

Financial Distress As A Selection Mechanism: Evidence From The United States*

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Abstract:

This paper analyzes financial distress as a selection mechanism. We follow the process of financial distress from its onset to its resolution for a sample of 102 firms that enter financial distress between 1979 and 1983. Only a little more than one-third of firms survive as independent companies. The main selection pressure comes from the acquisition market. Poor operating performance is not tolerated for long. The number of firms reporting negative operating income declines dramatically within a few years after the onset of financial distress, mainly due to the large number of firms that are acquired. A firm's short-run and long-run survival probability is positively affected by its operating performance, and the effect appears to be relatively strong. The only other factor systematically increasing a firm's survival probability is the willingness of creditors to take an equity stake in the firm. The roughly one-third of firms that survive financial distress as independent companies appear to be economically viable. They perform about as well as the industry median firm after emerging from financial distress and have overcome their financial difficulties within a median time of less than 3 years. Overall, the evidence suggests that there is substantial asset reallocation away from poorly performing firms and relatively little excessive continuation of inefficient firms.

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I. Introduction

Financial distress occurs when a firm cannot meet its debt obligations or has to restructure its debt to avoid a default. Because the inability to make debt payments may lead to the acquisition or liquidation of a firm, financial distress is an important selection mechanism. One of the central questions debated about financial distress is the efficiency of this selection process. Do the “good” firms survive while the “bad” firms do not, suggesting that assets of poor performers are reallocated to presumably better uses while the assets of good performers are retained within the firm and kept in their most efficient use? This question is of importance because it affects the efficiency of the resource allocation in the economy. It also has implications for economic policy. If the selection process is inefficient, it is desirable to reform the institutions affecting it, including bankruptcy law. However, bankruptcy law does not work in isolation, and hence it is important to look at the broader institutional framework affecting financially distressed firms, including the effect of the corporate control market, which can lead to substantial asset reallocation.

Despite the importance of the selection process during financial distress, there is surprisingly little evidence on it. This paper contributes to our knowledge about this process by studying it in detail. It is the first paper that analyzes the selection process from the onset to the resolution of financial distress. This allows the analysis of several aspects of survival during financial distress. The paper documents the operating performance and the number and timing of acquisitions and liquidations throughout the financial distress process. It also analyzes the determinants of survival. In addition, it analyzes the post-distress performance of all firms that overcome financial distress and survive as independent firms. The latter includes an appraisal of post-Chapter 11 performance, the only aspect of the selection process that has been looked at in the existing literature (see Hotchkiss (1995)). Another advantage of capturing the selection process from the onset to the resolution of financial distress is that it avoids sample selection problems. Survival is unlikely to be independent over time. This is because creditors and other investors learn about a financially distressed firm’s viability by observing its performance over time (see Kahl (2001)). Hence, analyzing only a particular stage in the survival process, for example,

studying only selection during Chapter 11, may not give a representative picture of the overall selection process during financial distress. This paper avoids such sample selection problems by looking at the entire financial distress process. As a consequence, it follows the survival of firms that never enter Chapter 11 as well as that of firms that enter Chapter 11 at some point during the financial distress process.

To investigate the selection process triggered by financial distress, we follow 102 firms that become financially distressed between 1979 and 1983 from the onset to the resolution of financial distress. This sample period is chosen because it is subsequent to the Bankruptcy Reform Act of 1978, but at the same time is early enough to allow the analysis of the entire financial distress process from its onset to its resolution and the analysis of a subsequent five years of post-distress performance for all sample firms.¹ The onset of financial distress is the first time that a firm defaults or violates a debt covenant, avoids this by negotiating to restructure its debt with its creditors, or files for Chapter 11. One possible resolution of financial distress is an acquisition or liquidation. Both induce the end of the firm as independent entity and the reallocation of its assets to a different user. In that sense, they are similar to what would occur under a liquidation code. The other possibility is that the firm survives the entire process of financial distress and emerges from it as independent entity, having overcome its difficulties in making debt payments.

Our main findings are as follows. There is substantial selection pressure, in particular from the acquisition market. Only a little more than one-third of all firms survive financial distress as independent firms; the remainder is acquired or liquidated. This happens relatively quickly. By the end of the second full year after the onset of financial distress, 26 firms are acquired and 6 more are liquidated. By the end of the third full year after the onset of financial distress, 31 firms are acquired and 11 more are liquidated, and by the end of the fifth year, 40 are acquired and 14 more are liquidated. Surviving firms improve their operating performance while they are still in financial distress. Not surprisingly, they still substantially underperform their industry median as long as they remain financially distressed – that is, have difficulties making their debt payments. However, only very few

firms with poor operating performance survive for long. While there are 50 firms with negative operating performance in the year of the onset of financial distress among the firms with data available, there are only 17 in the second year after the onset of financial distress, 8 in the fourth, and 6 in the fifth year. This suggests that poor performance leads to a relatively quick acquisition or liquidation.

Both short-run and long-run survival is positively related to operating performance. While it is difficult to judge what would constitute an “efficient” performance sensitivity of survival, the effect of performance on survival in our sample appears to be relatively strong. For example, we estimate that a one standard deviation improvement in a firm’s average return on assets during financial distress increases its survival probability from 0.27 to 0.56. The firm’s leverage ratio at the onset of financial distress has no statistically significant effect on survival, as it should not in an efficient selection process. However, there is some weak evidence that size has a positive effect on short-term survival (to the end of the second year after the onset of financial distress). Having filed for Chapter 11 does not increase a firm’s survival probability. In addition to operating performance, only one factor systematically increases a firm’s long-run survival probability: Firms in which creditors take equity stakes (typically in exchange for partial debt forgiveness) have a higher chance of survival. This should not be surprising because a debt reduction, for given performance, increases a firm’s chance to make its debt payments and overcome financial distress.

Our last main finding concerns post-distress operating performance. The roughly one-third of the firms that survive the financial distress process as independent firms seem to be economically viable firms. Their post-distress performance is almost identical to the industry median. Moreover, they overcome financial distress relatively quickly, within a median time of 34 months.

It is not easy to judge the efficiency of financial distress as a selection mechanism on the basis of these observations, because it is not clear what would constitute an “efficient” amount of asset reallocation and an “efficient” degree of performance sensitivity of survival. However, in our opinion, the data suggest that the selection process is fairly effi-

¹ The conclusion offers some conjectures about how the selection process may differ for later cohorts of fi-

cient in the sense that there is a large amount of asset reallocation away from poorly performing firms and relatively little excessive continuation of inefficient firms. The large number of acquisitions and liquidations leads to a large amount of asset reallocation. The small number of firms with operating losses after a few years in financial distress implies that poor performance is not tolerated for long. The good post-distress performance of the surviving firms suggests that they are economically viable (in fact, as viable as the industry median firm). Both findings together indicate that there is not much excessive continuation of inefficient firms. The economically significant effect of performance on survival suggests that the assets of the “right” firms, the worse performers, are reallocated. This makes both excessive continuation of inefficient firms as well as excessive liquidation of efficient firms less likely.

Our paper is related to a number of other studies. The one aspect of the selection process during financial distress that has been investigated is post-Chapter 11 performance. Hotchkiss (1995) finds that in each of the first five years after emerging from Chapter 11, between 35% and 41% of all firms have negative operating income.² While our sample of firms with post-Chapter 11 data available is extremely small because only 19 firms emerge from Chapter 11 and hence should be interpreted with caution, our results concerning their performance are comparable to the ones in Hotchkiss (1995) by some measures and worse than post-distress performance in general. The difference between post-distress and post-Chapter 11 performance arises for two reasons. The post-distress performance of firms that never file for Chapter 11 is much better than post-Chapter 11 performance. Moreover, some firms emerging from Chapter 11 are still in financial distress and are acquired or liquidated shortly after emerging from Chapter 11, eliminating some of the worse performers.

Hotchkiss (1995) interprets the poor post-bankruptcy performance as an indication of the excessive continuation of inefficient firms.³ This lends support to an important, perhaps dominant, view in the literature that in the U.S., one aspect of selection during financial distress – selection in Chapter 11 - is inefficient, because it allows the excessive con-

nancially distressed firms.

² However, post-Chapter 11 performance is much better in Hotchkiss and Mooradian (1997).

tinuation of inefficient firms (e.g., Baird (1986), White (1989), Bradley and Rosenzweig (1992)). As a consequence of this view, several authors have suggested a reform of U.S. bankruptcy law that moves the reorganization law closer to a liquidation code (Aghion, Hart, and Moore (1992)) or even abolishes Chapter 11 altogether (Bradley and Rosenzweig (1992)). Our results do not directly speak to this debate. They confirm poor post-Chapter 11 performance, and the better post-distress performance of firms never entering Chapter 11 suggests that the Chapter 11 institutions, rather than financial distress in general, may lead to some excessive continuation. On the other hand, our results suggest that the impact of any pro-continuation bias associated with Chapter 11 on the efficiency of financial distress as a selection mechanism is limited. Poor post-Chapter 11 performance affects only a small fraction of financially distressed firms, because many firms do not enter Chapter 11 and a large fraction of those that enter are acquired or liquidated within a short time in Chapter 11. Any pro-continuation bias of Chapter 11 seems to be offset to a large extent by an active corporate control market, both in and out of Chapter 11. However, an evaluation of the impact of Chapter 11 on the selection process is beyond the scope of this paper, since it would require knowledge of the extent to which Chapter 11 affects selection outside of Chapter 11 (see Mooradian (1994)).

Our paper is not the first paper that argues that the financial distress environment in the U.S. is not as inefficient as suggested by some of the literature on Chapter 11. Andrade and Kaplan (1998) analyze financial distress for firms that are in financial, but not in economic distress. In particular, they estimate relatively low costs of financial distress for a sample of leveraged buyouts and leveraged recapitalizations. In contrast to their paper, our paper focuses on a set of economically and financially distressed firms. Maksimovic and Phillips (1998) show that Chapter 11 status is much less important than industry conditions for explaining plant productivity, asset sales, and plant closure decisions of firms in Chapter 11. They interpret these findings as suggesting that Chapter 11 does not lead to large economic costs.

Acquisitions and liquidations are not the only means of asset reallocation away from financially distressed firms. This can also be accomplished partially through asset sales

³ While this is a plausible interpretation, poor post-bankruptcy performance could alternatively be explained

(partial liquidation). While our paper does not consider this dimension of asset reallocation, it has been documented already in the existing literature that the extent of asset sales during financial distress is substantial (Asquith, Gertner, and Scharfstein (1994), Brown, James, and Mooradian (1994), Franks and Torous (1994), Gilson (1997)).

The remainder of the paper is structured as follows. In section II, we describe our sample selection procedure and some characteristics of the sample firms in the year that they became financially distressed. In section III, we give an overview of the financial distress process and its resolution. Section IV describes the survival of firms throughout the process of financial distress. Section V documents the firm's pre- and in-distress operating performance. Section VI analyzes the factors that affect the probability that a firm survives the entire process of financial distress. Section VII looks at the determinants of survival over different time horizons. Section VIII describes the post-distress operating performance of surviving firms. Section IX looks at the subsample of firms filing for Chapter 11. Section X concludes.

