicative of the need for external discipline."

A second line of research examines the effect of ownership change on firm (or plant) performance. Both Lichtenberg and Siegel (1987) and McGuckin and Nguyen (1995) report that ownership change is followed by increases in plant-level productivity growth. Healy, Palepu and Ruback (1992) examine operating performance following mergers and conclude that "merger firms have increases in post-merger operating cash flow returns in comparison with their industries. These increases arise from post-merger improvements in asset productivity." Kaplan and Weisback (1992) examine acquisitions that are subsequently divested, which are often cited as evidence that the merger process does not operate well, and conclude that more than 50% of these divestitures were, in fact, successful.

Finally, the finance literature documents the creation of market value when assets are reallocated through takeovers and mergers. Jarrell and Poulsen (1987) report average takeover premia of more than 30% in the 1970s and 1980s. The Office of the Chief Economist, Securities and Exchange Commission (1987) reports that, even before tender offer announcements, target firms' market value increases by an average of 38%. Several studies also reveal that actions which inhibit the reallocation process have a negative effect on market values. Jarrell and Poulsen (1987) find that the adoption of supermajority amendments leads to negative equity returns. Ryngaert (1988) reports a negative equity effect when firms adopt poison pills. Ryngaert and Netter (1987) identify a negative effect associated with Ohio's anti-takeover law.

In summary, the literature provides many individual pieces of evidence that suggest that both takeovers and bankruptcy are mechanisms by which productive resources are reallocated to more

efficient uses. Baldwin and Caves (1991) write “mergers and related transactions desirably shift control of businesses into the hands of managers who are more efficient or better suited to deploy them.”

### *A Framework for Analysis*

Our analysis examines turnover from a perspective that draws on both the industrial organization and finance literatures. Our framework provides an explanation for what determines the long-term performance of firms and suggests how market value changes in response to takeovers and other types of disappearance. We begin with the assumption that firms contain “productive resources” which allow them to compete in their product markets. We think of these resources broadly. They could be physical (plants, machines), intangible (brand equity, patents), or tacit (specialized knowledge of market or production processes).<sup>6</sup> When firms’ managers use their productive resources efficiently, firm value will be high relative to the value of these resources in their next best use. When they use these resources inefficiently (either because of bad luck or mismanagement) firm value will be low relative to the value of the productive resources in other uses. It is likely that the grim reaper will reallocate inefficiently-used resources from firms whose market value is low more often than it will reallocate efficiently-used resources from firms whose market value is high. Thus we expect takeovers, as well as delistings due to financial distress, to be more likely for firms with poor stock price performance than for firms with strong performance. However, this will not always be true. Even firms with good equity returns may not be using their resources in the most productive way possible, and they too could be taken over and have their resources reallocated to firms that will utilize them even more efficiently.<sup>7</sup>

We examine stock market returns because the efficiency of resource utilization is reflected in market valuations. However, the efficiency of resource utilization is not all that the market values. It also anticipates the likelihood that resources will be reallocated, and that some of the value from this reallocation will be realized by the owners of the disappearing firm. Thus, a firm’s market value includes an anticipated takeover premium that varies with the likelihood of a takeover occurring. It also includes anticipated costs of financial distress. We look for evidence of changes in the likelihood

and costs of resource reallocation (through takeovers and distress delistings) by examining how the market values of firms vary through time as they approach delisting. When the takeover market is booming (as measured by the takeover rate) we expect the market value of firms approaching delisting to be high. Likewise, when the bankruptcy process is operating in favor of debtors (as opposed to incumbent management), we expect the market values of firms approaching delisting to be high.

Several other factors are likely to influence the effectiveness of the processes by which productive resources are transferred between firms, and thus the market values of firms as they approach delisting. One is the nature of the firms' themselves. Since taking over small firms is likely to entail less financing and organizational integration, such takeovers will be easier and small firms should thus lose less value (as a fraction of their market value) before a takeover occurs.<sup>8</sup> Similarly, the more transferable a firm's resources, the more likely it is that inefficiently-employed resources will be reallocated to higher valued uses, and thus the market value of the firm will be higher prior to delisting. We measure firm size and develop two proxies for the redeployability of a firm's resources. These measures are used to test whether such factors affect firm value before delisting.

In sum, we expect the resource reallocation process to result in higher market values for delisting firms when (1) frictions in the takeover and bankruptcy processes are low, and (2) when the firms are small and their assets are easily transferable.

### **3. The Extent of Turnover on the NYSE and AMEX**

7455 securities traded on NYSE and AMEX between January 1963 and December 1995.<sup>9</sup> Of these, 5409 began trading during this period and 4118 delisted. Only 477 securities traded for the entire 33 year period. In this section, we examine turnover in this population of firms, analyzing the birth and death rates of traded securities, changes in birth and death rates over the period, how these rates vary by firm size, and the reasons for delisting. The two merger waves during this period (in the late 1960s and the 1980s) affected the delisting rate significantly, as did the varying rate of financial distress.

*Short-term Entry and Exit Rates*

Measured on an annual basis, the entry rate averaged 6.66%, while exit averaged 5.11%.<sup>10</sup> But as Figure 1 demonstrates, these averages mask substantial variation in the rates over time. Entry ranged from a low of 1.53% in 1975 to a high of 16.27% in 1987. Exit ranged from 2.54% in 1971 to 8.76% 1988.

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The sample period was characterized by three distinct periods. From 1963 through 1973, entry exceeded exit in 10 of 11 years and the number of traded firms grew from 2046 to 2716. In the second period—from 1974 through 1985—exit exceeded entry in 11 of 12 years and the number of firms fell from 2716 to 2247. Finally, between 1986 and 1995, the number of firms grew from 2247 to 3275, as entry exceeded exit in nine of ten years.

Some care must be taken in interpreting the numbers in Figure 1. First, “entry” into this sample is generally not an initial public offering: it is the beginning of listing on NYSE or AMEX. Thus many of these firms had returns on another exchange before they enter our sample. Some of the exits in our sample do not represent the end of public trading of the securities: we identify 128 securities (3% of delistings) that moved to another exchange after delisting from NYSE or AMEX, and we expect that some of the other delistings (whose delisting reasons we could not determine) did the same. In addition, the entry and exit rates shown in Figure 1 are not value-weighted. There is some complexity in value-weighting these rates, because a significant fraction of the delisting firms are in severe financial distress, and thus have very low market values. This leads to an underestimate of the importance of exit if weighting is done near the time of delisting. Value weights can be assigned to securities some years before delisting, but then the sample must be restricted to firms with long trading histories before delisting.<sup>11</sup>

Figure 2 shows one-year and 10-year disappearance rates, equally-weighted and value-weighted (by the beginning period market value). These rates are calculated by simply asking how many firms

trading at the beginning of the period (or what fraction of the market value of firms trading at the beginning of the period) are not trading at the end. One-year value-weighted disappearance rates are significantly lower than unweighted rates, but still substantial.<sup>12</sup> The annual value-weighted disappearance rate averages 1.57% of beginning-of-the-year market value. This ranges from a low of 0.37% in 1975 to 4.18% in 1985.

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### *Longer-term Disappearance Rates*

While the one-year churn figures may seem low, the picture changes substantially if we move to longer periods. As Figure 2 shows, the ten-year disappearance rates vary between 30% and 48% on an equal-weighted basis, and from about 8% to 25% on a value-weighted basis. Table 1 summarizes disappearance rates by the duration of the period studied and by market capitalization quintile. For the entire sample, the 10-year disappearance rate is 39.4% of firms and 14.6% of starting-period market value.

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### *Size Effects*

Disappearance rates also vary substantially by firm size. Table 1 shows that firms with small market capitalizations disappear at a significantly higher rate than large cap firms. Firms in the smallest market-capitalization quintile (measured at the beginning of the period) have a 10-year disappearance rate of 54.3%, while those in the largest quintile have a disappearance rate of only 18.0%. Figure 3 shows that these rates vary substantially through time. The most dramatic change occurs for large firms. Their 10-year disappearance rate rises from only 8.5% between 1971 and 1980, to 30.0% for the 1981-1990 period. This rise corresponds to the active market for corporate control which occurred in the mid and late 1980s. Rates for smaller-capitalization quintiles also rose, but less dramatically.

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### *Reasons for Delisting*

Firms delist for two main reasons—takeovers and financial distress. A total of 4118 firms delisted between 1963 and 1995.<sup>13</sup> The cause of each delisting was determined by examining the *Wall Street Journal Index*, the *Capital Changes Reporter*, and the *Directory of Obsolete Securities*. Delistings were classified into the 16 categories shown in Table 2.

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The number of and reasons for delisting changed substantially through time. On average, 127 firms delisted each year between 1965 and 1995,<sup>14</sup> with 84 (66%) due to takeovers, 24 (19%) due to distress, and 19 (15%) unclassified. Total delistings ranged from a low of 63 in 1971 to 216 in 1988. Figure 4 charts the number and composition of delistings through time. Several trends are evident. First, the takeover waves in the late-1960s and mid-1980s stand out. The number of takeovers rose from 51 to 125 between 1965 and 1968, before declining to only 40 in 1971. Similarly, the number of takeovers rose from 69 in 1983 to 177 in 1988 and then again declined sharply. Second, the number of delistings (particularly takeovers) rose fairly steadily from 1975 through 1988, while the number of distress delistings shows no particular trend over this period. Third, after 1988, total delistings fell sharply, primarily due to the collapse in takeover activity which fell from 177 in 1988 to only 32 in 1991. During this same three-year period, distress delistings doubled from 27 to 55.<sup>15</sup>

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A crude look at the takeover and delisting rates suggest that these two mechanisms might be substitutes: the rates move in opposite directions, with a highly significant correlation of -0.44. We return to look more closely at these rates in Section 6.

#### 4. Delisting Returns and Survivorship Bias

This section develops a market performance benchmark and then examines the market-adjusted buy-and-hold returns of delisting firms for different holding periods. We examine all delisting firms as a group here. Section 5 analyzes takeover and distress delistings separately. We begin with a discussion of the construction of the market benchmark.

Suppose you were offered a choice between one of two possible twelve-month investment portfolios. The first is a portfolio of firms that will delist in twelve months, and the second is the market portfolio. Which would you choose? Would your choice differ if the holding period was 10 years? The first question you might ask before picking a portfolio is what “the market” means, given that roughly 5% of the firms in the market portfolio are likely to delist before the year is over (39% of the 10-year “market population” within 10 years), and another 6% (50%) will begin trading. In this paper, we calculate the returns to a “Market Buy-and-Hold” portfolio that is constructed as follows. At the beginning of the period, equal dollar amounts are placed in each security traded in that month. These positions are held, along with the reinvestment of any dividends, until the end of the period. If a firm delists, the amount of money invested in that security is divided up among the other firms in the portfolio in proportion to their cumulative returns to that time. If a firm begins trading during a month, dollars are taken out of every other security (again in proportion to their cumulative returns) to give the new security a  $1/n$  share of the value of the portfolio at that time. The return on this Market Buy-and-Hold (MBH) portfolio is calculated from each possible starting month to each possible ending month, and used throughout as the benchmark against which to compare the returns of selected other portfolios.

The analysis uses two market-adjusted returns measures: abnormal returns and value relative returns. Abnormal returns are calculated by cumulating firm  $i$ 's return from period  $T$  to  $T'$  and subtracting the MBH return over that same period:

$$ABN_i^{T,T} = \prod_{t=T}^T (1 + r_{it}) - MBH_T^T$$

where  $r_{it}$  = return (including dividends) of firm  $i$  in period  $t$ , and

MBH is the Market Buy-and-Hold from period  $T$  to period  $T$ .

The second measure—value-relative returns—is the ratio of firm  $i$ 's cumulative return to the MBH over a period:

$$VREL_i^{T,T} = \frac{\prod_{t=T}^T (1 + r_{it})}{MBH_T^T}$$

Over periods of a year or two, the measures track fairly closely. Over longer periods, however, they differ significantly. Cross-sectional distributions of ABNs tend to be slightly more symmetric than those of VRELS, though both are skewed to the right. The cross sectional variance in VRELS is much smaller than in ABNs, and large declines in VREL are easier to interpret.<sup>16</sup>

#### *Delisting Firms' Abnormal Returns*

We begin our analysis by comparing the distribution of delisting firms' 12-month abnormal returns to those of the market. As Figure 5 shows, the mean delisting firm outperforms the market over its last year of trading. The mean abnormal return for delisting firms is 11.3%. In addition, the distribution of returns for delisting firms is “fat,” with more winners and more losers than the distribution for the entire market.