II. Sample Selection and Descriptive Statistics

A. Sample Selection

This study analyzes the process of financial distress from its beginning to the end for 102 firms that enter financial distress between 1979 and 1983. To be included in the sample, firms must satisfy several criteria. First, they must have, according to *Compustat*, an interest coverage ratio of below 1 in at least one year between 1980 and 1983.⁴ The interest coverage ratio is calculated from *Compustat* by dividing operating performance *before* interest expense, income taxes, depreciation and amortization (EBITDA) by interest expense. We restrict the sample to firms that have a book value of total assets of at least \$10 million in at least one year between 1980 and 1983 in which they had an interest coverage ratio below one. 1346 firms meet this criterion. Most of these firms had negative operating income in the critical year(s). An interest coverage ratio below one does not mean that a

as a consequence of dynamic learning strategies of creditors (see Kahl (2001)).

⁴ Asquith, Gertner, and Scharfstein (1994) discuss advantages of the interest coverage filter over other indicators of financial distress used in the literature, in particular stock prices.

firm will necessarily become financially distressed, that is, have difficulties in making debt payments or complying with the covenants in its debt contracts. Debt payments can be made from other sources than operating income. However, a low interest coverage ratio seems to be a necessary condition for financial distress.

In addition, the *Wall Street Journal* Index must indicate that the firm is in default or negotiates with its creditors to restructure its debt in order to avoid a default, or that it has filed for Chapter 11 between 1980 and 1983.⁵ The *Wall Street Journal* Index was searched for all articles covering the firms that pass the interest coverage filter. Following Gilson (1990), a debt restructuring is defined as an exchange of financial claims that a firm makes to avoid defaulting on its debt or filing for bankruptcy (including implicit exchanges such as maturity extensions). A default, a debt restructuring that avoids a default, or a Chapter 11 filing indicate that the potential financial difficulties indicated by a low interest coverage ratio are indeed severe enough to make the firm financially distressed - that is, cause it to violate covenants in its debt contracts or miss a debt payment in the absence of a debt restructuring. 151 firms pass this additional filter. We define the first year in which there was a default, there were negotiations of a debt restructuring to avoid a default, or there was a Chapter 11 filing as the year of the onset of financial distress.

To avoid the inclusion of firms whose financial distress process may be affected by the bankruptcy environment prior to the Bankruptcy Reform Act of 1978, we check for all firms in our sample on *Dow Jones Interactive* and *Lexis/Nexis* whether they were in financial distress for 5 years prior to the year we defined as the onset of financial distress. We eliminate the 14 firms that were in financial distress before 1979. We also exclude two Canadian and two Philippine firms because their bankruptcy environment is substantially different from the U.S. system. Three firms are excluded because they are subsidiaries of other firms. For 28 firms we cannot establish completely what happened to them in financial distress. Hence, we exclude them from the sample. This is likely to introduce a bias against finding acquisitions and liquidations since many of these firms probably could not be found on *Dow Jones Interactive* and *Lexis/Nexis* anymore because they were acquired or liquidated. This leaves us with 102 firms.

⁵ Defaults include technical defaults and violations of debt covenants.

B. Descriptive Statistics At Onset Of Financial Distress

Four of the firms became financially distressed in 1979, 14 in 1980, and 14 in 1981. However, the bulk of the firms became distressed in 1982 (43 firms) and 1983 (27 firms). Panel A of Table 1 describes some characteristics of the sample firms at the onset of financial distress (which, as discussed above, differs across firms). All tables and figures are in the Appendix.

With a median book value of assets of \$57.3 million (the mean is \$240.3 million), the firms are comparable to Gilson's (1990) sample (median: \$74.8 million), substantially smaller than James' (1995) firms (median: \$135.95), and substantially larger than Hotchkiss' (1995) firms (median: \$21.1 million). The median and mean assets hide substantial heterogeneity across firms. As Panel B of Table 1 shows, about 12% of firms have a book value of assets less than \$20 million while 7.5% have more than \$1 billion in assets. Median net sales are \$71.7 million (mean: \$339.4 million).

The median firm has negative operating income so that its interest coverage ratio is negative (-0.07). Median book leverage (short-term debt plus long term debt, divided by the same expression plus the book value of common equity) is 77.9% (the mean is 84.7%).

Panel C of Table 1 describes the industry distribution of the sample firms (in 2-digit SIC codes). While the sample firms stem from 34 different 2-digit SIC codes, about half of all firms come from six industries: oil and gas extraction (13), primary metals (9), transportation by air (8), real estate (8), durable goods-wholesale (7), and industrial, commercial machinery and computer equipment (7). The industry concentration in our sample is comparable to other samples of financially distressed firms, including the one in Hotchkiss (1995).

III. Overview: Duration and Resolution of Financial Distress

In this section, we give an overview of the financial distress process that we analyze in this paper. We describe how many firms survive the entire process as independent companies, the duration of financial distress, and the incidence of Chapter 11 in it. We will also use this information below in the regression analysis.

The sample firms are followed from the onset of financial distress until the time of its resolution. We have already defined the onset of financial distress above. We also need to define a date at which a firm exits financial distress. From this date on, the firm does not have difficulties making its debt payments anymore. The definition of an exit year allows us to isolate the effect of financial distress on survival. Once a firm has emerged from financial distress, it can still be acquired. Any such post-distress acquisition should not and will not be recorded in our study, because it is not related to this incidence of financial distress. Hence, our exit year definition allows us to restrict our survival analysis to the period of financial distress.

For firms that remain independent, we construct the exit year (or, first post-distress year) as follows: A necessary condition for a year to be considered the exit year is that the firm is not in Chapter 11, is not in default, and is not negotiating to restructure its debt to avoid a default. To qualify as the exit year, one of two additional criteria has to be satisfied. First, we look for any sign in the articles in *Dow Jones Interactive* and *Lexis/Nexis* that indicates that the firm is clearly out of financial distress. We consider this to be the case if, for example, the firm resumes paying a dividend on its common stock or raises substantial funds in the debt or equity market. If we cannot find such clear evidence that the firm is out of financial distress, we use a formal criterion to determine whether the firm is still in financial distress or not. A firm is considered out of financial distress if it has at least one year of an interest coverage above one and in addition it satisfies one of the following two criteria: Either it has reduced its book leverage ratio by at least 15 basispoints relative to the onset of financial distress or it has a lower leverage ratio than the median firm in its 2-digit SIC industry code. The leverage criterion is employed to rule out situations in which the firm has overcome difficulties in making debt payments only for a very short time (for example, through a short-term maturity extension). If leverage has not gone down by much, then the firm has not eliminated the reason behind its difficulties making debt payments and is likely to have difficulties with it in the near future. However, if a firm has lower leverage than its industry median, the firm's debt burden might not be considered excessive and difficult to service. Hence, we assume that such a firm has overcome its financial distress. Note that the formal interest coverage and leverage criterion is

only used if there are no clear signs of emerging from financial distress in the articles in *Dow Jones Interactive* and *Lexis/Nexis*. Typically, it is very easy to determine in which year a firm exits financial distress.

An example might help to illustrate our procedure. Assume that a firm has the last incident of financial distress (is in default, in Chapter 11, or negotiates a debt restructuring) that we can find in 1980. Then, 1981 is the earliest possible exit date. If we can find clear signs of emerging from financial distress (for instance, resuming dividend payments on the common stock or a large equity or debt offering) in 1981 and there is no mention of incidents related to financial distress for this firm for 1981, 1981 is the exit year. If we cannot find a clear sign of recovery from financial distress for 1981, we check the interest coverage ratio for 1981. If it is above 1, we check whether the book leverage in 1981 is at least 15 basispoints lower than at the onset of financial distress or below the 2-digit SIC code industry median leverage ratio. If one of these two is satisfied, 1981 is treated as the exit year. Otherwise, it is not. We repeat the procedure for 1982 and the subsequent years until we find (or do not find) an exit year.

A. Duration of Financial Distress

Table 2 describes the duration of the process of financial distress for the sample firms. For firms that do not survive the process of financial distress as independent firms, it is measured as the number of months between the onset of financial distress and the month in which an acquisition of the firm or a liquidation is announced. If the announcement date is not available, we use the completion date (for acquisitions in Chapter 11, we use the date of the confirmation of the reorganization plan). For firms that emerge from financial distress as independent firms, the duration of financial distress is the number of months between the onset of distress and the January of the first post-distress (or exit) year, as defined above.

Table 2 shows the duration of financial distress for all of the sample firms. The median time spent in financial distress is 33 months. Sixty (58.8%) of the firms are in financial distress between 13 and 48 months. For 14 firms, financial distress is resolved within

one year. On the other hand, for 28 firms, financial distress lasts longer than 4 years and for 3 firms longer than 9 years.

Table 2 also shows separately the duration of financial distress for surviving firms and firms that do not survive. Only a bit more than one-third of all sample firms survive financial distress as independent companies: 35 firms (34.3%) exit from financial distress as independent companies, 67 do not. These 67 firms were either acquired or liquidated. For firms that emerged from financial distress as independent companies, the median time in financial distress was 34 month. For 23 out of the 35 firms (65.7%), it takes between one and four years. For 3 firms (8.6%) financial distress lasts at least 5 years. The median time in financial distress for firms that are acquired or liquidated is 32 months, with 23 firms (34.3%) taking less than 2 years, 23 firms taking between 2 and 4 years, and 21 firms (31.3%) more than 4 years.

B. The Incidence of Chapter 11

Panel A of Table 3 illustrates the timing of Chapter 11 filings. 56 firms (54.9%) file for Chapter 11 (none files twice⁶) and 46 firms do not. Most firms that file for Chapter 11 file early on in the process of financial distress. 23 firms file in the year of the onset of financial distress and 14 more in the first year after the onset year. However, 5 firms file in year 7 or later. Panel B of Table 3 shows the length of time the firms spent in Chapter 11. For most firms, Chapter 11 takes less than 2 years (36 out of 56) and for only 4 firms it takes longer than 3 years. The median time spent in Chapter 11 is 19.5 months.

Panel C of Table 3 shows how Chapter 11 is resolved. The majority of firms that file for Chapter 11 lose their independence and are either acquired or liquidated.⁷ 21 firms are acquired and 16 are liquidated. 19 (33.9%) emerge from Chapter 11 as independent companies. That does not necessarily mean that they emerge from financial distress as independent companies, because they may still be in financial distress after emerging from Chapter 11. We can give a bit more details on these 19 firms beyond what is reported in

⁶ We found that a few sample firms file a second time for Chapter 11 in an unrelated, typically much later second instance of financial distress, after they had clearly overcome the episode of financial distress analyzed in our study.

⁷ This is consistent with the finding in Hotchkiss (1995) that only 24% firms that file for Chapter 11 emerge as public companies.

the tables. Thirteen of these firms eventually exit financial distress as independent companies, but 6 remain in financial distress and are acquired (5) or liquidated (1) later outside of Chapter 11.

Panel D of Table 3 shows that the fraction of firms that emerge from financial distress as independent companies is much lower among those firms that ever file for Chapter 11 (23.2%) than among firms that never file for Chapter 11 (47.8%). Of course, this does not mean that being in Chapter 11 is the reason for being acquired or liquidated. Firms that file for Chapter 11 may have been acquired or liquidated even outside of Chapter 11, perhaps even earlier. However, our finding suggests that firms that file for Chapter 11 have a relatively small chance of avoiding an acquisition or a liquidation.

IV. Survival Over Time

In this section, we describe how many firms survived as independent firms over different time horizons. We also document how firms lost their independence, through a liquidation or an acquisition. In addition, we describe the extent of minority or majority equity stakes taken by creditors, because they can affect the probability of survival and are used below in the regression analysis. In particular, creditor equity stakes are typically acquired in a debt-equity swap, leading to a reduction in the firm's debt level. This will, for a given operating performance, increase the likelihood of survival. We do not count firms with creditor equity stakes as having lost their independence. If creditors are dispersed, corporate governance may not be much affected, and hence the control over the firm's assets not affected. For minority stakes, this is already so because there was no change in the majority control. Even if creditors take majority positions (which happens only in 6 cases), they may not have effective control of the firm since creditors may be relatively dispersed.

The information concerning liquidations, acquisitions, and creditor equity stakes covers the years from the onset of financial distress until the last year of financial distress. This information is collected from *Dow Jones Interactive* and *Lexis/Nexis*. For most firms we searched all articles in which the firm was mentioned first in *Dow Jones Interactive*. For some firms with a very large number of articles keyword searches were conducted to

identify the control events. If there was not sufficient information available from *Dow Jones Interactive*, we searched on *Lexis/Nexis*.

It was already mentioned above that for 28 firms, it could not be completely established what happened to them in financial distress and how it was resolved. They were eliminated from the sample. It seems most likely that a large fraction of these firms were actually liquidated or acquired. This would explain why they cease to be mentioned in any of the data sources. Overall, the lack of information about these firms probably leads to an underestimation of liquidation and acquisition events in the sample, and hence an overestimation of survival.

A liquidation refers to the sale of all the assets of the company to more than one buyer. We include among this category cases in which almost all the assets of the firm are sold. In several instances, firms were continued without almost any operating business (at least for a while). One reason is that many financially distressed firms accumulate a large amount of net operating loss carryforwards (NOLs). Roughly speaking, if these firms remain independent and satisfy a “continuation of business” test (for details see Gilson (1997)), they retain these NOLs which then are in many cases by far their most valuable asset. For these firms it makes sense to continue in business even without operating while looking to acquire firms with the potential for high earnings that can be shielded from income taxes through the NOLs. However, from the perspective of asset reallocation away from financially distressed firms, (almost) all of their productive assets are sold and hence we count these events as liquidations.

Control of a firm can be gained even without acquiring at least 50% of the voting shares. Often, small shareholders do not vote their shares so that a substantial minority stake can give effective control to an investor. As a consequence, if a stake of larger than 40% but less than 50% is acquired and at the same time the investor assumes control of the board of directors (his representatives gain a majority of the board seats) or assumes the CEO or chairman position, we count this event as an acquisition since it constitutes a control change. However, all but 6 acquisitions involve the purchase of at least 50% of the firm’s shares.

A. Survival Status of Firms Over Time

Figure 1 summarizes the aspects of the survival process that were already described above. Table 4 and Figure 2 give more detail by showing the evolution of the number of firms that are still in financial distress, that have been acquired or liquidated, and that have overcome financial distress and remained independent. In the following, all years are measured relative to the year of the onset of financial distress. For instance, year - 1 is the year before the year of the onset of financial distress, year 0 is the year of the onset of financial distress, and year 1 is the first year after the year of the onset of financial distress.

By the end of the second year after the year of the onset of financial distress (in the following called year 2), 32 (31.4%) of the 102 firms lost their independence (were acquired or liquidated). By the end of year 3, this number has grown to 42 (41.2%) and by the end of year 5 to 54 (52.9%). Overall, 67 firms (65.7%) do not survive financial distress as independent companies. Most firms lost their independence because they were acquired (48) rather than liquidated (19).

Most (28 of the 35) firms that emerged from financial distress as independent companies did so by the end of year 4. This suggests that firms that spend a long time in financial distress are unlikely to emerge as independent companies.

Overall, financial distress seems to be resolved relatively quickly. While by the end of year 2 60 firms (58.8%) are still in financial distress, this number shrinks to 25 (24.5%) by the end of year 4 and 16 (15.7%) by the end of year 5. For all other firms, financial distress has been resolved – with the minority surviving as independent entities and overcoming financial distress.

B. Acquisitions, Liquidations, and Creditor Equity Stakes

Table 5 gives a little more detail on how firms lost their independence (through an acquisition or a liquidation, in or out of Chapter 11) and also documents the incidence of creditor equity stakes, which can affect the firm's probability of survival, as explained above. Figure 3 illustrates the same information in graphical form.

As mentioned above, almost half (48) of the sample firms were acquired and 19 firms were liquidated. In addition, there were 40 instances in which creditors took an equity

stake in a total of 34 firms (for some firms, creditors took equity stakes more than once).

As can be seen from Table 5 and Figure 3, most control events happened within a few years after the onset of financial distress. Creditors took equity stakes within a few years after the onset of financial distress: 24 of the 40 (60.0%) instances in which this occurred happened by the end of year 2. 26 (54.2%) of the acquisitions occurred by the end of year 2 and 37 (77.1%) by the end of year 4. Not surprisingly, liquidations came later. Six of the liquidations (31.6%) occurred by the end of year 2 and 12 (63.2%) by the end of year 4. Liquidations also end the two longest histories of financial distress after more than 9 years.

Table 5 also shows the fraction of control events and liquidations in and out of Chapter 11. 57 (53.3%) occurred outside of Chapter 11. There were more acquisitions outside of Chapter 11 (27) than in Chapter 11 (21). On the other hand, liquidations occurred much more often (17 out of 19 times) in Chapter 11 (this includes conversions to Chapter 7).⁸ Creditors took equity stakes in 28 instances outside of Chapter 11 and in 12 instances inside of Chapter 11. There were 24 creditor equity stakes below 20%⁹, 10 stakes between 20% and 50%, and 6 majority stakes received by the creditors. All but one of the majority stakes are obtained by creditors in Chapter 11 while almost all stakes below 20% are obtained outside of Chapter 11.

The most important point emerging from the more detailed data on the control events is the importance of acquisitions in the resolution of financial distress. The main selection pressure during financial distress seems to come from the acquisition market.

V. Pre- and In-Distress Operating Performance

A. Raw Operating Performance

In this section, the operating performance of the sample firms is described in detail. We look at operating performance because it is a measure of the firm's viability. We do not look at stock performance in this paper because this has little to do with the efficiency

⁸ One firm was liquidated in Chapter 7 without ever filing for Chapter 11, but to avoid another separate category, we have included it among the Chapter 11 liquidations.

of the selection process in financial distress. Abnormal stock performance, instead, measures the ability of the market to forecast cash flows accruing to equityholders. This is important to evaluate the efficiency of the stock market, but not the efficiency of the selection process in financial distress.¹⁰

All data are calculated from *Compustat*. We want to distinguish between the performance of firms still in financial distress and those that have emerged from financial distress. As a consequence, the in-distress performance data are only for those firms that remain in financial distress. Once a firm has exited from financial distress, it is removed from the in-distress sample followed here. Below we will report the post-distress performance of those firms that emerged from financial distress as independent companies.

The performance is again measured by the operating income *before* interest, taxes, depreciation and amortization (EBITDA). Performance is reported as a return on assets (ROA), EBITDA/ASSETS, or an operating margin (EBITDA/SALES). Table 6a describes the evolution of the *median* ROA and operating margin. The return on assets is in principle the better of the two performance measures. It is the product of the operating margin and capital turnover. Hence, a change in the operating margin is only one way to change performance; the other way is a change in capital turnover. We initially also report operating margins because the measurement of assets may be affected by write-offs and other accounting changes. We will see that both performance measures present a similar picture and subsequently focus only on the return on assets. The number of observations declines mainly because many firms are acquired or liquidated or emerge from financial distress.¹¹ In addition, for some firms performance data are missing on *Compustat* (presumably because of delisting or because they did not file with the SEC), although they were still independent and in financial distress.¹²

The median return on assets deteriorates from the third full year before the onset of financial distress on until it becomes negative in the year of the onset of financial distress.

⁹ This includes 3 cases in which we know that creditors received equity but we could not find out how much. In these cases, we assumed that the stake was below 20%.

¹⁰ Kahl and Torous (2001) analyze the stock performance of the firms in this sample.

¹¹ The fiscal year in which the acquisition or liquidation occurred was still included in the in-distress operating performance if at least 6 months of it had passed before the announcement of the event.

¹² There are 9 firms with no performance data on *Compustat* in year 0, 12 in year 1, 17 in year 2, 8 in year 3, 8 in year 4, and 5 in year 5. Afterwards, the maximal number of missing observations is 3.

In the first year after the onset the performance is almost identical. The year of the onset and the first year after the onset of financial distress are the worst years in terms of median operating performance and at the same time the only years during which the median firm suffers operating losses (but for year 9 when only one firm has data available). The median return on assets increases already in the second year after the onset (in the following, year 2) by almost 6 percentage points. While afterwards there is overall some improvement in the operating performance as compared to the year of the onset of financial distress, the operating performance does not reach the level of two years prior to entering financial distress. The results using the operating margin as performance measure are similar to the ones just discussed for the return on assets.

To summarize, the performance of the still financially distressed firms that have not been acquired or liquidated improves to some extent after the onset of financial distress. It is not surprising that these firms do not achieve their pre-distress performance because they are still in financial distress (and a “normal” performance might have let them emerge from financial distress).

Table 6a describes the evolution of the number (also shown in Figure 4) and percentage of firms with negative return on assets. The fraction of firms with negative return on assets was calculated by dividing the number of observations with negative return on assets by the number of firms with performance data available. Note that the same measures are not reported for operating margins because they are, of course, almost identical (the only difference is that one less firm has sales data available in some of the years). Starting three years before the onset of financial distress, the fraction of firms that experience operating losses increases until it reaches its peak (53.8%) in the year of the onset of financial distress. After the onset of financial distress, the fraction of firms with operating losses declines relatively slowly. It reaches 40.0% in year 5. Later it increases again but there are only very few firms still in financial distress.

While the fraction of firms with negative operating performance remains relatively high during financial distress, the number of firms experiencing negative operating performance declines dramatically. It reaches its peak in the year in which the firms become financially distressed (50). However, already two years later, this number is cut to 17. In

no year after year 4 there are more than 6 firms experiencing operating losses. The dramatic and quick decline in the number of firms that report operating losses is due to both an improvement in the distribution of performance among the surviving firms and, much more importantly, the reduction in firms that survive without being acquired or liquidated.¹³

To summarize, the fraction of firms with operating losses declines only slowly after the onset of financial distress. However, the number of firms with operating losses declines dramatically because so many firms are acquired relatively quickly (and some liquidated) during financial distress. As a consequence, the number of poor performers that continue is very limited.