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The story changes significantly when we move to a longer time horizon. Figure 6a charts the distribution of delisting firms' abnormal returns in the 10 years prior to delisting. Sixty-six percent of firms underperform the market in the 10 years prior to delisting. The mean return is -12%, while the median is -109%.

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Figure 6b provides an indication of delisting firms' performance prior to their final year "delisting kick." The figure charts abnormal returns from 10 years through one year prior to delisting. Over this period, the mean firm underperforms the market by 90%, with a median abnormal return of -132%.

The combination of these two results—superior performance in the last year before delisting, inferior performance before this time—yields one of the central findings of this paper. On average, delisting firms suffer long-term declines in value before a final "kick" at the end of their lives. This pattern is shown in Figure 7, which charts value-relative performance in the years prior to delisting. The mean firm loses about 25% of its value (relative to the market), while the median firm loses 48%, before regaining some of this loss in the last year. The grim reaper appears, on average, to kill poorly performing firms. Before going on (in Section 5) to explore how this effect varies by delisting cause, we briefly examine the consequences of this pattern of performance for survivorship bias.

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#### *Surviving Firms' Returns*

The performance of delisting firms—short-term overperformance, long-term underperformance—has important implications for researchers studying the long-term performance of firms. We have seen that the performance of delisting firms differs systematically from the market. If this is true, then other segments of the market population—in particular survivors—also have returns that systematically differ from "the market."

As with the returns for delisting firms, the magnitude of the survivorship bias differs with the duration of the period measured. Table 3 summarizes the cumulative performance differential (i.e. the "survivorship bias") for firms that have survived one, five, ten, and twenty years.

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As expected, the survivorship bias for short holding periods is negative—that is, surviving firms underperform the market. As the duration of the measurement period increases, however, the relative performance of surviving firms improves. Average value-relative performance becomes positive for firms that survive between 5 and 10 years. The magnitude of this survival bias also varies through time. Appendix A addresses this issue in more detail.

This bias suggests that the results from studies which employ a control sample screened on survival should be interpreted with care. Such benchmarks do not represent “the market,” and can not be used in trading strategies, as survival can not be determined ex-ante.

While the identification of a survivorship bias is provocative, a note of caution is in order. These performance differentials are significant when measured over a large population of firms, as done here. However, the cross-sectional variance of returns is so large that the bias we identify (a few percentage points) will be small compared to the standard error on mean returns in studies with smaller sample sizes. While a survivorship bias correction based on the results in Table 3 should be implemented, it is unlikely to change the results of many studies.

We have seen that the performance trajectories of delisting firms differ systematically from the overall “market return.” Delisting firms show long-term underperformance, but experience a kick at the end of their lives. This pattern suggests that delisting firms are, on average, long-term underperformers and that takeover premiums represent the recovery of some previously destroyed market value.<sup>17</sup>

## **5. Delisting Reasons and Firm Performance**

Section 4 examined returns for all delisting firms and long-term survivors. This analysis, however, aggregated at least two importantly different types of delisting firms—those that delisted

due to bankruptcy or financial distress, and those that delisted because of takeover. In order to more fully understand the process of resource redeployment, we now examine these groups of firms separately.

Figure 8 repeats the analysis of Figure 7, separating delisting firms into three categories—those that delist due to takeover, those that delist due to financial distress, and those that delist for some other reason. The results for the two main groups, takeovers and distress delistors, are dramatically different. The takeover delistors underperform the market in the period from ten years before to one year before delisting, but on average they more than fully recover this value loss when they are taken over. The distress delistors steadily underperform. They lose 57% of their value relative to the market in the period from ten years before to one year before delisting, and continue to decline in the final year of their lives. The difference between the cumulative performance of distress and takeover delistors is small five years prior to delisting, but steadily widens thereafter.

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Table 4 shows differences in firm characteristics, based on Compustat data,<sup>18</sup> between takeover and distress delistings. It shows the differences in size (measured by sales and relative market value), tangible asset intensity, profitability (return on assets), and leverage for firms in the two subsamples. There is not too much that is surprising in this table: firms that delist due to financial distress are, on average, smaller, less profitable, and more highly leveraged than firms that delist due to takeover. They also have a lower proportion of tangible assets (property, plant and equipment is a smaller proportion of total assets). This is true well before they delist: the mean difference for each of these measures is significantly different in all ten years before delisting.<sup>19</sup>

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The mean value trajectories for each group in Figure 8 mask substantial cross-sectional variation. Table 5 reports summary statistics for the distributions around these means. For example, the mean

VREL for a takeover delisting five years prior to delisting is 0.88, with a standard deviation of 0.63. A large number of these firms (30%) have outperformed the market (have VRELS>1) five years before being taken over. Even one year before delisting, 28% of the (to be) taken-over firms show VRELS that are above 1. The same is true for distress delistors. 25% of distress delistors show positive performance five years before delisting.

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This cross-sectional heterogeneity has important implications for our subsequent analysis. In much of what follows, we examine the performance trajectories of firms to be delisted *as if* investors could tell (four or more years in advance) that a firm would delist, and whether it would delist due to takeover or due to financial distress. But of course this cannot be literally true: if investors knew the fate of these firms, prices would adjust immediately and there would be no subsequent decline in value for distress delistors nor any kick for takeover targets. The fact that we are able to detect, four years before delisting, a statistically significant performance difference between firms that will delist due to takeover and those that will delist due to financial distress is not evidence that investors can predict with any confidence which will be which.<sup>20</sup>

In our subsequent analyses, we do not assume that investors know perfectly the fates of these firms. Rather, we assume that they have some indication of the likelihood of the different outcomes, and that this shows up in the market values of these firms. As events unfold that differentially affect, say, the efficiency of the takeover process relative to the bankruptcy process, firms that are more likely to be taken over will be affected more (on average) than firms that are likely to go bankrupt. However, our tests of these differences are necessarily weak, since investors knowledge of which firms will be affected by these changes is highly imperfect.

When we compare the two performance trajectories, we see that the mean value relative for distress delistors is not significantly different from that for takeover delistors until four years before delisting. After this time, the difference between both the means and the medians widens. It is

interesting to note that firms which delist for either reason lose a significant fraction of their value in the years before delisting. In particular, firms that will ultimately be taken over lose, on average, 16% (mean) and 35% (median) of their value before their takeover premium kick in the final year.

Our chief interest in this paper is the process by which firms disappear from the economy and their resources are redeployed. The fact that, on average, firms that will disappear have lost value in the years before their disappearance is consistent with a hypothesis that suggests that this redeployment represents a movement of these resources to more productive uses or more effective managers. We now go on to examine more closely the factors that affect the reallocation process. First we examine how changes in the environment affect the value trajectories of firms prior to their disappearance. We then examine how the characteristics of delisting firms influence the amount of value lost before delisting.

## **6. Delisting Performance Through Time: The Effect of Environmental Factors**

Takeovers and distress delistings are two mechanisms by which firms disappear and their productive resources are redeployed to surviving firms. The friction with which these mechanisms work, and thus the values of these firms as they approach delisting, is likely to be influenced by the institutional and legal environment. We examine two such factors, the regulations governing takeovers and bankruptcy reorganization, and the activity level of the market for corporate control.

We note first that, while the pattern of returns prior to delisting (a fall and then rise for the takeovers, a steady decline for distress delistors) is consistent, the magnitudes of the shifts in value vary substantially through time. Figures 9 and 10 show the pattern, by half decade, for takeovers and distress delistings.

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The patterns shown in Figure 9 suggest that there were significant changes in the takeover market in the early 1990s: compared with earlier periods, the amount of value lost before takeover is larger, and the takeover kick is smaller in the 1990s. The pattern of returns for distress delisting firms (Figure 10) also shows significant changes through time. In the late 70s and early 80s, distress delistings lost significantly less of their value before delisting than they did in the early 70s, the late 80s, or the early 90s.

During the period we examine there were many changes (and proposed changes) to the regulations governing both takeover activity and bankruptcy reorganization. Many of these changes were extensively debated and, presumably, well-anticipated prior to enactment. These factors make it difficult to define event dates, and so a traditional event study is problematic. We proceed by identifying shifts in the pattern of pre-delisting returns. We find that there were substantial shifts in the pattern of returns, and that these shifts correspond to changes in the regulatory environment and level of activity in the market for corporate control.

In order to examine these effects more closely, and to identify the time-invariant part of the pattern of cumulative returns before delisting, we regress the VREL for each firm in each of the ten years before delisting on the number of years before delisting (the “years-to-go” dummies), as well as on calendar year dummies. In order to separate the calendar effects on values shortly before delisting from those long before delisting, we use two sets of calendar year dummies, one set for five to nine years before delisting (EarlyYrDummies), and another set for zero to four years before delisting (LateYrDummies). The coefficients on the calendar year dummies trace out shifts in the overall pattern of returns through time. The dataset is structured as a balanced panel: each of the 284 distress delistings and 1169 takeovers have ten observations in the dataset, one for each of the ten years before delisting.

The regression equation is:

$$VREL_{it} = C + \sum_{j=-8}^0 \beta_{1j}(\text{YearsToGoDummies}) + \sum_{t=1974}^{1995} \beta_{2t}(\text{EarlyYrDummies}) + \sum_{t=1974}^{1995} \beta_{3t}(\text{LateYrDummies})$$

where:  $VREL_{it}$  is the cumulative return (relative to the market) for firm  $i$  in year  $t$

$\beta_{1j}$  are coefficients on the “years-to-go” dummies (TOGODUM8-TOGODUM0), TOGODUM9 is left out,

$\beta_{2t}$  and  $\beta_{3t}$  are coefficients on the year dummies for the first and second halves of the trajectories (EYRDUM73 and LYRDUM73 are left out).

Table 6 presents the results of this analysis, with the dummies on early year effects (none of which are significantly different from zero) unreported. Note that the value declines in the early years before delisting (the intercept and the coefficients on TOGODUM 8 through 6) are small and negative for both takeovers and distress delistings. However, as the delisting horizon comes closer these coefficients become large and negative for distress delistings, while they decline and then kick up in the last year for takeovers. A plot of these dummies yields curves very similar to those in Figure 8, confirming that the pattern in Figure 8 remains after controlling for calendar year effects.

The coefficients on the *LateYearDum* variables provide an estimate of yearly shifts in the pre-delisting pattern of returns and give insight into changes in the regulatory and legal environment in the takeover market and the bankruptcy process.

#### *Changes in Takeover Trajectories Through Time*

There were both changes in takeover regulations and important institutional developments during the period covered in our study. The rise of the junk bond market in the mid-1980s led to a substantial increase in takeover activity, when the number of takeovers grew from 69 in 1983 to 177 in 1988. The collapse of the junk bond market in 1989 led to a sharp decline in takeover activity, with takeovers falling to only 32 in 1991 (see Figure 4 above). Also around that same time, political opposition to takeovers led to plant closing regulations and state anti-takeover legislation. Twenty eight states passed legislation making hostile corporate takeovers more difficult between 1985 and 1990, including the important state of Delaware in 1988.<sup>21</sup> Federal legislation was introduced (but never enacted) to disallow the deductions for interest debt used for hostile takeovers.

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**Place Table 6 about here**  
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The coefficients on the *LateYearDum* variables in the takeover regression in Table 6 suggest that the institutional and legal changes in the late 1980s had a significant effect on the pre-bid values of takeover targets. The coefficients are positive and significant from 1977 through 1979, positive through the mid 1980s, then turn negative in the late 1980s, and significantly negative in the 1990s. This suggests that, when takeover activity subsided in the early 1990s, pre-delisting value losses became much larger. We interpret these results as indicating that when the market for corporate control is active, the prospect of a future takeover premium places a floor under a firm's stock price. When the likelihood of a final-year takeover premium is reduced, this floor is lowered.

A second analysis is consistent with this interpretation. The coefficients on the *LateYearDum* variables appear to reflect changes in the liquidity of the market for corporate control. We examine this effect by looking at the correlation between the year dummies in Table 6 and the annual takeover rate. Figure 11 shows that, when takeover activity is high, the values of firms that will be taken over is also high. The correlation between the year dummies and the takeover rate is 33%.

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**Place Figure 11 about here**  
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These shifts in the value of firms that will be taken over suggest that variation in the level of friction in the resource reallocation process is important. If resources are being reallocated with little friction, the value losses prior to delisting are small—that is, the VREL pattern of returns shifts up. If, on the other hand, the reallocation process involves substantial friction (due, for example, to transactions costs or temporary matching problems), resources will be bound more tightly to firms and their current managers, and pre-delisting equity values must fall further in order to make purchases attractive to competing management teams. These data suggest that periods where pre-delisting declines in relative value are small (indicated by positive coefficients on the *LateYrDum* variables) are ones in which the reallocation process is functioning smoothly. Large declines in

relative value (negative coefficients) correspond to periods when the reallocation process is experiencing increased friction.

### *Changes in Distress Delisting Trajectories Through Time*

There were several important changes to the regulations and procedures governing distress delistings during the period we study. In 1978, the bankruptcy code was substantially rewritten with the goal of lowering the costs of reorganization, thereby facilitating corporate reorganizations instead of liquidation. A second set of changes came in 1989 and 1990, with the fall of Drexel Burnham Lambert and the 1990 LTV bankruptcy decision, both of which substantially decreased the likelihood of successful workouts for distressed firms. The 1978 and 1989-90 changes should each affect the level of friction in the reallocation process. We thus expect the 1978 reforms to lead to an upward shift in the pre-delisting pattern of returns and the 1989 changes to lead to a downward shift.

The distress delisting year dummy coefficients in Table 6 indicate that the trajectory of returns shifted abruptly following both changes in the distress reallocation process. There was substantial controversy in the years following the 1978 change over its effect on bankruptcy costs and the ease of corporate reorganization. Edward Altman concluded in 1982: “In general, the new Code is easier to work with and compromise is much more likely than before. . . . On balance, the new code could even be less difficult, and probably will be shown to be less costly.” Our data show that, after the 1978 changes, the coefficients on the *LateYearDum* variables increased in magnitude and became statistically significant—that is, value losses for to-be-delisted firms were smaller. All six coefficients between 1979 and 1984 are positive and significant at the 10% level. Four of the six are significant at the 5% level.

The 1989-90 changes also led to a shift in the pre-delisting pattern of returns. The failure of Drexel in 1989 left a large void in the workout process for firms with high-yield debt in their capital structures. Whereas before 1989 Drexel had played an important role in facilitating voluntary workouts of distressed firms, after 1989 such workouts became more difficult to arrange. This

situation was exacerbated by the LTV decision in 1990, in which the court ruled that agreements reached in pre-bankruptcy voluntary workouts might not be honored by the bankruptcy court if the distressed company ever filed for bankruptcy. This ruling had a chilling effect on the voluntary workout process (Wruck, 1990). Our data provide some evidence on the effects of these changes on the values of firms approaching distress delisting. Following 1989, the trajectory of returns shifts down. All six of the coefficients between 1990 and 1995 are negative, with four of the six significant at the 5% level.

Finally, we find that the correlation between the late year dummies for distress delistings and the takeover rate is positive and significant: when takeovers provide an alternative mechanism for reallocating resources, firms approaching financial distress lose less of their value.

The results presented in this section further support the hypothesis that takeover and distress delistings are mechanisms for reallocating resources among firms and managers. When these mechanisms are working smoothly, less value is lost by firms on their way to delisting. We also provide some evidence that they are substitute mechanisms: we see that changes in takeover rates affect the pre-delisting value trajectories of both takeover and distress delistings. These correlations across alternate delisting mechanisms suggest that the two delisting modes—takeovers and distress delistings—serve a similar purpose in reallocating assets in the economy.

#### *Are Takeover and Distress Delistings Substitutes?*

In Section 3, we noted that the takeover rate was negatively correlated with the rate of distress delistings and suggested that this might indicate that these two mechanisms were substitute ways of redeploying assets in the economy. In this subsection, we examine this negative correlation more closely, controlling for some macro-economic effects to see whether the correlation is spurious. As a first step, we regress the distress delisting rate on a constant and the takeover rate. The first column of Table 7 reports the results of this simple regression. As expected, the coefficient on the takeover rate is negative and significant. Our next test is to control for the growth rate of the economy, under the hypothesis that a booming economy might lead to a higher takeover rate and lower

incidence of financial distress. As the second column of Table 7 shows, the negative relationship between the distress delisting rate and the takeover rate remains significant after controlling for the real change in GDP.

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**Place Table 7 about here**  
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As a third test, we break our 30 year period down into sub-periods, based on general trends in the economy and changes in the regulatory and institutional environment for takeovers and bankruptcy. The five periods are shown in panel B of Table 7. It is interesting to note that there is no strong negative relationship between takeover and distress delisting rates across the periods: some periods have high distress delisting rates and low takeover rates, but there are also other combinations. We then regress the distress delisting rate on the takeover rate, GDP growth, and dummy variables for each period. The negative relationship between distress delistings and takeovers is even stronger and remains statistically significant. This robust negative relationship between the takeover rate and the distress delisting rate suggests that takeover and distress delistings are substitute mechanisms for redeploying assets in the economy.

## **7. Firm Characteristics and the Trajectory of Returns**

The characteristics of firms and their productive resources may also affect the pre-delisting pattern of returns. We examine a number of such characteristics, including firms' asset tangibility, size, profitability, stock price volatility, and leverage.

Shleifer and Vishny (1992) and Williamson (1988) suggest that the extent to which assets are redeployable affects their liquidation value. While those analyses focused on the prices that different classes of buyers would be willing to pay for liquidated assets, similar logic applies to the more broadly defined productive resources that we examine here. The price that a productive resource will yield in the factor market depends in large part on its redeployability. Returning to the resource characteristics discussed in the introduction, physical assets are likely to be most redeployable, followed by intangible assets, while specialized and tacit knowledge are the least redeployable.

This logic suggests that the redeployability of a firm's productive resources will affect its value losses prior to delisting. Firms with more tangible assets should experience smaller value losses, while those that rely on less redeployable assets will experience larger declines. We use both the market-to-book ratio and the fraction of a firm's book assets that are property, plant and equipment as proxies for the redeployability of firms' productive resources. Firm profitability, as measured by operating profit over book value of assets, is another measure of the degree to which firms generate profits with tangible as opposed to intangible assets. We include this measure in the regressions as well.

We also examine the effect of firm size on the pre-delisting pattern of returns. We use a firm's sales (in 1990 dollars) and its market capitalization as a percentage of total market capitalization to represent size.

We include several controls in the regressions. These include leverage (the book value of debt over the book value of assets), stock price volatility (the standard deviation of the monthly abnormal returns from ten years before to one year before delisting), equity Beta (from the CRSP data base), as well as the takeover and distress delisting rates in the year of delisting.

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**Place Table 8 about here**  
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Table 8 presents definitions for variables used in these regressions. For this analysis, we do not use the panel dataset, but rather construct datasets on takeover and distress delistings with one observation per firm. Means for the variables are reported in Table 9.

For takeovers, we use firm characteristics to predict value loss (or gain) from 10 years to one year before delisting. We measure firm characteristics at two different times prior to delisting: nine years before and five years before. The dependent variable in the regressions that use firm characteristics in year 1 (9 years before delisting) is the change in value relative from nine years before to one year before delisting. The dependent variable in the regressions that use firm characteristics measured in year 5 (5 years before delisting) is the change in VREL from five years before to one year before delisting.

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**Place Table 9 about here**  
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Table 10 reports the results of a model predicting the depth of the trough for takeover delistings. We expect the factors that make a company more difficult or less valuable to take over—larger size, more intangible assets, a lower fraction of PPE-type assets—will result in greater value losses in the periods prior to takeover.

Columns 1 and 2 present results for two specifications that estimate VREL for the firm in year 9 as a function of characteristics of the firm in year 1. The trough is deeper (firms have smaller VRELS) for large firms and for firms with high market-to-book ratios. It is also deeper for firms with volatile stock prices, and less deep for highly-leveraged firms.

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**Place Table 10 about here**  
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Columns 3 and 4 report results for the period from five years to one year before delisting, as a function of firm characteristics in year 5. Roughly the same pattern emerges: large firms and firms with intangible assets (high market-to-book) lose more of their value before being taken over.

These results are broadly consistent with the hypothesis proposed above—the process by which firms disappear, and the value consequences of this process, depend on the firm’s characteristics and the ease with which it can be taken over. Small firms, firms with low market-to-book ratios, and firms with high leverage may well be easier to take over and, as a consequence, lose less of their value in advance of the transaction.

We repeat the four specifications for distress delistings in order to examine how firm characteristics affect the pre-distress delisting pattern of returns. Table 11 shows these results. Again, large firms and those with volatile stock prices lose more of their value before delisting, as do firms with highly intangible assets. There is also some indication, in columns 1 and 2, that firms with more property, plant and equipment as a fraction of their assets lose less value going into financial distress.

Neither leverage, Beta, nor RoA appear to affect the magnitude of value losses. The distress delisting rate has an effect—if a firm delists during a period of significant distress delisting activity, it loses more value.

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**Place Table 11 about here**  
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## 8. Conclusions

The death of firms is central to the process of creative destruction in a capitalist economy. Without the economic grim reaper, productive resources—physical, intangible and human resources—would be less likely to move to higher valued uses, or into the hands of better managers. Economic development depends on innovation and this reallocation of productive resources. While some firms are able to reconfigure their assets and strategies to adjust to changing technology and tastes, many are not. The death of old firms and the subsequent birth of new ones thus greatly hastens economic development. Death by takeover allows a target firm's management to redeploy the assets of the disappearing firm; death by bankruptcy and liquidation often puts those assets into the market for reallocation to new managers.

In this paper, we examine equity market returns in the periods before firms delist in an effort to understand why and how firms die. We show that the disappearance rate from the New York and American Stock Exchanges is high: some 40% of firms disappear within ten years. We document a robust pattern in the returns of firms before they delist. Firms that will delist lose a significant fraction of their value in the period from ten years to one year before delisting. Firms that delist due to financial distress, on average, regain none of this value loss, but continue to lose value in their last year of life. Firms that are taken over rebound in the last year of their lives, regaining on average more than the value lost in the previous nine years.

We argue that this pattern of pre-delisting returns is consistent with a theory that puts the grim reaper at the center of the asset reallocation process. We examine this theory from a number of perspectives, asking how the legal and institutional environment surrounding the market for

corporate control and the bankruptcy process affects the values of firms before they delist. We find that an active takeover market increases the values of firms as they approach delisting, whether they are to delist due to takeover or due to financial distress. We also find evidence consistent with the notion that changes in the institutions and laws governing bankruptcy affect the friction with which the asset reallocation process operated. The 1978 bankruptcy law change that made reorganization easier appears to have increased the values of firms in financial distress; the meltdown of the junk bond market in 1989 and the LTV decision in 1990 appear to have made efficient asset reallocation significantly more difficult.

We also examine how characteristics of firms and their assets affect firm value before death. Again, if firm death is a part of the asset reallocation process, then the nature of a firm's productive resources should partially explain the pattern of pre-delisting returns. We find evidence consistent with this theory, showing that firms with more redeployable assets (a low market-to-book ratio) and small firms lose less of their value before delisting.