B. Industry-Adjusted Performance

While the previous subsection described the raw performance of the sample firms, this subsection describes their industry-adjusted performance. Industry-adjusted performance was calculated as follows: First, the median return on assets of all firms on *Compustat* with the same 2-digit SIC code and the same 4-digit SIC code was calculated for each year for each firm in the sample. Then this number was subtracted from each firm's return on assets. Table 6b illustrates the evolution of the median industry-adjusted return on assets of the sample firms. Industry-adjusted operating margins present a similar picture and hence are not reported here.

Starting five years before the onset of financial distress, the median 2-digit SIC-code adjusted return on assets of the sample firms deteriorates until it reaches its low in the year of the onset of financial distress with -10.2% . Then it improves until year 3 when the median industry adjusted return on assets is still negative but substantially improved (-4.6%). Later, it deteriorates again, but there are very few firms still in financial distress. The table also shows that if one compares the sample firms' performance to the median firm in the same 4-digit SIC-code, their performance looks a little bit better than when compared to the median firm in the same 2-digit SIC code.

¹³ As mentioned above, this also occurs because some firms emerge from financial distress. Their post-distress performance is described below. Moreover, there are some firms that are still in financial distress and independent but that have no performance data available on *Compustat*.

Finally, Table 6b also shows the number and percentage of financially distressed firms that underperform the industry median. For the 2-digit SIC-code adjusted return on assets, the fraction of firms underperforming the industry median increases in the five years before the onset of financial distress and reaches its high at 84% during the first year after the onset of financial distress. Then it declines somewhat but still is 80% in year 5. The number of firms underperforming their industry median (among those with data available on *Compustat*) declines dramatically from 81 in the year before and 78 in the year of the onset of financial distress, reaching 31 in year 3, 17 in year 4, and 12 in year 5. After that this number is at most 6. The 4-digit SIC-code adjusted return on assets presents a similar picture, except that there are typically slightly fewer firms underperforming the industry median.

The industry-adjusted performance data reinforce the main findings on in-distress operating performance already pointed out earlier. The sample firms that are still in financial distress improve their operating performance in the years after the onset of financial distress but, not surprisingly, do not recover fully to the median performance in their industry. The number of firms underperforming their industry median becomes small relatively quickly because so many firms are taken over and, to a lesser extent, liquidated.

VI. Determinants of Survival

In this section, we will relate the findings on survival in section IV and performance in section V. In particular, we will investigate the determinants of survival, i.e., the factors that affect the probability that a firm emerges from financial distress as independent company. If the financial distress process is an efficient selection mechanism, firms with good prospects (viable firms) should survive while firms with bad prospects (not viable firms) should not survive. Other factors, such as size, leverage at the onset of financial distress, and Chapter 11 status, should have no impact on the firm's survival.

The firm's prospects or viability cannot be directly measured. However, there are several proxies. The firm's performance and performance improvement during financial distress are presumably the best measures of its prospects. A viable firm is likely to recover

relatively quickly from its poor economic performance while a not viable is not. If financial distress is an efficient selection mechanism, we should expect a statistically significant positive relationship between measures of the firm's in-distress performance and its survival probability. Moreover, this relationship should be economically significant as well. We measure the firm's in-distress performance with three variables: AVERPERF measures the firm's average return on assets during financial distress, starting with the year of the onset until the last year in financial distress (years with missing performance data are ignored). ONSETPERF measures the return on assets in the year of the onset of financial distress. Finally, PERFIMPROV is the difference between the return on assets in the last year of financial distress and the return on assets in the year of the onset of financial distress. If the performance is not available in the last year of financial distress, we use the latest available return on assets before the last year of financial distress.¹⁴

One might argue that in an efficient selection process the performance measures should not be the only variables affecting a firm's survival probability. In particular, perhaps the length of financial distress should affect the probability of survival. If a firm is longer in distress, this is, for given operating performance, worse news about economic viability, and hence the firm should be less likely to survive. We measure the firm's length of financial distress by the months the firm spends in financial distress. The variable is denoted by LENGTH.

We use one other measure of the firm's prospects, a measure of the firm's growth opportunities in the year of the onset of financial distress. In particular, we use the measure of growth opportunities suggested by James (1995), the ratio of the market value of assets to its book value. It is defined as the book value of assets minus the book value of equity plus the market value of equity, divided by the book value of assets. We use the assets and not just equity for two reasons. First, the equity is only a very small part of the financially distressed firm's value. And second, this avoids negative ratios in case that the book value of equity is negative. This variable is called GROWTH.

Factors that do not affect the firm's expected viability should not affect its survival probability in an efficient selection process. One might conjecture a number of factors that

¹⁴ If the year of the onset of financial distress is the only year during financial distress with performance data

may in reality have an impact on the firm's survival although they should not in a perfectly efficient world. First, the institutional features of Chapter 11 may affect a firm's ability to survive. In particular, it has been suggested that Chapter 11 allows firms to survive or survive for longer even if they are not viable and should be liquidated (Bradley and Rosenzweig (1992) and Hotchkiss (1995)). Hence, we use a dummy variable that takes the value of one if the firm ever files for Chapter 11 and zero otherwise. This variable is called CH11.

The leverage ratio with which a firm enters financial distress might also affect its survival probability. In particular, the higher its leverage ratio, the more severe its financial difficulties.¹⁵ Hence, we include the firm's book leverage ratio as defined previously as an independent variable, denoted by LEV. It is measured at the onset of financial distress.

The firm's size may also affect its survival. One might expect that larger firms have a higher likelihood of survival. One reason for this conjecture is that larger firms are less likely to be acquired (Hasbrouck (1985)). We measure size by the logarithm of the book value of assets in the year of the onset of financial distress, denoted by SIZE.

Finally, there is one other variable that we include in the regressions. If creditors take an equity stake in the financially distressed firm, this is likely to affect the probability of a firm's survival. Creditors take equity stakes almost always in exchange for a debt reduction. This will increase the chance of the firm overcoming its financial difficulties and surviving as independent entity for a given performance level. Hence, we include a dummy variable that takes on the value of one if creditors ever take an equity stake in the firm during financial distress and zero otherwise. The dummy variable is called STAKE. There are in principle two ways to overcome financial distress: through an improvement in operating performance or through a reduction in the debt burden (or a combination of both). A strong positive effect of STAKE on survival could imply good or bad news about the efficiency of the selection process. Creditor equity stakes may allow economically viable firms to emerge from financial distress that would not have been able to do so with-

available, PERFIMPROV cannot be constructed and hence is not available.

¹⁵ Zingales (1998) finds that in the deregulation of the trucking industry, the likelihood of a firm's survival is not only affected by its pre-deregulation efficiency but also by its leverage, with higher leverage reducing the survival probability.

out a debt reduction. However, they may also allow economically not viable firms to survive.

A. Regression Results

Tables 7a and 7b show the regression results. The regressions are probit regressions. The dependent variable is a dummy variable taking on the value of one if the firm emerges from financial distress as independent entity and zero otherwise. Recall that 35 firms survive the process of financial distress and 67 do not. Hence, the overall survival probability in the sample is 0.343. However, for some firms not all of the variables included in the regressions are available. Hence, we have 84 observations for the specifications in Table 7a and 67 observations in Table 7b.¹⁶ Both tables show various specifications of the regressions. We report the coefficients, the associated z-statistics, and the marginal effects. As is well known, in probit regressions, the coefficients cannot be interpreted as the marginal effect of a unit change of the independent variable on the probability of survival. However, one can calculate these marginal effects, and they are reported in the table. We calculate them at the means of the independent variables, as is standard in the literature. Note that for dummy independent variables, these marginal effects are not appropriate. Instead, we calculate the effect of a change from the dummy variable taking on the value zero to its taking on the value one on the probability of survival, evaluating all other variables at their mean.

While we report 8 different specifications for the regressions, the results are overall very similar. In particular, all performance variables are statistically significant, often at the 1% significance level and always at least at the 5% level, and positive. This suggests that firms that perform better have a higher likelihood of survival. This is true both for the average performance during financial distress (Table 7a) and the combination of perform-

¹⁶ We exclude eight firms that have, according to *Compustat*, zero long-term debt in the year of the onset of financial distress. A comparison with the annual report in the onset year shows that for two of these firms, the information on total debt on *Compustat* is wrong. For two other firms for which we do not have the annual report, both long-term debt and short-term debt are zero on *Compustat*, which is highly unlikely for a financially distressed firm. Including those four firms with zero long-term debt but positive short-term debt on *Compustat* for which we cannot be sure that the information on *Compustat* is wrong because we do not have their annual report in the onset year generates results that are very similar to the ones reported in the paper.

ance in the onset year and improvement until the last year of financial distress (Table 7b).

First, let us consider regression (1) in Table 7a. This regression includes all independent variables and measures performance as average ROA during financial distress. The coefficient on AVERPERF is positive and statistically significant at the 1% level. The only other variables that are statistically significant at conventional levels are STAKE (significant at the 1% level), which enters positively, and LENGTH (significant at the 5% level), which enters negatively. Both conform to our expectations.

The positive and significant relationship between AVERPERF and survival probability is consistent with an efficient selection mechanism, but arguably this rules out only an entirely inefficient process. The economic significance of the variable gives us an idea about the effect of performance on survival in the sample. From the regression results, we can calculate the effect of an increase of average ROA by one standard deviation from its mean value (-0.014) to 0.101. All other variables are held at their means. Such a one standard deviation increase in AVERPERF leads to an increase in the survival probability from 0.27 to 0.56. Of course, the one standard deviation increase in ROA is rather large (almost 12 percentage points). We can also consider a smaller increase in AVERPERF from its mean of -0.014 by 5 percentage points. This increases the survival probability from 0.27 to 0.39. We lack a benchmark to evaluate how high this performance sensitivity of survival should be in an “efficient” world. All we can say is that the effect of performance on survival seems economically significant and relatively strong.

The variables SIZE, and LEV are insignificant, suggesting that the selection process is not biased towards larger and less highly levered firms. CH11 is also insignificant.¹⁷ GROWTH is also not significant and enters unexpectedly with a negative sign, suggesting some inefficiency in the selection process.