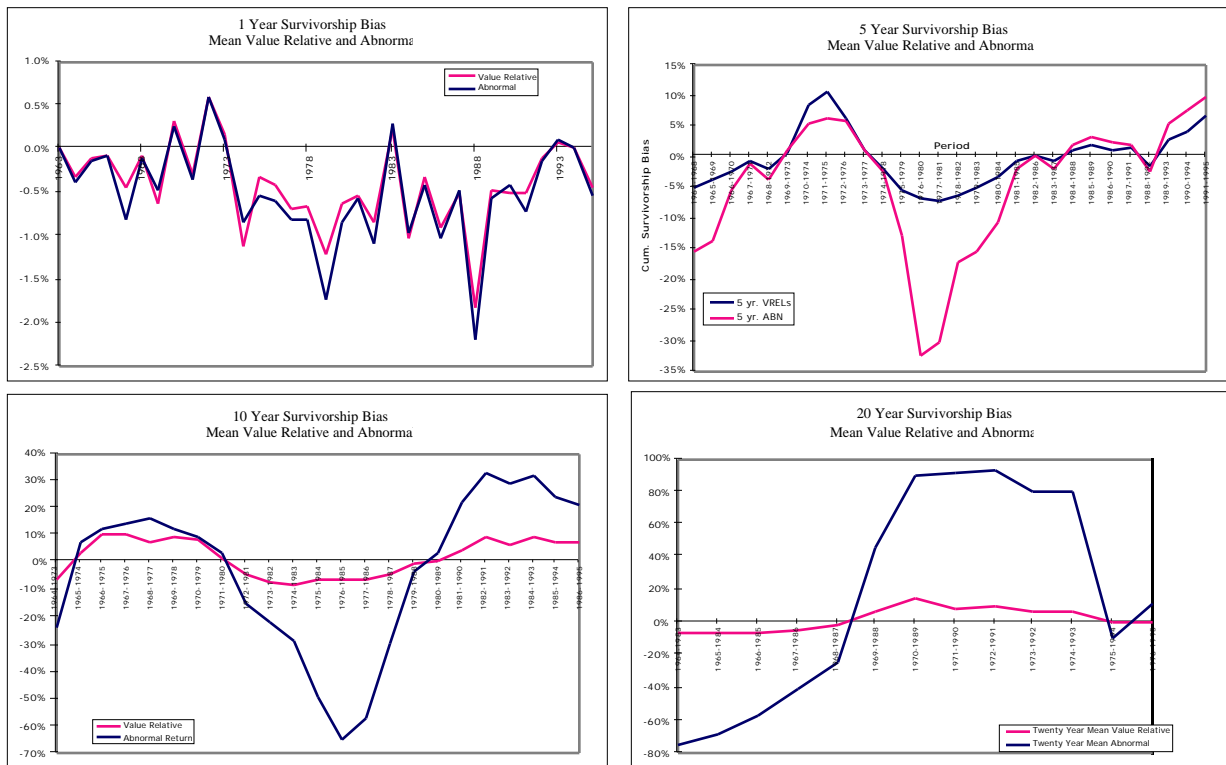
The costs and dislocations that occur when firms die—plant closings, layoffs, the destruction of communities—have been the subject of popular concern in recent years. At times it seems that politicians, workers, and especially managers, would like to put the economic grim reaper out of business. However, if firm death is an important part of the asset reallocation process, such a change would certainly lead to lower levels of allocative efficiency. While we cannot, with the data presented in this paper, prove that such a change would be inefficient, the set of results presented here are consistent with a Schumpeterian theory that gives firm death a central role in the process that reallocates assets to better managers and higher valued uses.

## Appendix A

### Survival Bias

Figures A1a, A1b, A1c, and A1d chart the ABNs and VRELS through time for firms that have survived for one, five, ten, and twenty years. The figures show that the direction and magnitude of the survival bias (end of holding period ABN and VREL) change over time and that the effects are dramatic in the 1980s. The performance (relative to the market) of firms that survive one, five, and ten years all became significantly negative in periods ending in the 1980s, indicating that these survivors underperformed the market. This is due to two factors: the healthy takeover premiums paid during this period, and the large number of takeovers. An active takeover market that raised takeover premiums for large numbers of firms appears to have led to the result that firms that survived the 1980s did worse than those that delisted during this period.

**Figure A1**  
**Survivorship Bias by Survival Duration through Time (4 Panels)**



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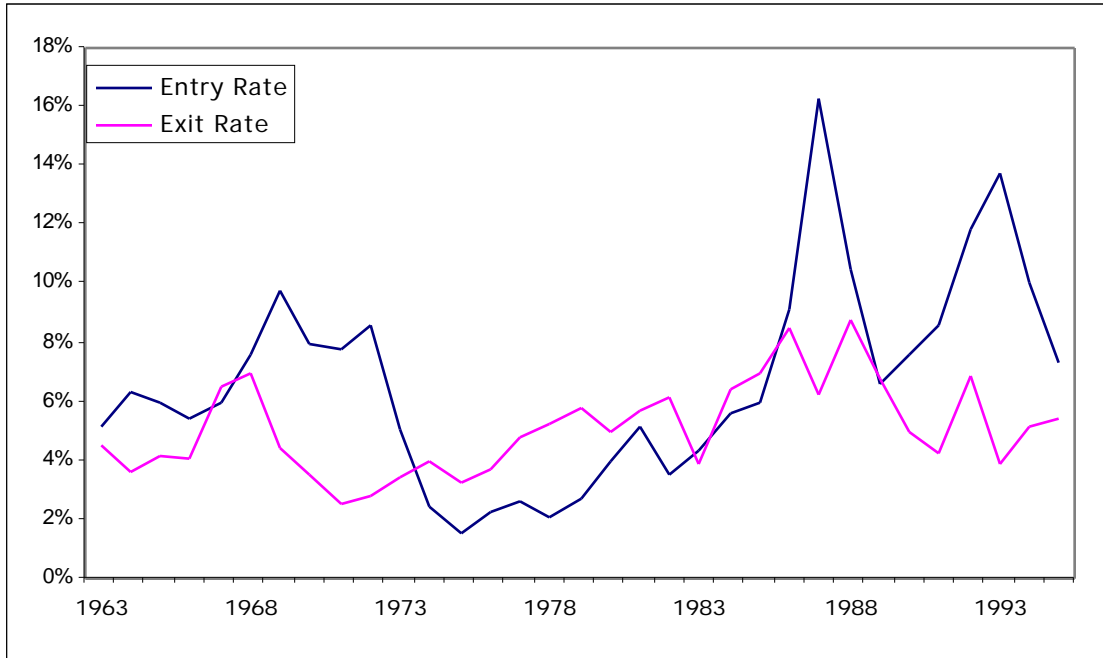
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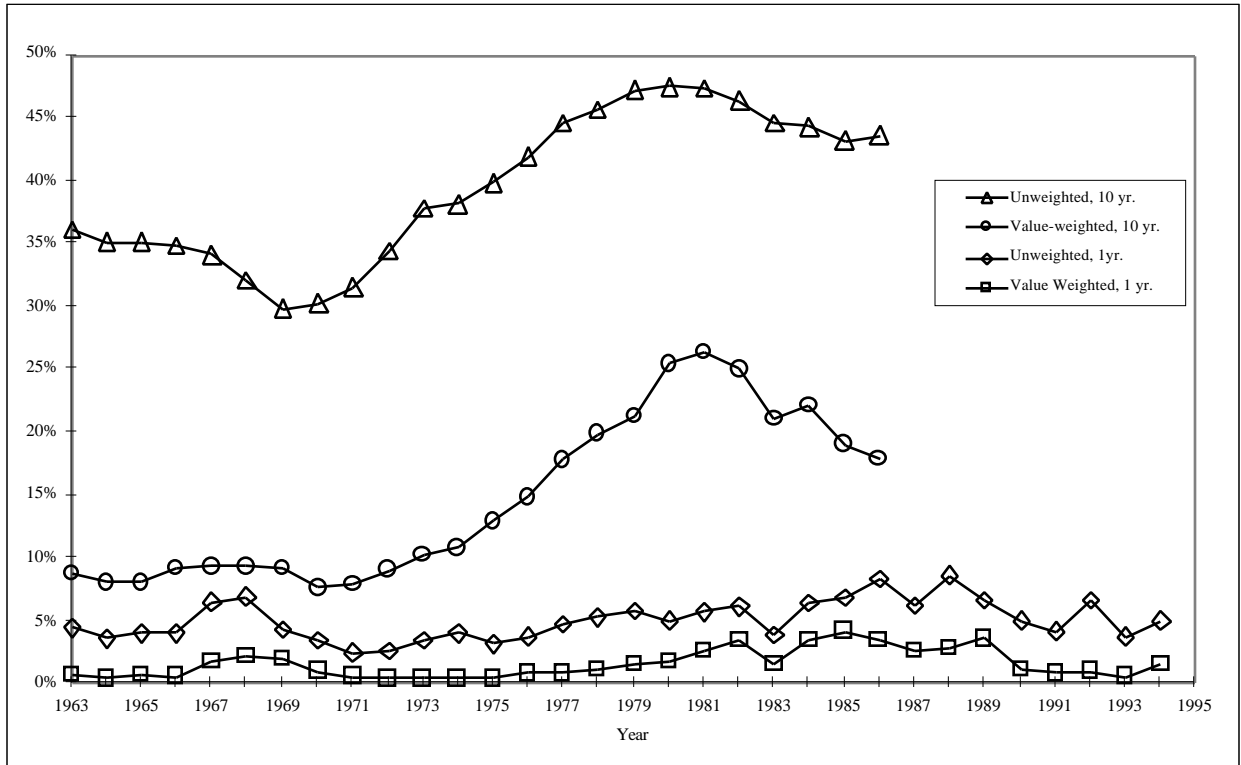
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**Figure 1**  
**Entry and Exit Rates on NYSE and AMEX, 1963-1995**

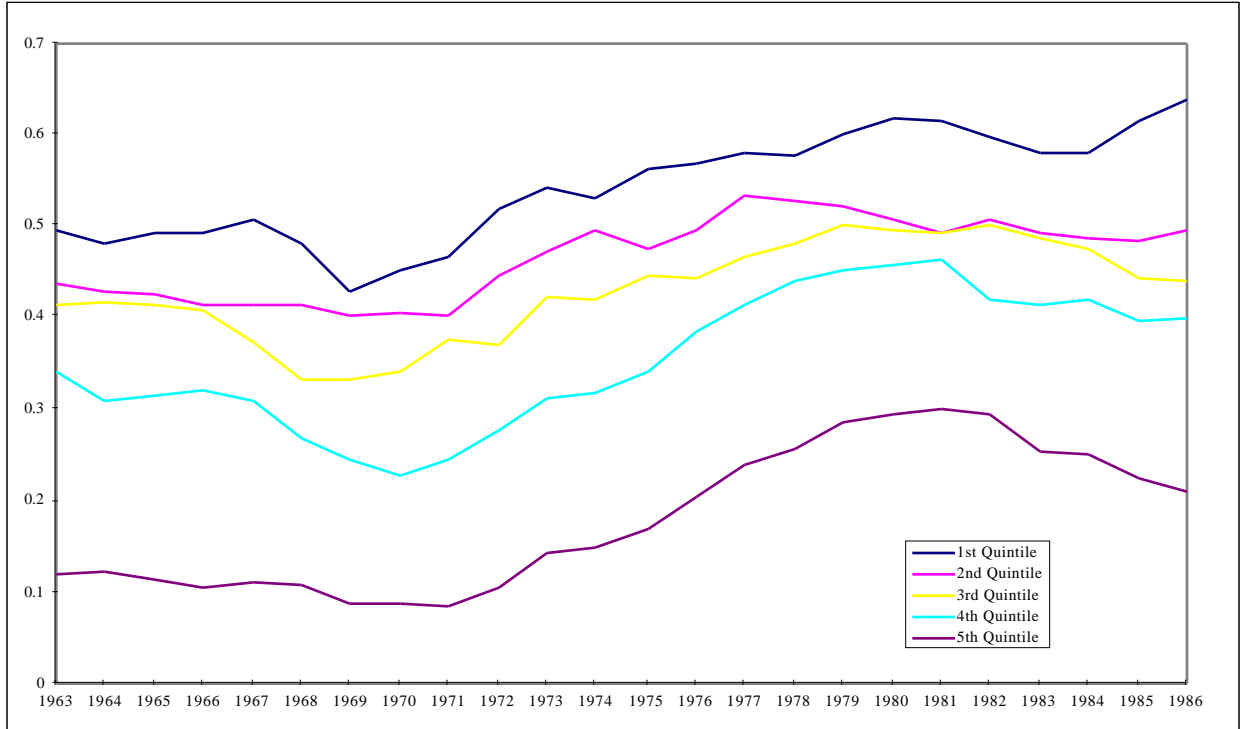


**Figure 2**  
**One-year and Ten-year Disappearance Rates**

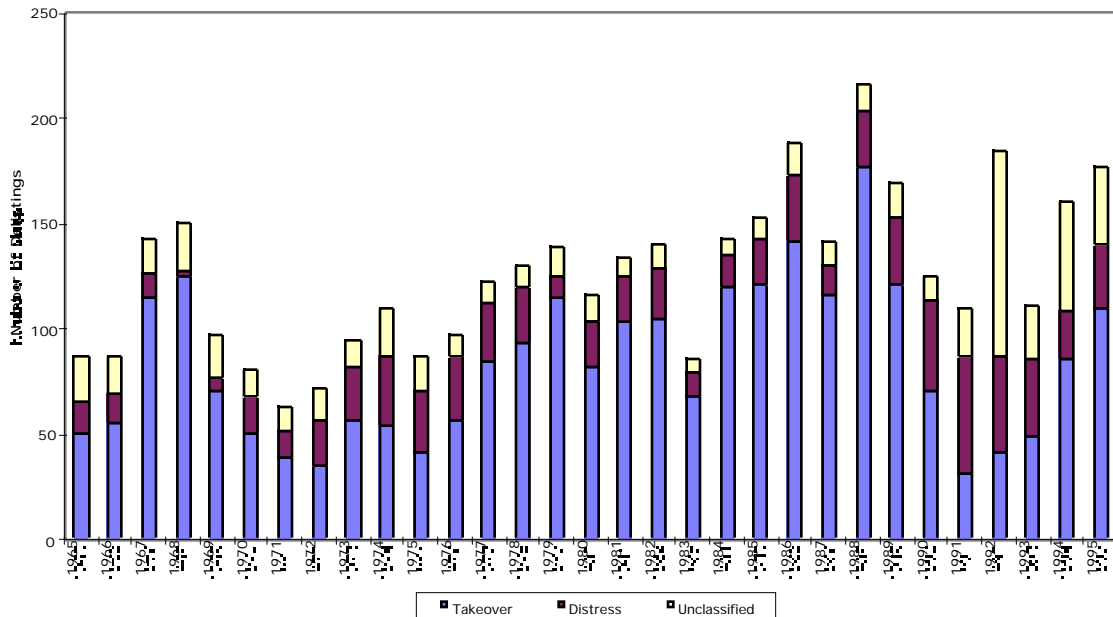


Note: Because our sample ends in 1995, ten-year survival rates cannot be calculated after 1986.

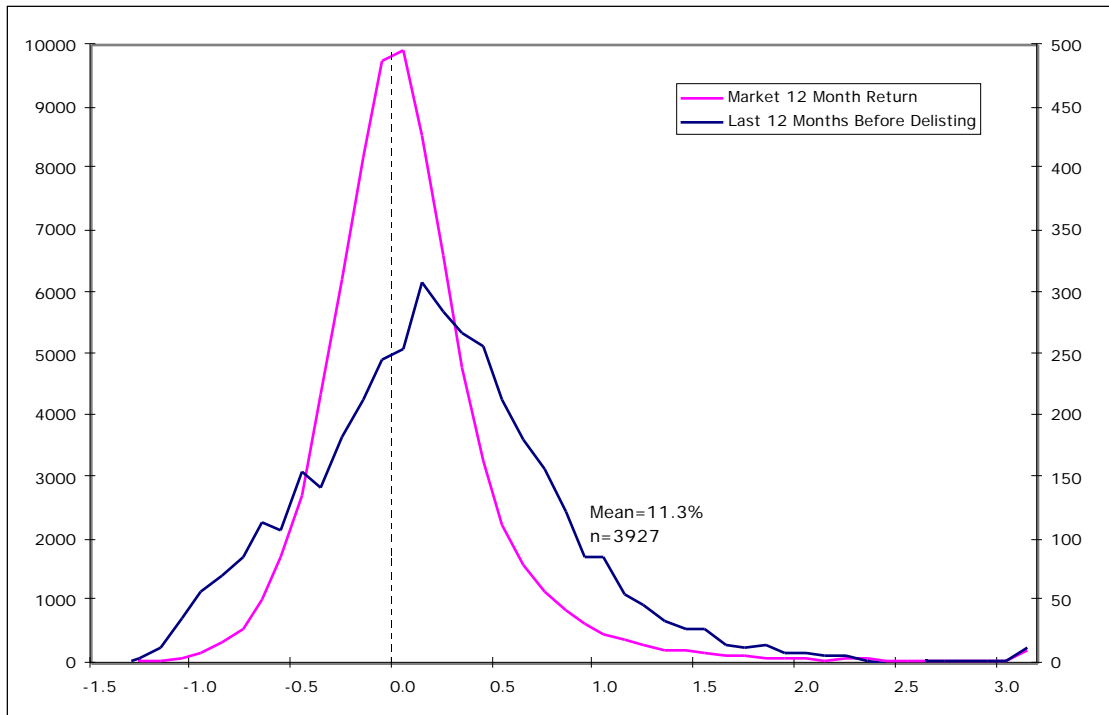
**Figure 3**  
**Ten-year Disappearance Rates by Size Quartile**



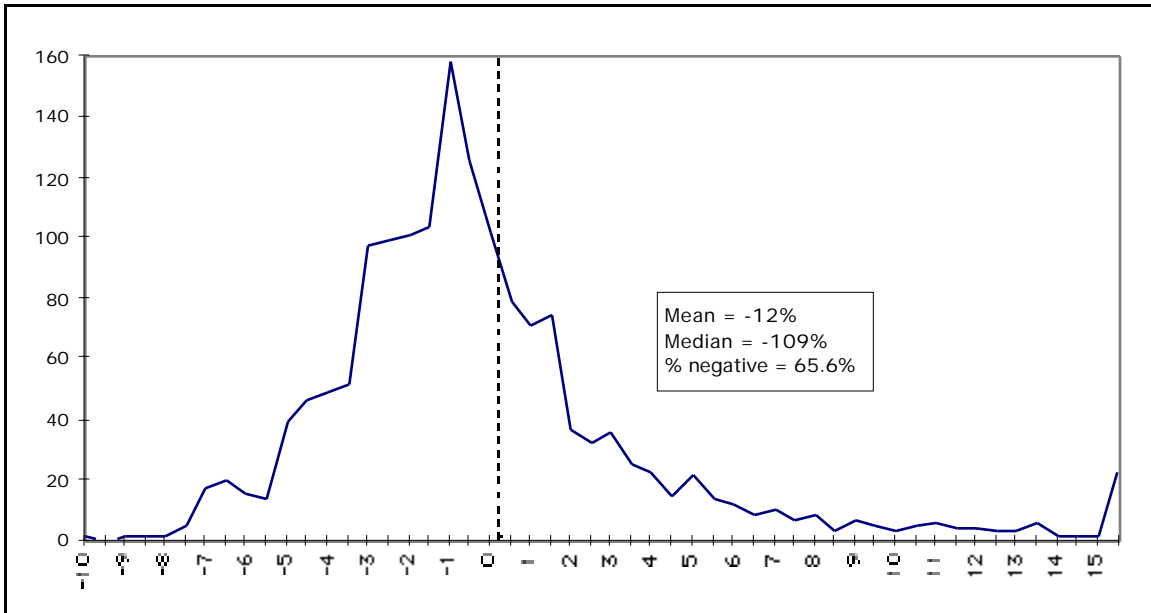
**Figure 4**  
**Delisting Reasons 1965-1995**



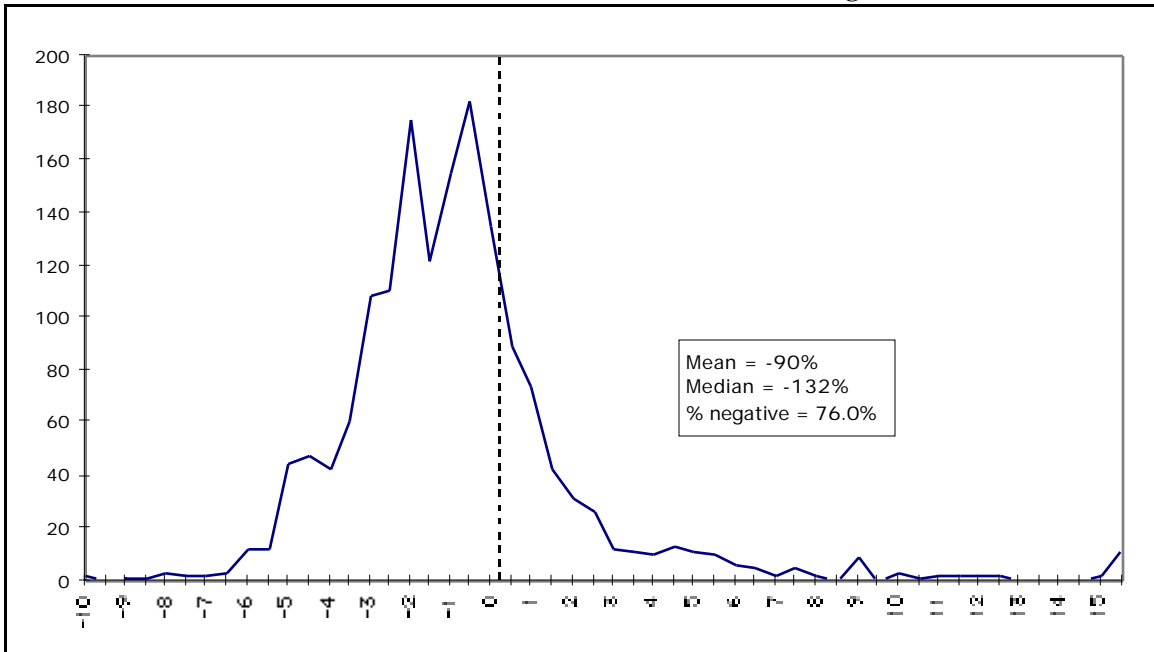
**Figure 5**  
**12 Month Abnormal Returns**



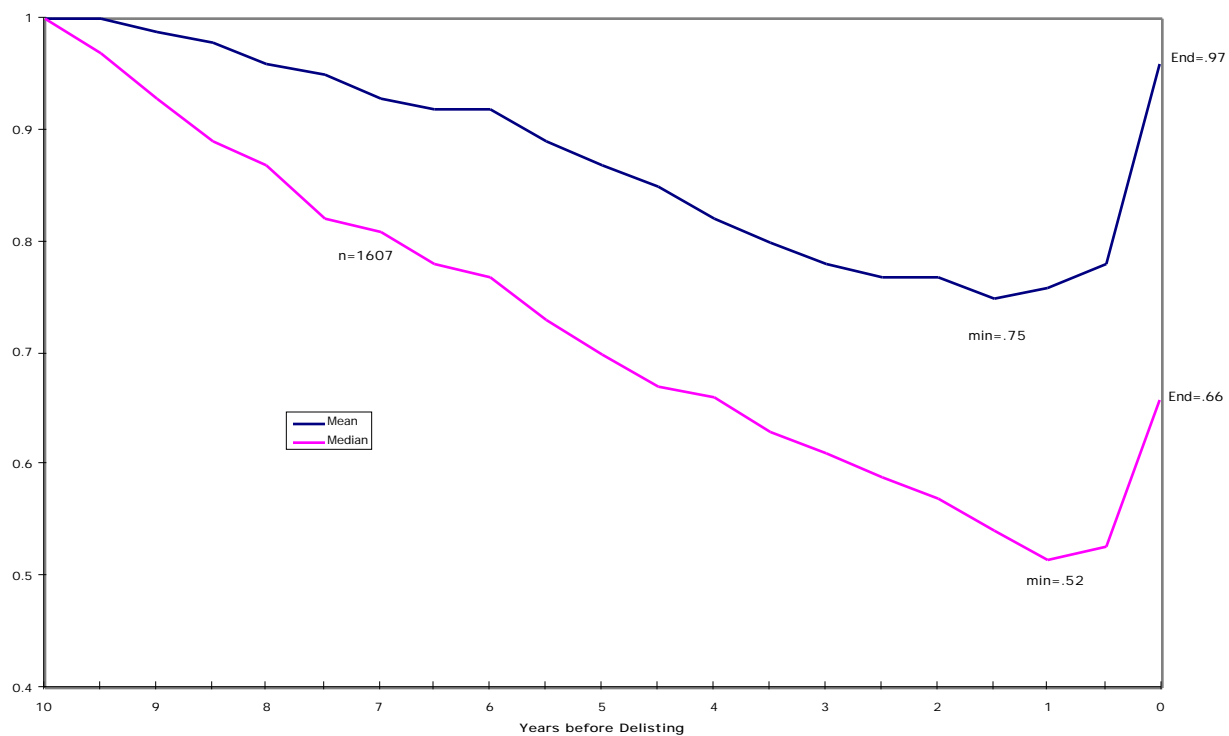
**Figure 6a**  
**10-year Abnormal Returns for Delisting Firms**