One can also calculate that if the duration of financial distress increases from its mean value of 39.3 months (for the 84 observations) by 12 months, the survival probability is reduced from 0.27 to 0.20, if all other variables are evaluated at their means. This effect may arise because longer distress may be worse news about a firm’s prospects. Finally, if

¹⁷ If a dummy variable interacting CH11 and AVERPERF is included, its coefficient is also statistically insignificant.

creditors take an equity stake in the financially distressed firm, this increases its survival probability from 0.14 to 0.61.¹⁸

One issue with the specification in regression 1 is that some of the variables, CH11, STAKE, and LENGTH, are arguably endogenous. While they are predetermined and hence there is no possibility of a simultaneous equation bias, they may be a function of some of the other regressors. For example, it is plausible to assume that whether a firm files for Chapter 11 is affected by its operating performance up to that point, with the worse firms having a higher likelihood of filing for Chapter 11.¹⁹ Moreover, one might think that a firm's operating performance as well as its growth opportunities affect creditors' willingness to take an equity stake in them in exchange for debt forgiveness.²⁰ Under these circumstances, the inclusion of these variables may substantially affect the coefficients and significance of the other regressors and hence make their interpretation more difficult. For this reason, we also present regression 2, which excludes LENGTH, regression 3, which excludes both CH11 and STAKE, and regression 4, which excludes just STAKE.²¹ The results with these specifications are similar to regression 1. In particular, AVERPERF is always statistically significant at the 1% level and it can be calculated that its economic significance is of similar magnitude to what we calculated for regression 1 (this can also be seen from the marginal effects, which turn out to approximate the economic significance as calculated from the regression outcomes quite well, as is typical for probit regressions). One difference is that LENGTH loses its statistical significance in regression 4. Moreover, regression 2 shows that once LENGTH is left out of the regression, CH11 becomes statistically significant. It can be calculated that, according to this regression specification, having ever filed for Chapter 11 during the process of financial distress reduces a firm's survival probability from 0.46 to 0.15. But this result should be interpreted with caution. First, whether a firm files for Chapter 11 or not is endogenous. And second, as seen in regression 1, once LENGTH is included, CH11 becomes insignificant.

¹⁸ The survival probability, evaluated at the means of all other variables, is 0.14 if STAKE takes on the value of zero and 0.61 if it takes on the value of 1.

¹⁹ Franks and Torous (1994) show that many firms filing for Chapter 11 attempt an out of court restructuring first. They argue that firms filing for Chapter 11 are less solvent or liquid than firms that undertake an out of court restructuring.

²⁰ James (1995) analyzes when banks take equity stakes in distressed restructurings.

²¹ Excluding all three variables (CH11, STAKE, and LENGTH) leads to very similar results.

Table 7b presents the same specifications as Table 7a, but uses a different set of variables to measure in-distress operating performance. In particular, instead of AVERPERF we use the ROA in the year of the onset of financial distress, ONSETPERF, and the improvement of the ROA from the first year to the last year in financial distress, PERFIMPROV. The overall results are similar to the previous regressions. In particular, both performance measures enter positively and are statistically significant at least at the 5% significance level. The only other variable consistently significant is STAKE, as before, which is always positive and significant at the 1% level. LENGTH and CH11 are statistically significant for some regression specifications and not significant for others, as in Table 7a.

We close by evaluating the economic significance of the two new performance variables. We calculate the effects from regression (5), which has all variables included. An increase of ONSETPERF from its mean (for the 67 observations) of -0.014 by one standard deviation (0.107) increases the survival probability from 0.25 to 0.52. An increase by 0.05 increases the survival probability from 0.25 to 0.37. An increase of PERFIMPROV from its mean (for the 67 observations) of -0.007 by one standard deviation (0.245) increases the survival probability from 0.25 to 0.66. An increase by 0.05 increases the survival probability from 0.25 to 0.33. Note that the regressions show that both a better performance in the year of the onset of financial distress and a larger degree of performance improvement during financial distress increase the chance of a firm's survival.

The results on the statistical and economic significance of the other variables are similar to the results in Table 7a that were discussed before. Regressions 6, 7, and 8 in Table 7b are included for the same reasons as regressions 2, 3, and 4 in Table 7a. Again, the main results seem robust to alternative regression specifications.

To summarize, operating performance has a statistically and economically significant and positive effect on survival. Equity stakes taken by creditors also have a strong positive effect on survival. There is some evidence that a longer duration of financial distress may reduce a firm's chances of survival. Firm size, growth opportunities, and the leverage ratio at the onset of financial distress seem to have no effect on a firm's likelihood of survival.

VII. Determinants of Survival Over Varying Horizons

In the previous section, we have analyzed the factors that affect the likelihood that a firm survives the entire process of financial distress and emerges from it as independent company. Because financial distress is resolved for all firms by the end of year 11, the regressions in section VI are formally equivalent to survival until the end of year 11. In this subsection, we analyze the determinants of survival over a varying time horizon. The determinants of short-run survival may be very different from the determinants of long-run survival. We report separate regressions for three horizons: survival at least until the end of the second, fourth, and sixth year after the year of the onset of financial distress. We will also refer to these different time horizons as the short-run, medium-run, and long-run, respectively. The dependent variable is the dummy variable for survival over the relevant horizon. The independent variables are similar to the ones used in the previous section, but there are a few adjustments. First, the relevant variables are defined only over the horizon captured by the dependent variable. In particular, the average performance is measured up to and including the second, fourth, and sixth year after the onset of financial distress, respectively. The same is true for the performance improvement. The Chapter 11 dummy indicates whether the firm ever was in Chapter 11 between the onset of financial distress and the end of the second, fourth, and sixth year after the onset of financial distress, respectively. The equity stake variable indicates whether creditors had taken an equity stake by that date. The other independent variables are defined exactly as previously: size, leverage, and growth opportunities are measured at the onset of financial distress. We do not include a variable measuring the length of financial distress, because it measures to an important extent the same as the dependent variable. For instance, if a firm is in financial distress for six years, it surely has survived at least until the end of year 2 and 4.

The results of the regression analysis can be found in Tables 8a and 8b. Overall, the results are similar to the survival regressions reported previously. In particular, the performance measures always have a positive and significant impact on the survival probability, regardless of the survival horizon (however, *PERFIMPROV* is significant only at the 10% level). Note that the economic significance of the performance variables is lower in the short-run.

There are also some differences to the regressions reported in Tables 7a and 7b. The equity stake dummy is insignificant for short-run survival (until the end of year 2). It is statistically significant at the 5% or 10% level for medium-run survival. For long-run survival (survival until the end of year 6) the equity stake variable is statistically significant at the 1% significance level, as it was in the previous survival regressions. Having ever been in Chapter 11 has, according to some regression specifications in Tables 7a and 7b, a statistically significantly negative impact on survival in the very long-run. However, even for survival until the end of year 6, its coefficient is never statistically significant. Finally, there is weak evidence that size may matter for survival in the short-run: in the 2-year regressions, *SIZE* enters positively and is statistically significant at the 10% level in one of the two regressions and close to it in the other one. Hence, there is some evidence that larger firms have a higher chance of short-run survival. However, this is not true for medium-run and long-run survival when the coefficient on the size variable is insignificant. The other differences to the survival regressions in section VI seem unimportant.

To summarize, operating performance has a statistically and economically significant and positive effect on a firm's short-run, medium-run, and long-run survival probability. Creditor equity stakes have a positive effect on a firm's medium- and long-run survival probability but not on its short-run survival probability. And finally, there is weak evidence that larger firms have a higher chance of surviving in the short-run, but this is not true in the medium- and long-run.

VIII. Post-Distress Performance

In this section, we turn to the subsample that has overcome financial distress and remained independent. An important question to ask is whether the firms that emerge from financial distress are viable or whether the financial distress process allows firms to survive that are not viable and continue to perform poorly. We can observe the viability of the firms that survived the process of financial distress directly by looking at their post-distress operating performance. Here we are looking at the performance of the surviving firms after the relatively short time (median: 34 months) it takes them to overcome financial distress.

Table 9 describes the operating performance of the 35 firms that emerge from financial distress as independent companies. Year 1 is the exit year (the first post-distress year), year 2 is the first year after the exit year, and so on. The median sample firm has strongly positive post-distress operating performance. The median ROA is in general comparable to the median ROA reported for the whole sample in Table 6a 3 to 5 years before the onset of financial distress. It seems that these firms are performing quite well and appear to be economically viable. There are very few firms with post-distress operating losses.

Table 9 also shows industry-adjusted performance. The sample firms seem to perform roughly as well as their 2-digit SIC code industry median, and never more than 1.2 percentage points worse. The industry-adjusted return on assets is never statistically significantly different from zero at any conventional significance level.²² In only one year (year 5) a fraction substantially larger than 50% of the firms underperform the industry median, and in year 3 almost two thirds outperform it. If one uses the 4-digit SIC code as benchmark, the operating performance looks typically even a little bit better (with the exception of year 4).

To summarize, the industry-adjusted operating performance reinforces the impression that the post-distress performance of firms emerging from financial distress is reasonably good. It suggests that these firms are economically as viable as the median firm in the same industry. Arguably, even if the firms were underperforming their industry somewhat, this would still be consistent with being economically viable. The surviving firms do not only perform reasonably well, they also overcome financial distress relatively quickly, within a median time of 34 months.

Another way to look at the surviving firms' performance is to measure it from the onset of financial distress on, rather than from the exit (as done in Table 9). This is done in Table 10. Year 0 is the year of the onset of financial distress, year 1 the first year afterwards, and the later years are defined analogously. From year 4 on, the median performance is at least as good as that of the median firm in the same 4-digit SIC code industry and close to that of the same 2-digit SIC code industry. This, of course, is the consequence of the good post-distress performance of the surviving firms and the fact that they over-

²² In all tables, the statistical significance of medians is tested with the Wilcoxon signed rank test.

come financial distress relatively quickly.

It was already discussed above that the significance of the equity stake variable in the survival regression is not surprising and does not directly speak to the efficiency of the selection process. Debt-equity swaps make survival more likely by reducing the firm's debt burden. This can be efficiency-enhancing if it allows viable firms to survive, but it can also be efficiency-reducing if it allows not viable firms to survive. One way to gauge the impact of the creditor equity stakes in our sample is by looking at the post-distress performance of the firms in which creditors take equity stakes. Table 11 illustrates the post-distress performance for firms in which creditors take equity stakes during financial distress and those in which creditors do not.

It is clear from Table 11 that firms in which creditors take equity stakes typically perform worse than the other firms after emerging from financial distress (however, due to the small size of both subsamples this difference is significant at least at the 10% confidence level only for the industry-adjusted operating performance in years 2 and 4)²³. This suggests that they are economically less viable. However, it should be noted that the performance of the firms in which creditors do not take an equity stake is very strong and typically better (at times substantially so) than industry median (although this is typically not statistically significant). These firms improve their performance apparently so much that they do not need a debt reduction to overcome financial distress. Debt-equity swaps allow somewhat worse firms to emerge from financial distress. This presumably allows some efficient firms to survive that would not have survived otherwise – at the cost of allowing some inefficient firms to survive as well.

IX. The Chapter 11 Subsample

The post-distress performance results obtained for our sample are much better than the post-Chapter 11 operating results in Hotchkiss (1995), who finds that in each of the first five years after emerging from Chapter 11, between 35% and 41% of all firms have negative operating performance. This subsection examines the post-Chapter 11 perform-

ance of the sample firms and sheds some additional light on the role of Chapter 11 in the selection process.

Table 12 summarizes the post-Chapter 11 performance for the only 19 firms in our sample that emerge from Chapter 11 at some point. Year 1 is the first full fiscal year after emerging from Chapter 11, year 2 is the second year, and years 3 to 5 are defined analogously. Data are available at most for 14 firms and hence this evidence should be interpreted with extreme caution. The median post-Chapter 11 return on assets in our sample is comparable to the results in Hotchkiss (1995) in year 1 and worse than in Hotchkiss (1995) in year 5. However, in years 2,3, and 4 our results indicate a better operating performance than reported in Hotchkiss (1995). On the other hand, our results show a worse operating performance than found in Hotchkiss and Mooradian (1997), who report post-Chapter 11 performance for the first two years only.²⁴ The median industry-adjusted performance (using 2-digit SIC codes) is very similar to the results in Hotchkiss (1995) and worse than in Hotchkiss and Mooradian (1997).