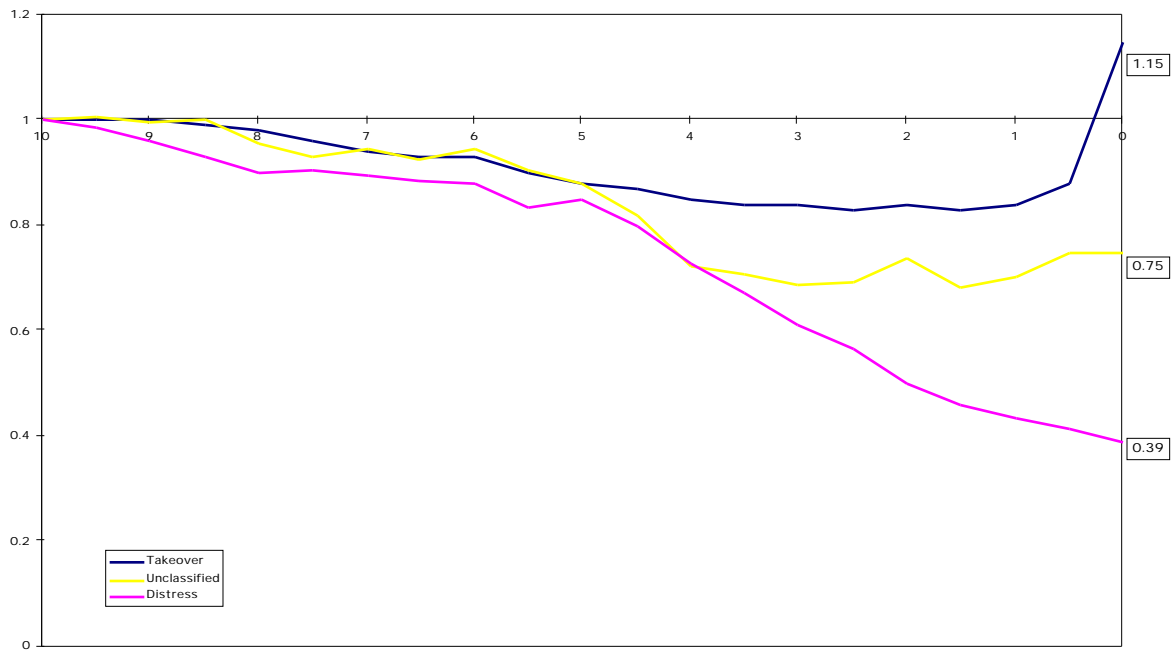
**Figure 6b**  
**Abnormal Returns for Delisting Firms**  
**From 10 Years Before to 1 Year Before Delisting**



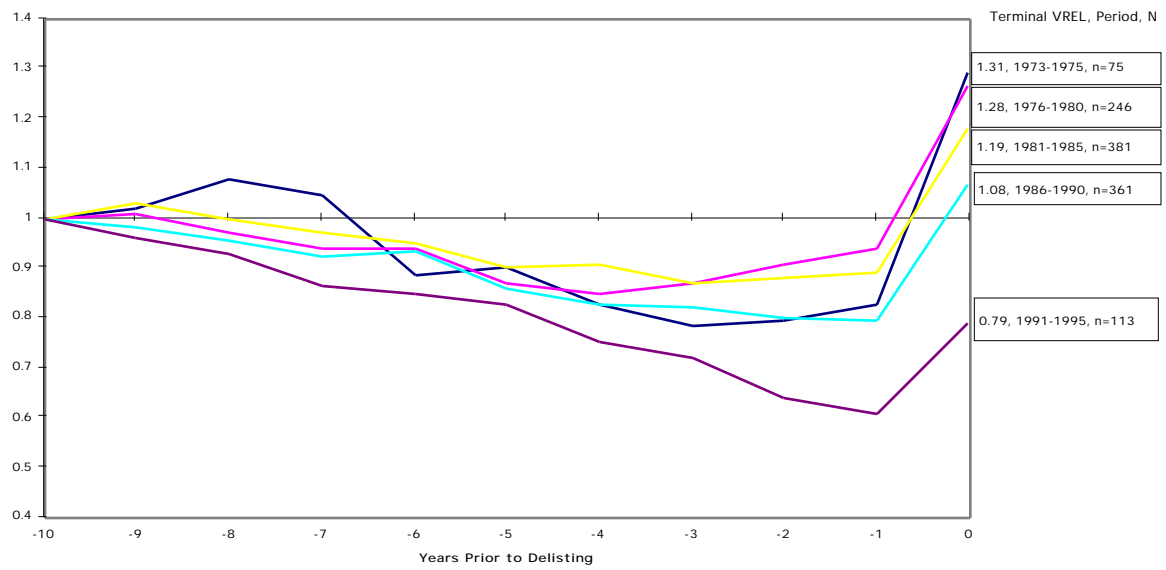
**Figure 7**  
**Value Relatives for Delisting Firms**



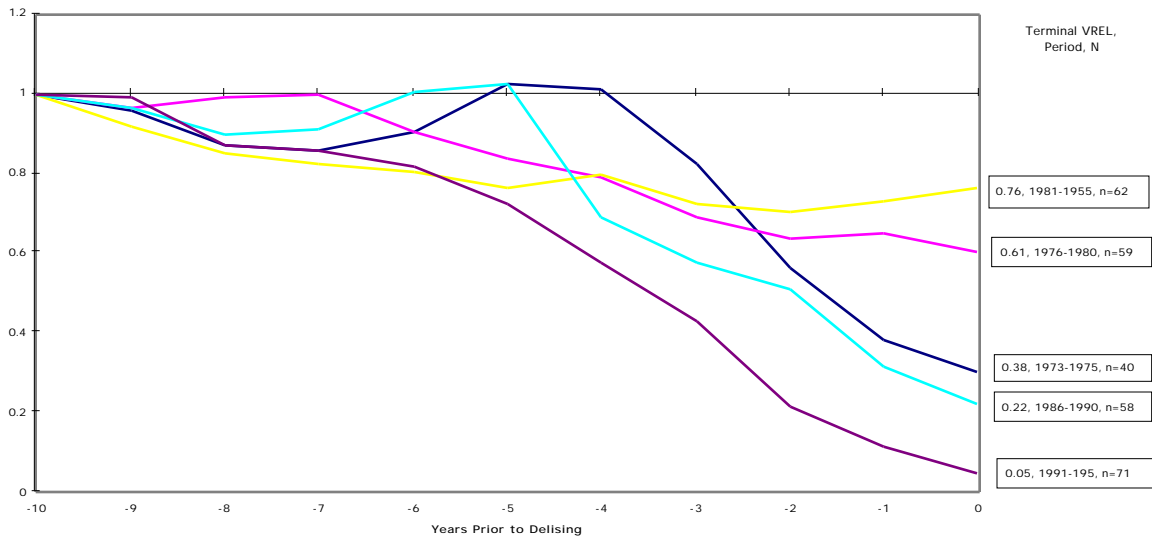
**Figure 8**  
**Mean VREL for 10 Years before Delisting, by Reason**



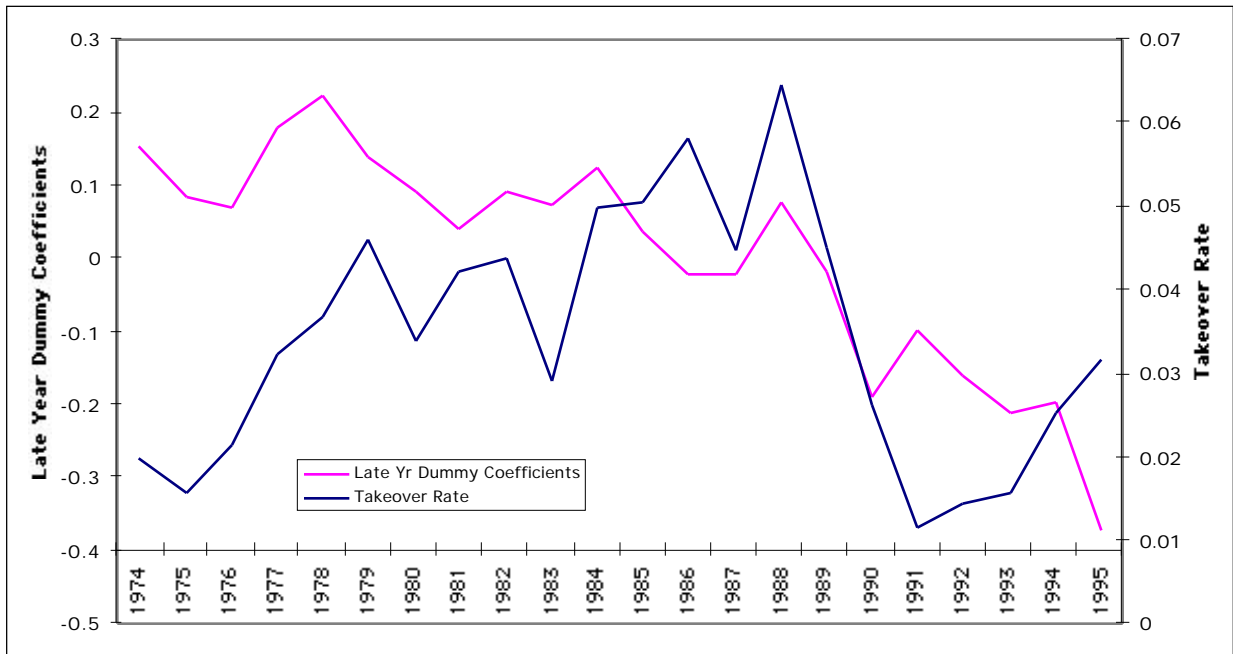
**Figure 9**  
**10 Year VRELs for Takeover Delists, by Half Decade**



**Figure 10**  
**10 Year VRELS for Distress Delists, by Half Decade**



**Figure 11**  
**Shifts in the Takeover Delisting Trajectory and Takeover Rate**



**Table 1**  
**Disappearance Rates**

	<u>1 yr.</u>	<u>10 yr.</u>
% of firms	5.0	39.4
% of value	1.6	14.6
By size quintile (% of firms):		
smallest	8.6	54.3
2	5.5	46.6
3	5.2	42.9
4	4.0	35.4
largest	1.8	18.0

**Table 2**  
**Delisting Reasons, 1963-1995**

<b>Reason for Delisting</b>	<b>Number Delisting</b>	<b>% of Total</b>
<b>Distress Delisting</b>		
Financial Distress	193	4.7%
Bankruptcy	392	9.5%
Liquidated	160	3.9%
Bank Bailout	1	0.0%
<b>Takeover Delisting</b>		
Friendly	1823	44.3%
Hostile	216	5.2%
White Knight	106	2.6%
Leveraged Buyout	204	5.0%
Can't Tell	264	6.4%
Bank Takeover	5	0.1%
<b>Unclassified</b>		
1963 and 1964 Delisting	164	4.0%
Can't find company	20	0.5%
No evidence of delisting	135	3.3%
Non-Bankruptcy Reorganization	171	4.2%
Delisted by Exchange (Other)	136	3.3%
Moved to another exchange	128	3.1%
<b>Total</b>	4118	100.0%
<b>Sources:</b>		
<i>Wall Street Journal Index</i>		
<i>Capital Changes Reporter</i>		
<i>Directory of Obsolete Securities</i>		

**Table 3**  
**Market-Adjusted Performance of Surviving Firms**

	Mean ABN	Mean VREL
1 year	-0.49	-0.41
5 years	-4.14	-0.26
10 years	-2.35	1.95
20 years	16.56	2.26

**Table 4**  
**Differences Between Distress and Takeover Delistings**

		Distress Delisting			Takeover Delisting			t-test for difference in means
		N	Mean	Std. Dev.	N	Mean	Std. Dev.	
<b>Sales in Year:</b> (in real 1997 \$000)	-10	229	\$14,192	\$39,911	1054	\$28,295	\$77,312	-2.7
	-9	226	\$17,646	\$53,952	1060	\$32,451	\$85,295	-2.5
	-8	230	\$20,736	\$62,004	1063	\$37,930	\$100,218	-2.5
	-7	234	\$22,178	\$61,690	1065	\$43,872	\$114,091	-2.8
	-6	237	\$23,941	\$66,169	1063	\$49,533	\$126,712	-3.0
	-5	237	\$26,326	\$71,605	1062	\$55,113	\$135,721	-3.2
	-4	240	\$27,184	\$72,078	1072	\$61,017	\$151,720	-3.4
	-3	241	\$27,431	\$70,195	1075	\$67,144	\$166,267	-3.6
	-2	236	\$25,909	\$66,316	1079	\$71,859	\$176,834	-3.9
	-1	154	\$22,090	\$54,508	453	\$98,363	\$228,200	-4.1
<b>Relative Market Value in Year:</b> (Market value of the firm over the total value of all firms in the market)	-10	284	8.50E-05	1.93E-04	1169	2.39E-04	5.07E-04	-5.0
	-9	284	7.78E-05	1.57E-04	1169	2.44E-04	5.44E-04	-5.1
	-8	284	7.99E-05	1.64E-04	1169	2.43E-04	5.51E-04	-4.9
	-7	284	7.89E-05	1.44E-04	1169	2.46E-04	5.37E-04	-5.2
	-6	284	7.60E-05	1.40E-04	1169	2.41E-04	5.71E-04	-4.8
	-5	284	6.44E-05	1.24E-04	1169	2.43E-04	6.17E-04	-4.9
	-4	284	5.30E-05	9.67E-05	1169	2.37E-04	5.72E-04	-5.4
	-3	284	4.33E-05	8.87E-05	1169	2.36E-04	5.53E-04	-5.8
	-2	284	3.62E-05	9.35E-05	1169	2.30E-04	5.67E-04	-5.7
-1	284	2.50E-05	7.42E-05	1169	3.09E-04	7.13E-04	-6.7	
<b>Hard Asset Intensity in Year:</b> (Property, Plant and Equipment over book value of assets)	-10	236	28.64%	0.21	1056	34.60%	0.21	-3.9
	-9	233	28.42%	0.21	1061	34.81%	0.21	-4.2
	-8	235	27.73%	0.21	1064	34.85%	0.21	-4.6
	-7	241	28.79%	0.22	1067	35.12%	0.22	-4.1
	-6	242	28.47%	0.22	1064	35.23%	0.21	-4.4
	-5	242	28.45%	0.22	1068	35.34%	0.21	-4.5
	-4	244	28.91%	0.22	1074	35.30%	0.21	-4.2
	-3	245	28.63%	0.22	1076	35.36%	0.22	-4.3
	-2	241	28.39%	0.23	1078	35.13%	0.22	-4.3
-1	159	28.89%	0.24	460	35.37%	0.22	-3.1	

(Table 4 continues on the next page)

**Table 4 (continued)**

		Distress Delisting			Takeover Delisting			t-test for difference in means
		N	Mean	Std. Dev.	N	Mean	Std. Dev.	
<b>Return on Assets in Year:</b>	-10	226	8.92%	0.19	1051	14.26%	0.09	-6.5
	-9	223	9.97%	0.08	1056	13.75%	0.14	-3.9
	-8	227	8.80%	0.10	1062	13.75%	0.08	-7.8
	-7	232	9.53%	0.10	1063	13.60%	0.09	-6.1
	-6	233	9.03%	0.09	1063	13.34%	0.08	-7.5
	-5	235	7.85%	0.09	1061	12.56%	0.16	-4.5
	-4	237	6.99%	0.10	1070	13.13%	0.08	-9.9
	-3	238	4.64%	0.12	1073	12.84%	0.13	-9.0
	-2	234	1.88%	0.14	1076	12.92%	0.10	-14.4
	-1	151	-6.99%	0.39	447	9.27%	0.56	-3.3
<b>Leverage in Year:</b> (Book value of debt over book value of equity)	-10	229	23.35%	0.19	1053	19.31%	0.15	3.6
	-9	228	22.96%	0.18	1058	19.66%	0.14	3.0
	-8	230	23.31%	0.19	1061	20.33%	0.15	2.6
	-7	236	25.79%	0.21	1064	20.05%	0.14	5.1
	-6	237	25.18%	0.20	1063	20.37%	0.14	4.4
	-5	237	27.37%	0.22	1067	20.61%	0.15	5.8
	-4	240	28.11%	0.24	1073	20.44%	0.14	6.5
	-3	243	27.40%	0.27	1076	20.65%	0.15	5.3
	-2	236	26.38%	0.28	1080	20.68%	0.16	4.2
	-1	157	38.65%	2.04	461	25.71%	0.64	1.2
<b>Leverage in Year:</b> (Book value of debt over market value of equity)	-10	224	33.96%	0.25	1040	29.37%	0.23	2.6
	-9	225	35.02%	0.26	1051	30.29%	0.23	2.7
	-8	228	37.08%	0.28	1059	32.07%	0.23	2.8
	-7	233	37.90%	0.27	1063	32.17%	0.23	3.3
	-6	235	39.88%	0.27	1062	32.92%	0.22	4.1
	-5	237	42.56%	0.27	1064	33.26%	0.22	5.6
	-4	240	44.58%	0.28	1071	32.41%	0.22	7.4
	-3	242	45.83%	0.29	1074	31.99%	0.22	8.3
	-2	235	46.78%	0.32	1079	30.83%	0.22	9.2
	-1	153	42.74%	0.37	457	34.76%	0.28	2.8

**Table 5**  
**Value Relatives Through Time, by Type of Delisting**

	Years Before Delisting									
	9	8	7	6	5	4	3	2	1	0
<b>Distress Delistings</b>										
N	284	284	284	284	284	284	284	284	284	284
Mean	0.961	0.899	0.894	0.880	0.848	0.730	0.612	0.502	0.433	0.389
Median	0.899	0.822	0.796	0.740	0.667	0.570	0.473	0.330	0.194	0.087
Standard Deviation	0.365	0.507	0.692	0.788	0.906	0.744	0.578	0.578	0.688	0.951
Percent <1	63%	66%	67%	70%	75%	75%	81%	86%	88%	88%
<b>Takeovers</b>										
N	1169	1169	1169	1169	1169	1169	1169	1169	1169	1169
Mean	1.003	0.978	0.944	0.930	0.877	0.852	0.837	0.836	0.840	1.145
Median	0.941	0.880	0.821	0.781	0.723	0.694	0.680	0.655	0.650	0.858
Standard Deviation	0.372	0.489	0.585	0.695	0.628	0.625	0.657	0.921	0.807	1.057
Percent <1	58%	62%	66%	67%	70%	71%	72%	72%	72%	57%
Difference in Means	0.042	0.079	0.050	0.050	0.029	0.122	0.225	0.334	0.407	0.756
Pooled Standard Error	0.024	0.033	0.045	0.051	0.057	0.048	0.039	0.044	0.047	0.064
t-stat on diff in means <>0	1.73	2.37	1.12	0.98	0.51	2.55	5.72	7.66	8.63	11.75

Sample is all firms that survive ten years before delisting (1169 takeovers and 284 distress delistings)

**Table 6**  
**Regression Analysis For Time Effects**

Dependent Variable Delist Type Variable	VREL Takeovers		VREL Distress	
	Coefficient	(st. error)	Coefficient	(st. error)
	INTERCEP <sup>1</sup>	1.012	(0.0245)	0.954
TOGODUM8	-0.023	(0.0286)	-0.050	(0.0587)
TOGODUM7	-0.055*	(0.0290)	-0.055	(0.0591)
TOGODUM6	-0.060**	(0.0294)	-0.047	(0.0603)
TOGODUM5	-0.134***	(0.0316)	-0.106*	(0.0630)
TOGODUM4	-0.159***	(0.0316)	-0.224***	(0.0630)
TOGODUM3	-0.240***	(0.0526)	-0.379***	(0.0839)
TOGODUM2	-0.232***	(0.0534)	-0.471***	(0.0863)
TOGODUM1	-0.214***	(0.0542)	-0.526***	(0.0882)
TOGODUM0	0.107 *	(0.0551)	-0.546***	(0.0912)
LYRDUM74	0.153 *	(0.0797)	0.029	(0.1159)
LYRDUM75	0.085	(0.0750)	0.128	(0.1173)
LYRDUM76	0.068	(0.0688)	0.083	(0.1226)
LYRDUM77	0.182 ***	(0.0655)	0.101	(0.1241)
LYRDUM78	0.225 ***	(0.0620)	0.099	(0.1190)
LYRDUM79	0.139 **	(0.0609)	0.209 *	(0.1136)
LYRDUM80	0.093	(0.0610)	0.273 **	(0.1115)
LYRDUM81	0.042	(0.0596)	0.265 **	(0.1139)
LYRDUM82	0.091	(0.0594)	0.201 *	(0.1180)
LYRDUM83	0.074	(0.0586)	0.370 ***	(0.1228)
LYRDUM84	0.124 **	(0.0576)	0.333 ***	(0.1229)
LYRDUM85	0.040	(0.0574)	0.127	(0.1241)
LYRDUM86	-0.018	(0.0586)	-0.005	(0.1293)
LYRDUM87	-0.019	(0.0605)	-0.082	(0.1228)
LYRDUM88	0.077	(0.0657)	-0.137	(0.1208)
LYRDUM89	-0.018	(0.0761)	-0.097	(0.1078)
LYRDUM90	-0.188**	(0.0875)	-0.255**	(0.1032)
LYRDUM91	-0.098	(0.0982)	-0.315***	(0.1089)
LYRDUM92	-0.160*	(0.0821)	-0.342***	(0.1114)
LYRDUM93	-0.212**	(0.0847)	-0.344**	(0.1378)
LYRDUM94	-0.198**	(0.0899)	-0.352*	(0.1814)
LYRDUM95	-0.372***	(0.1035)	-0.371	(0.2429)
R-squared	0.029		0.117	
number of observations	11,690		2,840	

\*\*\* significant at 1%    \*\* significant at 5%    \* significant at 10%  
1 statistical significance measured against the hypothesis that intercept = 1

**Table 7**  
**Relationship Between Distress Delisting Rate and Takeover Rate**

<b>Panel A: Dependent Variable is the Distress Delisting Rate</b>			
Independent Variable	Coefficient (Std Error)	Coefficient (Std Error)	Coefficient (Std Error)
Constant	0.013*** (0.002)	0.015*** (0.002)	0.011*** (0.002)
Takeover Rate	-0.12*** (0.046)	-0.11** (0.045)	-0.14** (0.049)
GDP Growth Rate		-0.0005* (0.0003)	-0.00029 (0.00024)
Period Dummy 1972-1979			0.0037** (0.0015)
Period Dummy 1980-1985			0.0047** (0.0017)
Period Dummy 1986-1989			0.0076*** (0.0020)
Period Dummy 1990-1995			0.0071*** (0.0015)
*** significant at 1%      ** significant at 5%      * significant at 10%			
<b>Panel B: Delisting Rates in Periods</b>			
Period	Distress Delisting Rate	Takeover	Delisting Rate
1965 - 1971	0.51%		3.31%
1972 - 1979	0.98%		2.62%
1980 - 1985	0.83%		4.63%
1986 - 1989	0.99%		5.40%
1990 - 1995	1.41%		2.24%