The most important conclusion from Table 12 is that the post-Chapter 11 operating performance is worse than the post-distress performance reported previously (although this is only sometimes statistically significant because of the small sample sizes of both subsamples). Table 13 illustrates that one reason for the difference between post-distress and post-Chapter 11 performance is that the post-distress performance of firms that never enter Chapter 11 is much better than the post-Chapter 11 performance in our sample. In addition, 6 firms that emerge from Chapter 11 are still financially distressed and are acquired or liquidated while still in financial distress later on. Typically, this occurs fairly soon after emerging from Chapter 11 - five of these firms are acquired or liquidated within 16 months of emerging from Chapter 11. This eliminates apparently some of the worse performers, enhancing the contrast between post-distress and post-Chapter 11 performance. The post-distress performance of the remaining 13 firms that were at some point in Chapter 11 is worse than the post-distress performance of firms that never enter Chapter 11 (although the difference is never statistically significant). However, their performance

²³ Throughout the paper, the statistical significance of differences in the median of two distributions is tested with the Wilcoxon/Mann-Whitney test.

is quite close to the median performance in their 4-digit SIC code (with the exception of year 2) and hence does not suggest a large extent of excessive continuation.

It should be noted that among the firms that file for Chapter 11 there are almost no firms that survive the entire financial distress process as independent firms without creditors taking an equity stake in them. Perhaps their debt burden is very difficult to service without a substantial debt reduction, given their economic performance. While creditors do not take an equity stake in 13 out of the 22 surviving firms that never enter Chapter 11, they take an equity stake in 11 out of the 13 survivors that at some point enter Chapter 11. It is easier to reduce leverage through debt-equity swaps in Chapter 11 due to the voting rules for the reorganization plan that alleviate free-rider problems and other factors (Gilson (1997)). This may have the unintended consequence of allowing some not viable firms to survive financial distress as independent companies.²⁵

Table 3d has illustrated that the fraction of firms that are acquired or liquidated is higher among those firms that at some point enter Chapter 11 than among those that never do. One might conjecture then that firms that survive the entire financial distress process despite entering Chapter 11 might be better performers than those that never enter Chapter 11, because the selection pressure may be higher for firms filing for Chapter 11. To the contrary, they seem to perform slightly worse (see Table 13). One reason may be that the worse firms enter Chapter 11. The characteristics of firms that enter and that never enter Chapter 11 seem very similar at the onset of financial distress (this is not reported in a table for brevity). In particular, the operating performance as well as the leverage ratios of both sets of firms are similar. While the median ROA of firms that never enter Chapter 11 is -0.002 , it is -0.009 for firms that at some point file for Chapter 11 (the difference is not statistically significant). While the median leverage ratio of firms filing at some point for Chapter 11 is slightly higher (80.3%) than that of firms that never enter Chapter 11 (71.6%), the difference is not statistically significant either. However, there is some evidence that firms that eventually enter Chapter 11 experience a deterioration in their in-

²⁴ The Hotchkiss and Mooradian (1997) sample is not quite comparable, because it includes a minority of firms emerging from an out of court debt restructuring rather than from Chapter 11.

²⁵ However, the operating performance of the two firms that enter Chapter 11 at some point and survive the entire financial distress process as independent firms without a creditor equity stake is even worse than that of the Chapter 11 firms with a creditor equity stake.

distress performance or at least do not improve as much as firms that avoid Chapter 11. In particular, the median ROA of those firms that eventually enter Chapter 11 is worse in the fiscal year in which they file for Chapter 11 than at the onset of financial distress: -0.030 rather than -0.009 (and -0.150 instead of -0.116 when compared to the median firm in the same 2-digit SIC code and -0.132 instead of -0.095 when compared to the median firm in the same 4-digit SIC code). This contrasts with the overall tendency of an improvement in in-distress performance for the whole sample of firms illustrated in Table 6a, in particular early on.²⁶ One might interpret this as limited support for the conjecture that firms that enter Chapter 11 have experienced a lesser improvement in their in-distress operating performance and are in that sense the worse firms. This is consistent with the theoretical argument by Mooradian (1994).

X. Conclusion

This paper has described and analyzed the selection process during financial distress. We have followed the financial distress process from its onset to its resolution for 102 firms that entered financial distress between 1979 and 1983. Our main findings are the following. There is substantial selection pressure, in particular from the acquisition market. Only about one-third of the firms survive financial distress as independent firms. By the end of the second full year after the onset of financial distress, almost one third of the firms are acquired or liquidated, and by the end of the fifth year, more than half. The operating performance of surviving firms improves but remains substantially below industry median as long as they are still in financial distress. However, poor performance is not tolerated for long. The number of firms that report negative operating income becomes small within only a few years after the onset of financial distress due to the large number of acquisitions and liquidations. The probability of a firm's short-run and long-run survival is positively related to its operating performance. The effect seems economically relatively strong. The only other factors that improve the likelihood of survival are equity stakes

²⁶ Moreover, in all but one in-distress year, the performance of firms that enter Chapter 11 at some point is worse than that of the firms that never enter Chapter 11. However, the difference is never statistically significant.

taken by creditors (which improve a firm's medium- and long-run survival probability) and firm size (which may improve a firm's short-run survival probability only). Last not least, firms that emerge from financial distress as independent companies seem to have fully overcome their financial difficulties within a median time of less than 3 years and perform about as well as the industry median firm. This suggests that they are economically viable.

Due to the absence of a clear efficiency benchmark, it is not easy to make a judgment about the overall efficiency of the selection process. However, our findings suggest that there is a substantial amount of asset reallocation away from poorly performing firms and relatively little excessive continuation of inefficient firms. Any pro-continuation bias of Chapter 11 seems to have a limited impact, largely due to an active corporate control market both in and outside of Chapter 11. Poor post-Chapter 11 performance affects only a small fraction of financially distressed firms, because many firms do not enter Chapter 11 or are acquired or liquidated while in Chapter 11.

The implications of our analysis for the debate about the reform of Chapter 11 are mixed and limited. On the one hand, the fact that relatively poor post-restructuring performance is found only for firms entering Chapter 11, but not for firms avoiding Chapter 11, suggests that the selection process may be made less efficient (and biased towards continuation) by aspects of the institutional framework associated with Chapter 11. On the other hand, any pro-continuation bias associated with Chapter 11 does not seem to have a dramatic impact on the overall efficiency of the selection process during financial distress. Hence, the negative consequences of Chapter 11 for the selection process seem to be limited. Some theoretical models suggest that one cannot evaluate the efficiency of Chapter 11 by only looking at firms in Chapter 11 but one also needs to look at the financially distressed firms avoiding Chapter 11 (e.g., Mooradian (1994)). To generate clearer implications for the Chapter 11 reform debate, one would need to know what impact Chapter 11 reorganization law has on the (seemingly fairly efficient) selection process outside Chapter 11, which is an empirical question that is beyond the scope of this paper. One potential way to get stronger implications for the Chapter 11 debate might be to compare the selection process documented in this paper to the selection process for financially distressed

firms in countries with a more liquidation-oriented bankruptcy code, but with a similar takeover environment, such as the UK.²⁷ This is left for future work.

Our analysis shows that there is a large amount of asset reallocation away from poorly performing firms. Because these firms are likely to have poor prospects, it is reasonable to conjecture that the assets are reallocated to a higher value use. To confirm this conjecture, one would need to analyze the post-acquisition and post-liquidation use of these assets, which is left to future research. However, there is some evidence in the existing literature that acquisitions of financially distressed firms lead to a reallocation of the assets to better uses (see Hotchkiss and Mooradian (1997, 1998)).

Poorly performing firms can also be acquired if they have little debt and hence are not financially distressed. It would be interesting to establish a control sample of similar economically but not financially distressed firms and compare the survival process for these firms to the one for the financially distressed sample described here. This would highlight the particular role of financial as opposed to economic distress and of debt in the reallocation of assets away from poorly performing firms.

This paper has looked at a sample of firms that enter financial distress between 1979 and 1983, in order to capture the whole process of financial distress and five post-distress years. One question is whether the selection process is substantially different and less efficient for later cohorts of financially distressed firms. There is some empirical evidence suggesting the opposite. In particular, firms entering financial distress in the late 1980s and early 1990s seem to perform better than earlier cohorts. Hotchkiss and Mooradian (1997) find that the post-restructuring performance in their sample is better than that found in the earlier sample in Hotchkiss (1995). Andrade and Kaplan (1998) look at a sample of highly leveraged firms that become financially distressed in the late 1980s and early 1990s. They are not economically distressed, outperforming the industry median even in the year they become financially distressed. Moreover, the selection pressure arising from the acquisition market may have increased since the early and mid-1980s, in particular due to a more active vulture market. Hotchkiss and Mooradian (1997) find that the incidence of vulture investors taking substantial stakes in financially distressed firms is higher in the

²⁷ For a comparison of the U.S. and the UK bankruptcy environments, see Franks and Torous (1992).

post-1988 period than in the pre-1988 period. Both the improved economic performance of financially distressed firms and the higher selection pressure from the acquisition market suggest that the selection process for later cohorts of financially distressed firms may be characterized by even more asset reallocation away from poorly performing firms and an even higher performance sensitivity of survival than for the sample analyzed in this paper.

Table 1: Selected Sample Characteristics At The Onset Of Financial Distress

Summary statistics are presented for 102 firms that enter financial distress between 1979 and 1983. The characteristics are measured in the year of the onset of financial distress. Not all variables are available for all firms. N denotes the number of observations. The data are from *Compustat*. Interest coverage is defined as the ratio of EBITDA and interest expense. Book leverage is defined as short-term debt plus long-term debt, divided by the same expression plus the book value of common equity.

Panel A: Sample Description at the Onset of Financial Distress

Variable		N
Median (mean) book value of assets (\$ million)	57.3 (240.3)	93
Median (mean) net sales (\$ million)	71.7 (339.4)	93
Median (mean) Interest Coverage Ratio	-0.07 (-0.83)	93
Median (mean) EBITDA/Assets	-0.004 (-0.033)	93
Median (mean) EBITDA/Net Sales	-0.009 (-0.015)	93
Median (mean) book leverage	77.9% (84.7%)	85

Panel B: Assets at the Onset of Financial Distress

Assets (\$ million)	Number of Firms
Smaller than 20	11
Between 20 and 50	31
Between 50 and 100	14
Between 100 and 500	27
Between 500 and 1000	3
Larger than 1000	7

Panel C: Industry Classification

Industry	Number of Firms
Oil and Gas Extraction	13
Primary Metal	9
Transportation by Air	8
Real Estate	8
Durable Goods - Wholesale	7
Industrial, Commerc. Machinery, Computer Equip.	7
Transportation Equipment	5
Other	45

Table 2: Duration of Financial Distress

The duration of financial distress is measured as the number of months between the onset of financial distress and the month in which the firm exits financial distress. The onset of financial distress is the first default, the first time the firm negotiates with its creditors to restructure its debt in order to avoid a default, or the first time the firm is in Chapter 11. For firms that emerge from financial distress as independent entities (surviving firms), the month in which they exit financial distress is the January after the last year in which they are in financial distress. The exact definition of the exit date can be found in section III. For firms that are acquired or liquidated, the month in which they exit financial distress is defined to be the month of the announcement of the acquisition or liquidation. If this is not available, it is the month of the completion of the acquisition or the liquidation. For firms that are acquired or liquidated in Chapter 11, the exit date is the date of the confirmation of the reorganization plan or plan of liquidation.