**Table 8**  
**Variable Definitions**

<b>Variables</b>	
VREL1	The value relative in year 1, 9 years before delisting
VREL5	The value relative in year 5, 5 years before delisting
VREL9	The value relative in year 9, 1 year before delisting
Sales	Sales in constant 1990 dollars
Size	Market value of the firm's equity over the combined equity values of all firms in the market
Mkt/Book	Market value of equity over (book value of assets – book value of debt)
PPE/Assets	Book value of property, plant and equipment over book value of assets
RoA	Operating profit over book value of assets
Debt/Assets	Book value of debt over book value of assets
Volatility	Standard deviation of monthly returns from 119 to 12 months before delisting
Beta	Equity Beta for each year from the CRSP database.
Takeover rate	The number of takeovers over the number of firms trading in the year of delisting
Distress rate	The number of distress delistings over the number of firms trading in the year of delisting

**Table 9**  
**Means of Regression Variables**

	<b>Takeover Delistings</b>		<b>Distress Delistings</b>	
	N	Mean	N	Mean
VREL9÷VREL1	1055	0.88	230	0.45
VREL9÷VREL5	1055	1.02	230	0.57
VREL10÷VREL9	1055	1.39	230	0.65
Log(Sales in Yr. 1)	973	8.69	194	7.89
Log(Sales in Yr. 5)	980	9.34	202	8.36
Log(Size in Yr. 1)	1055	-9.56	230	-10.55
Log(Size in Yr. 5)	1055	-9.62	230	-10.76
Mkt/Book in Yr. 1	964	0.91	189	0.81
Mkt/Book in Yr. 5	982	0.71	200	0.69
PPE/Assets in Yr. 1	975	0.36	195	0.31
PPE/Assets in Yr. 5	982	0.37	202	0.31
Return on Assets in Yr. 1	973	0.15	192	0.10
Return on Assets in Yr. 5	982	0.14	200	0.10
Debt/BV Assets in Yr. 1	975	0.19	194	0.22
Debt/BV Assets in Yr. 5	983	0.20	202	0.25
Market Value Volatility	1055	0.10	230	0.14
Takeover rate in year delisted	1055	0.042	230	0.032
Distress delisting rate in year delisted	1055	0.009	230	0.011

**Table 10**  
**Regressions on Firm and Resource Characteristics—Takeover Delistings**

Dep. Variable	VREL9÷VREL1 (uses data on the firm from year 1)	VREL9÷VREL1 (uses data on the firm from year 1)	VREL9÷VREL5 (uses data on the firm from year 5)	VREL9÷VREL5 (uses data on the firm from year 5)
Constant <sup>1</sup>	2.26*** (0.24)	0.31 (0.25)	1.95*** (0.21)	0.41* (0.22)
Ln(Sales)	-0.097***(0.017)		-0.082***(0.014)	
Ln(Size)		-0.112***(0.020)		-0.087***(0.018)
Market/Book	-0.16*** (0.033)	-0.061* (0.034)	-0.182***(0.039)	-0.111***(0.041)
PPE/Assets	0.046 (0.14)	0.23 (0.15)	-0.063 (0.12)	0.046 (0.12)
RoA	-0.54 (0.34)	-0.67** (0.34)	0.66** (0.34)	0.62* (0.34)
Leverage	0.38* (0.21)	0.19 (0.21)	0.35* (0.18)	0.17 (0.18)
Volatility	-3.96*** (0.89)	-4.81*** (0.94)	-1.37* (0.75)	-1.65** (0.80)
Beta	0.030 (0.041)	0.066 (0.043)	-0.117***(0.038)	-0.081** (0.040)
Takeover Rate	1.71 (2.04)	0.46 (2.02)	3.11* (1.67)	1.39 (1.64)
Distress Rate	-10.58 (8.57)	-16.29* (8.48)	-5.82 (7.33)	-9.35 (7.31)
N	946	947	955	956
R-squared	.073	.075	.070	.063

\*\*\* significant at 1%    \*\* significant at 5%    \* significant at 10%

<sup>1</sup> t-stats for the constant are calculated for the hypothesis that the coefficient is different from 1.

**Table 11**  
**Regressions on Firm and Resource Characteristics—Distress Delistings**

Dep. Variable	VREL9÷VREL1		VREL9÷VREL1		VREL9÷VREL5		VREL9÷VREL5	
	(uses data on the firm from year 1)		(uses data on the firm from year 1)		(uses data on the firm from year 5)		(uses data on the firm from year 5)	
Constant <sup>1</sup>	2.14***	(0.44)	0.19	(0.59)	2.37***	(0.40)	0.85	(0.55)
Ln(Sales)	-0.12***	(0.033)			-0.13***	(0.030)		
Ln(Size)			-0.10**	(0.043)			-0.054	(0.042)
Market/Book	-0.15**	(0.071)	-0.032	(0.070)	-0.09	(0.06)	-0.021	(0.062)
PPE/Assets	0.62**	(0.31)	0.59*	(0.32)	0.31	(0.26)	0.30	(0.28)
RoA	0.22	(0.27)	0.15	(0.27)	0.45	(0.57)	0.17	(0.60)
Leverage	-0.184	(0.36)	-0.15	(0.37)	-0.03	(0.29)	-0.116	(0.30)
Volatility	-4.09***	(1.23)	-4.64***	(1.29)	-2.80**	(1.16)	-2.76**	(1.28)
Beta	-0.031	(0.067)	-0.016	(0.07)	-0.13*	(0.07)	-0.10	(0.07)
Takeover Rate	2.35	(3.94)	2.64	(4.04)	3.02	(3.76)	2.22	(3.94)
Distress Rate	-20.36	(17.27)	-30.34*	(17.39)	-33.38*	(17.02)	-45.93***	(17.47)
N	182		182		195		195	
R-squared	.181		.144		.186		.114	

\*\*\* significant at 1%    \*\* significant at 5%    \* significant at 10%

<sup>1</sup> t-stats for the constant are calculated for the hypothesis that the coefficient is different from 1.

## Endnotes

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- \* We thank Richard Caves, Stuart Gilson, Paul Gompers, Brian Hall, Julio Rotemberg, Art Schleifer, Oliver Williamson, Karen Wruck, two anonymous referees, and participants at several seminars at Harvard University for helpful comments. We also thank Nicole Agnew, Xiomeng Tong, Sherry Roper, William Simpson, and Sarah Woolverton for research assistance.
- \* We thank Richard Caves, Stuart Gilson, Paul Gompers, Brian Hall, Julio Rotemberg, Art Schleifer, Oliver Williamson, Karen Wruck, two anonymous referees, and participants at several seminars at Harvard University for helpful comments. We also thank Nicole Agnew, Xiomeng Tong, Sherry Roper, William Simpson, and Sarah Woolverton for research assistance.
- <sup>1</sup> Cable and Schwalback (1991) report average entry rates (measured across eight countries) of 6.5%, accounting for a market share of 2.8%. Dunne, Roberts, and Samuelson (1988) report an average annual entry rate of 6.8% in four-digit U.S. manufacturing industries. Geroski (1991) reports an average entry rate of 6.5% in U.K. manufacturing. Tybout (1996) reports average entry rates of about 4% in Chile, and Roberts (1996) reports entry rates of over 11% in Colombia.
- <sup>2</sup> In part this is because economists have failed to follow Schumpeter's advice to focus on the dynamic process of a capitalist economy.
- <sup>3</sup> Number of entrants (exiting firms) measured as a percentage of the number of firms trading in January of each year. These figures are similar to those reported in studies of all (not just public) manufacturing firms, based on the Census of Manufacturers (see footnote 1).
- <sup>4</sup> Thus, if one chooses 100 firms trading on NYSE or AMEX in 1975, only 61 will still be trading by 1985.
- <sup>5</sup> The remainder delisted for some other reason, or we were unable to identify the reason for delisting
- <sup>6</sup> This "resources-based" view of the firm was developed in Penrose (1968) and extended by Wernerfelt (1984).

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<sup>7</sup> McGuckin and Hguyen (1995) report results consistent with the idea that some successful firms will be taken over. In a comprehensive analysis of 28,294 plants in the U.S. food processing industry (SIC 20), they find that prior to ownership changes, large plants had below-average productivity, but small plants had above-average productivity. In a review article, Caves (1998) interprets this combination of results as indicating that takeovers of large plants leads to better asset utilization, while takeovers of small plants may serve to provide the resources needed to more fully exploit opportunities.

<sup>8</sup> Palepu (1986) finds that firm size, measured as book value of assets, is significant in a takeover probability model.

<sup>9</sup> We use the CRSP monthly returns tape, which begins including AMEX firms in 1963. NASDAQ firms, which CRSP begins to include in 1973, are excluded. We establish entry and exit dates from the header file, which we confirm with data from the returns file. When a returns array contains missing returns, we do one of three things. If there are monthly returns before the beginning or after the end of the trading period specified by the header information, we adjust the trading period to reflect the actual returns history. If there are intermediate missing values and CRSP's "returning" return includes the performance during the missing months, we "fill in" the missing returns by giving the firm the market return that month plus or minus whatever adjustment is necessary to make the cumulative return during the missing spell equal the CRSP returning return. In 33 instances where we could not fill in the missing returns because the CRSP returning return did not include performance during the missing months, we split the securities' returns arrays into two different arrays, and treat them as separate securities.

<sup>10</sup> Number of entrants (exiting firms) measured as a percentage of the number of firms trading in January of each year. This compares to annual entry and exit rates 6.73% and 6.22% for establishments (imputed from Dunne, Roberts, and Samuelson, 1988).

<sup>11</sup> This difficulty with value-weighting leads us to a particular choice of a market benchmark, described in Section 4.

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- <sup>12</sup> This is consistent with Mansfield's (1962) result on size and exit rates.
- <sup>13</sup> 164 firms that delisted in 1963 and 1964 are excluded from future analysis, since we had very short returns histories for these firms.
- <sup>14</sup> These figures exclude the 1963 and 1964 delistings, and therefore differ slightly from the subtotals in Table 2, which include the 1963 and 1964 delistings as unclassified.
- <sup>15</sup> The unclassified delistings for 1992 total 97, by far the highest for any year. This total is somewhat misleading, as 72 of these delistings were artificial securities traded under the "Americus Trust" brand.
- <sup>16</sup> To explain this, imagine that over a ten year period, a security increased in value three-fold, but the market went up five-fold. The VREL would be 0.6—i.e. the firm lost 40% of its value relative to a market portfolio. The ABN would be -200%:—the firm lost 200% of its value?
- <sup>17</sup> The fraction of market value recovered is arbitrary due to our choice of a ten-year window in which to measure value relative returns.
- <sup>18</sup> From this point on in the paper, we focus on the subsample of firms that trade for ten years prior to delisting, and are taken over or delist due to financial distress. This sample of firms (1169 takeovers and 284 distress delistings) is made up of firms that are very likely to be included in Compustat, so we can collect accounting data for these firms while suffering only a small sample size reduction. Matching the entire CRSP sample to Compustat would result in a much larger reduction in sample. For all analyses that use accounting data, we also exclude firms in the financial sector (SIC 6000).
- <sup>19</sup> Multivariate analysis confirms these results. We ran a logistic regression predicting takeover versus distress delisting for firms that ultimately dislisted. All variables (return on assets, sales, book value leverage, and intangible asset intensity) were significant in all years prior to delisting, with the exception of the last year before delisting.

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<sup>20</sup> Indeed, when we attempted to predict (with a logit model) the fates of these firms based on our performance trajectories, we got a model with almost no predictive power.

<sup>21</sup> There is controversy in the literature about the true effect of state anti-takeover laws. Comment and Schwert (1995) find no evidence that the laws themselves deterred takeovers, blaming instead a credit crunch and the recession of 1990 for the collapse of the takeover market. For a discussion of changes in state anti-takeover laws, and their potentially chilling effects on takeovers, see Bertrand and Mullainathan (1997). See also Easterbrook and Fischel (1991). A recent paper by Bebchuk, Coates, and Subramanian (2001) re-examines the Comment and Schwert results, and finds that state anti-takeover statutes, in combination with certain other corporate charter features, has had a significant negative effect on the success of takeovers.