Number of Months in Financial Distress	Surviving Firms	Firms That Are Ac- quired or Liquidated	Sum
0-12	5	9	14
13-24	5	14	19
25-36	9	16	25
37-48	9	7	16
49-60	4	5	9
61-72	2	5	7
73-84	0	3	3
85-96	1	5	6
97-108	0	0	0
109-120	0	2	2
121-132	0	1	1
>132	0	0	0

Table 3: Chapter 11

This table provides information on the incidence of Chapter 11 filings, the time spent in Chapter 11, and its resolution. All information is from *Dow Jones Interactive* and *Lexis/Nexis*. Panel A describes how many sample firms filed for Chapter 11 in the year of the onset of financial distress (year 0), the first full year after the onset of financial distress (year 1), and all other years. Panel B shows how much time the sample firms spent in Chapter 11. It is measured as the number of months between the filing for Chapter 11 and the confirmation of the reorganization plan or plan of liquidation. Panel C describes the resolution of Chapter 11. Panel D shows survival rates for firms that file for Chapter 11 at least once during financial distress and those that never do.

Panel A: Chapter 11 Filings

Year	0	1	2	3	4	5	6	7	8	9	10	11	Sum
Number of firms filing for Ch. 11	23	14	5	5	2	2	0	3	0	1	1	0	56

Panel B: Duration of Chapter 11

Months spent in Chapter 11	0-12	13-24	25-36	37-48	49-60	61-72	73-84	>84	Sum
Number of firms	13	23	16	2	1	0	1	0	56

Panel C: Resolution of Chapter 11

Status at exit from Chapter 11	Number of firms
Acquired	21
Liquidated	16
Creditor majority	5
Creditor minority>20%	5
Creditor minority<20%	4
No creditor stake	5
Sum	56

Panel D: Chapter 11 and Survival

	Emerge as independent companies	Acquired or liquidated	Sum
Firms that file for Chapter 11	13 (23.2%)	43 (76.8%)	56
Firms that never file for Chapter 11	22 (47.8%)	24 (52.2%)	46
Sum	35	67	102

Table 4: Status of Firms By Year

This table describes the status of the sample firms by the end of each full year after the onset of financial distress. Year 0 is the year of the onset of financial distress, year 1 is the first full year after the onset of financial distress, etc. The category “lost independence” encompasses both firms that were acquired and firms that were liquidated. Acquisitions include the acquisition of a minority stake in a firm’s equity if it is at least 40% and at the same time the acquirer assumes control of the board of directors (his representatives gain a majority of board seats) or assumes the CEO or chairman position. Liquidations include instances in which the firm sells all or almost all of its operating assets and emerges from Chapter 11 without any or almost any operating assets in order to take advantage of its net operating loss carry-forwards. All information is from *Dow Jones Interactive* and *Lexis/Nexis*.

Year	0	1	2	3	4	5	6	7	8	9	10	11
Still in financial distress	96	83	60	41	25	16	10	7	3	2	1	0
<i>Acquired</i>	5	12	26	31	37	40	43	45	47	48	48	48
<i>Liquidated</i>	1	2	6	11	12	14	15	16	17	17	18	19
Lost independence	6	14	32	42	49	54	58	61	64	65	66	67
Exited financial distress as independent companies	0	5	10	19	28	32	34	34	35	35	35	35

Table 5: Acquisitions, Liquidations, and Creditor Equity Stakes

This table shows the number of liquidations, acquisitions, and instances in which creditors take equity stakes in the sample firms for each year during financial distress. Year 0 is the year of the onset of financial distress, year 1 is the first full year after the onset of financial distress, etc. The control events are counted only for firms that were still in financial distress. The table also shows how many of these control events occurred in and how many outside of Chapter 11. Acquisitions include the acquisition of a minority stake in a firm's equity if it is at least 40% and at the same time the acquirer assumes control of the board of directors (his representatives gain a majority of board seats) or assumes the CEO or chairman position. Liquidations include instances in which the firm sells all or almost all of its operating assets and emerges from Chapter 11 without any or almost any operating assets in order to take advantage of its net operating loss carry-forwards. In three cases, it is known that creditors took an equity stake in the firm but not exactly how large it was. These cases were treated as creditor minority equity stakes of less than 20%. In a few firms, creditors take equity stakes at several points of time, and these instances are counted separately.

Year	0	1	2	3	4	5	6	7	8	9	10	11	Sum
Event													
Liquidation outs. Ch.11	0	0	1	0	0	0	0	0	0	0	1	0	2
Liquidation in Ch.11	1	1	3	5	1	2	1	1	1	0	0	1	17
Acquisition outs. Ch.11	4	5	7	1	4	2	2	2	0	0	0	0	27
Acquisition in Ch.11	1	2	7	4	2	1	1	0	2	1	0	0	21
Creditor majority outs. Ch.11	0	0	0	0	0	1	0	0	0	0	0	0	1
Creditor majority in Ch.11	0	1	0	2	0	0	1	1	0	0	0	0	5
Creditor minority >20% outs. Ch.11	1	3	1	0	1	0	0	0	0	0	0	0	6
Creditor minority >20% in Ch.11	1	0	1	2	0	0	0	0	0	0	0	0	4
Creditor minority <20% outs. Ch.11	7	2	5	3	3	1	0	0	0	0	0	0	21
Creditor minority <20% in Ch.11	0	0	2	1	0	0	0	0	0	0	0	0	3
Sum	15	14	27	18	11	7	5	4	3	1	1	1	107

Table 6a: Median Pre- and In-Distress Raw Operating Performance

This table describes the sample firms' operating performance before and during financial distress. Year 0 is the year of the onset of financial distress, year -1 is the first full year before the onset of financial distress, and year +1 the first full year after the onset of financial distress, etc. Not all firms have their performance data available in all years. N denotes the number of observations. For the in-distress performance, only firms are considered that are still in financial distress. The performance data are not industry-adjusted. All data are from *Compustat*.

Year	Median EBITDA/Assets	N	Median EBITDA/Net Sales	N	Number of firms with negative EBITDA/Assets	Percentage of firms with negative EBITDA/Assets
-5	0.119***	86	0.083***	86	6	7.0
-4	0.122***	88	0.080***	88	5	5.7
-3	0.103***	94	0.075***	94	11	11.7
-2	0.080***	98	0.066***	98	12	12.2
-1	0.041***	100	0.029***	100	29	29.0
0	-0.004	93	-0.009	93	50	53.8
1	-0.007	75	-0.003	74	39	52.0
2	0.052**	55	0.043***	54	17	30.9
3	0.027	40	0.023	39	17	42.5
4	0.037	21	0.043	20	8	38.1
5	0.008	15	0.021	14	6	40.0
6	0.061	11	0.029	10	3	27.3
7	0.051	7	0.031	7	3	42.9
8	0.018	2	0.031	2	1	50.0
9	-0.097	1	-0.052	1	1	100.0

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 6b: Median Industry-Adjusted Pre- and In-Distress Operating Performance

This table describes the sample firms' industry-adjusted operating performance before and during financial distress. Year 0 is the year of the onset of financial distress, year -1 is the first full year before the onset of financial distress, and year +1 the first full year after the onset of financial distress, etc. Not all firms have their performance data available in all years. N denotes the number of observations. For the in-distress performance, only firms are considered that are still in financial distress. ROA is the return on assets, EBITDA/Assets. The median industry-adjusted return on assets is calculated as follows. For the SIC2 (SIC4)-adjusted return on assets, the median return on assets of all firms in the same 2-digit (4-digit) SIC code as the sample firm is subtracted from each firm's return on assets. The median of this industry-adjusted performance measure for the sample firms is reported in the table. All data are from *Compustat*.

Year	N	Median ind.- adj. ROA (SIC2)	Median ind.- adj. ROA (SIC4)	< ind. median (SIC2)	< ind. median (SIC2), percentage	< ind. median (SIC4)	< ind. median (SIC4), percentage
-5	86	-0.004	0.000	47	54.7	41	47.7
-4	88	-0.018*	-0.006	53	60.2	47	53.4
-3	94	-0.023***	-0.012***	60	63.8	54	57.4
-2	98	-0.042***	-0.032***	69	70.4	67	68.4
-1	100	-0.074***	-0.070***	81	81.0	78	78.0
0	93	-0.102***	-0.075***	78	83.9	77	82.8
1	75	-0.100***	-0.074***	63	84.0	60	80.0
2	55	-0.052***	-0.030***	44	80.0	36	65.5
3	40	-0.046***	-0.041***	31	77.5	31	77.5
4	21	-0.075***	-0.044***	17	81.0	14	66.7
5	15	-0.039**	-0.029**	12	80.0	11	73.3
6	11	-0.000	0.000	6	54.5	5	45.5
7	7	-0.070	-0.021	5	71.4	4	57.1
8	2	-0.091	-0.081	2	100.0	2	100.0
9	1	-0.160	-0.137	1	100.0	1	100.0

***statistically significantly different from zero at the 1% significance level
 ** statistically significantly different from zero at the 5% significance level
 * statistically significantly different from zero at the 10% significance level

Table 7a: Survival Regressions I

This table shows several specifications of probit regressions estimating the probability of emerging from financial distress as an independent company (survival). The dependent variable is a dummy variable that takes on the value of one if the firm survives and zero otherwise. Not all variables are available for all firms. N denotes the number of observations. AVERPERF denotes the average EBITDA/Assets during financial distress. SIZE, GROWTH, and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of assets. GROWTH denotes the ratio of the market value of assets to its book value. LEV is the ratio of short-term debt plus long term debt, divided by the same expression plus the book value of common equity. CH11 is a dummy variable that takes on the value of one if a firm was ever in Chapter 11 during its period of financial distress and zero otherwise. LENGTH is the number of months spent in financial distress. STAKE is a dummy variable that takes on the value of one if creditors take an equity stake in the firm during financial distress and zero otherwise. There are four regression specifications, denoted by (1), (2), (3), and (4). The coefficient of an independent variable is to the left of the number of the regression specification, with the z-statistic in parentheses. The number to the right of the regression coefficient is the marginal effect of the relevant independent variable. For dummy variables, it was calculated by estimating the difference between the survival probability if the dummy variable takes on the value of one and if it takes on the value of zero, evaluating all other variables at their mean.

Variable	(1)	(2)	(3)	(4)				
Constant	0.539 (0.544)	0.181	0.422 (0.447)	0.144 0.348 (0.387)	0.124	0.513 (0.559)	0.182	
AVERPERF	6.491*** (3.001)	2.176	5.456*** (2.751)	1.867	7.295*** (3.576)	2.602	6.886*** (3.396)	2.449
SIZE	0.013 (0.093)	0.004	-0.062 (-0.474)	-0.021	0.070 (0.538)	0.025	0.040 (0.301)	0.014
GROWTH	-0.403 (-0.762)	-0.135	-0.490 (-0.939)	-0.168	-0.373 (-0.756)	-0.133	-0.404 (-0.802)	-0.144
LEV	-0.036 (-0.168)	-0.012	0.042 (0.201)	-0.014	-0.005 (-0.029)	-0.002	0.042 (0.212)	0.015
CH11	-0.507 (-1.246)	-0.167	-0.934*** (-2.622)	-0.310			-0.394 (-1.089)	-0.138
LENGTH	-0.021** (-2.289)	-0.007			-0.015** (-2.293)	-0.005	-0.012 (-1.551)	-0.004
STAKE	1.341*** (3.397)	0.466	1.058*** (2.994)	0.376				
LogLikelihood	-36.265		-39.276		-43.390		-42.798	
McFadden R^2	0.344		0.290		0.216		0.226	
N	84		84		84		84	

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 7b: Survival Regressions II

This table shows several specifications of probit regressions estimating the probability of emerging from financial distress as an independent company (survival). The dependent variable is a dummy variable that takes on the value of one if the firm survives and zero otherwise. Not all variables are available for all firms. N denotes the number of observations. ONSETPERF denotes EBITDA/Assets in the year of the onset of financial distress. PERFIMPROV is the difference between EBITDA/Assets in the last year of financial distress and EBITDA/Assets in the year of the onset of financial distress. SIZE, GROWTH, and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of assets. GROWTH denotes the ratio of the market value of assets to its book value. LEV is the ratio of short-term debt plus long term debt, divided by the same expression plus the book value of common equity. CH11 is a dummy variable that takes on the value of one if a firm was ever in Chapter 11 during its period of financial distress and zero otherwise. LENGTH is the number of months spent in financial distress. STAKE is a dummy variable that takes on the value of one if creditors take an equity stake in the firm during financial distress and zero otherwise. There are four regression specifications, denoted by (5), (6), (7), and (8). The coefficient of an independent variable is to the left of the number of the regression specification, with the z-statistic in parentheses. The number to the right of the regression coefficient is the marginal effect of the relevant independent variable. For dummy variables, it was calculated by estimating the difference between the survival probability if the dummy variable takes on the value of one and if it takes on the value of zero, evaluating all other variables at their mean.

Variable	(5)		(6)		(7)		(8)	
Constant	1.669 (1.246)	0.538	1.217 (0.984)	0.415	0.723 (0.693)	0.262	1.011 (0.923)	0.365
ONSETPERF	6.822*** (2.691)	2.199	5.954** (2.480)	2.028	5.253** (2.428)	1.903	5.219** (2.369)	1.885
PERFIMPROV	4.460** (2.303)	1.438	4.473** (2.426)	1.524	3.688** (2.413)	1.336	3.645** (2.276)	1.316
SIZE	-0.120 (-0.600)	-0.039	-0.207 (-1.113)	-0.070	0.042 (0.260)	0.015	-0.004 (-0.022)	-0.001
GROWTH	-0.599 (-0.984)	-0.193	-0.597 (-1.019)	-0.203	-0.417 (-0.802)	-0.151	-0.488 (-0.901)	-0.176
LEV	-0.166 (-0.648)	-0.053	-0.083 (-0.319)	-0.028	-0.042 (-0.200)	-0.015	0.017 (0.077)	0.006
CH11	-0.680 (-1.524)	-0.217	-0.985** (-2.431)	-0.330			-0.543 (-1.441)	-0.196
LENGTH	-0.025** (-2.032)	-0.008			-0.016* (-1.877)	-0.006	-0.011 (-1.211)	-0.004
STAKE	1.726*** (3.663)	0.555	1.416*** (3.485)	0.483				
LogLikelihood	-27.326		-29.665		-36.884		-35.836	
McFadden R^2	0.389		0.337		0.176		0.199	
N	67		67		67		67	

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 8a: Estimating The Survival Probability Over Different Time Horizons I

This table shows several specifications of probit regressions estimating the probability of survival over different time horizons. The dependent variable of the first (second, third) regression is a dummy variable that takes on the value of one if the firm survives as independent entity (is not acquired or liquidated) until at least the end of the second (fourth, sixth) full year after the onset of financial distress and zero otherwise: SURV2 (SURV4, SURV6). Not all variables are available for all firms. N denotes the number of observations. AVERPERF denotes the average EBITDA/Assets during financial distress up to and including the second (fourth, sixth) full year after the onset of financial distress. SIZE, GROWTH, and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of assets. GROWTH denotes the ratio of the market value of assets to its book value. LEV is the ratio of short-term debt plus long term debt, divided by the same expression plus the book value of common equity. CH11 is a dummy variable that takes on the value of one if a firm was ever in Chapter 11 up to and including the second (fourth, sixth) full year after the onset of financial distress and zero otherwise. STAKE is a dummy variable that takes on the value of one if creditors take an equity stake in the firm up to and including the second (fourth, sixth) full year after the onset of financial distress and zero otherwise. There are three regression specifications, denoted by the dependent variable, SURV2, SURV4, and SURV6. The coefficient of an independent variable is to the left of the name of the dependent variable, with the z-statistic in parentheses. The number to the right of the regression coefficient is the marginal effect of the relevant independent variable. For dummy variables, it was calculated by estimating the difference between the survival probability if the dummy variable takes on the value of one and if it takes on the value of zero, evaluating all other variables at their mean.

Variable	Coefficient (z-stat.)	Marginal Effect	Coefficient (z-stat.)	Marginal Effect	Coefficient (z-stat.)	Marginal Effect
	<u>SURV2</u>		<u>SURV4</u>		<u>SURV6</u>	
Constant	-0.614 (-0.664)	-0.192	-0.475 (-0.558)	-0.187	-0.610 (-0.723)	-0.240
AVERPERF	4.703*** (3.073)	1.473	6.835*** (3.407)	2.688	6.083*** (3.040)	2.392
SIZE	0.264* (1.817)	0.083	0.115 (0.889)	0.045	0.068 (0.540)	0.027
GROWTH	0.027 (0.067)	0.008	0.137 (0.352)	0.054	0.152 (0.397)	0.060
LEV	0.066 (0.273)	0.021	-0.071 (-0.354)	-0.028	-0.142 (-0.840)	-0.056
CH11	0.131 (0.361)	0.040	-0.197 (-0.600)	-0.078	-0.385 (-1.166)	-0.150
STAKE	0.298 (0.677)	0.088	0.668* (1.958)	0.252	0.962*** (2.836)	0.369
LogLikelihood	-40.534		-42.733		-42.030	
McFadden R^2	0.193		0.255		0.275	
N	84		84		84	

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 8b: Estimating The Survival Probability Over Different Time Horizons II

This table shows several specifications of probit regressions estimating the probability of survival over different time horizons. The dependent variable of the first (second, third) regression is a dummy variable that takes on the value of one if the firm survives as independent entity (is not acquired or liquidated) at least until the end of the second (fourth, sixth) full year after the onset of financial distress and zero otherwise: SURV2 (SURV4, SURV6). Not all variables are available for all firms. N denotes the number of observations. ONSETPERF denotes EBITDA/Assets in the year of the onset of financial distress. PERFIMPROV denotes the difference between EBITDA/Assets in the second (fourth, sixth) full year after the onset of financial distress and EBITDA/Assets during the year of the onset of financial distress. SIZE, GROWTH, and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of assets. GROWTH denotes the ratio of the market value of assets to its book value. LEV is the ratio of short-term debt plus long term debt, divided by the same expression plus the book value of common equity. CH11 is a dummy variable that takes on the value of one if a firm was ever in Chapter 11 up to and including the second (fourth, sixth) full year after the onset of financial distress and zero otherwise. STAKE is a dummy variable that takes on the value of one if creditors take an equity stake in the firm up to and including the second (fourth, sixth) full year after the onset of financial distress and zero otherwise. There are three regression specifications, denoted by the dependent variable, SURV2, SURV4, and SURV6. The coefficient of an independent variable is to the left of the name of the dependent variable, with the z-statistic in parentheses. The number to the right of the regression coefficient is the marginal effect of the relevant independent variable. For dummy variables, it was calculated by estimating the difference between the survival probability if the dummy variable takes on the value of one and if it takes on the value of zero, evaluating all other variables at their mean.

Variable	Coefficient (z-stat.)	Marginal Effect	Coefficient (z-stat.)	Marginal Effect	Coefficient (z-stat.)	Marginal Effect
	<u>SURV2</u>		<u>SURV4</u>		<u>SURV6</u>	
Constant	-0.569 (-0.484)	-0.132	-0.282 (-0.290)	-0.103	-0.465 (-0.472)	-0.185
ONSETPERF	6.405*** (2.826)	1.489	5.458** (2.495)	1.984	4.877** (2.258)	1.934
PERFIMPROV	2.248* (1.653)	0.523	2.515* (1.679)	0.914	2.944* (1.930)	1.167
SIZE	0.319 (1.604)	0.074	0.108 (0.731)	0.039	0.056 (0.374)	0.022
GROWTH	0.199 (0.412)	0.046	0.161 (0.383)	0.058	0.126 (0.313)	0.050
LEV	-0.109 (-0.470)	-0.025	-0.097 (-0.447)	-0.035	-0.191 (-1.003)	-0.076
CH11	-0.305 (-0.707)	-0.075	-0.358 (-1.010)	-0.131	-0.434 (-1.217)	-0.171
STAKE	0.501 (0.876)	0.102	0.787** (2.107)	0.269	1.159*** (3.132)	0.426
LogLikelihood	-25.876		-35.518		-34.580	
McFadden R^2	0.247		0.187		0.255	
N	67		67		67	

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 9: Post-Distress Operating Performance

This table describes the operating performance of firms that emerge from financial distress as independent companies. Year 1 is the first post-distress year, year 2 the second post-distress year, etc. Performance data are not available for all firms in all years. N denotes the number of observations. The median industry-adjusted return on assets is calculated as follows. For the SIC2 (SIC4)-adjusted return on assets, the median return on assets of all firms in the same 2-digit (4-digit) SIC code as the sample firm is subtracted from each firm's return on assets. The median of this industry-adjusted performance measure for the sample firms is reported in the table. All data are from *Compustat*.

Year	Median EBITDA/Assets	N	Number (%) <0	Median industry-adjusted EBITDA/Assets (SIC2)	Number (%) <0	Median industry-adjusted EBITDA/Assets (SIC4)	Number (%) <0
1	0.099***	34	4 (11.8%)	-0.006	18 (52.9%)	0.001	13 (38.2%)
2	0.095***	32	6 (18.8%)	-0.012	17 (53.1%)	0.000	14 (43.8%)
3	0.114***	29	2 (6.9%)	0.013	11 (37.9%)	0.029*	6 (20.7%)
4	0.116***	26	3 (11.5%)	0.016	12 (46.2%)	0.006	12 (46.2%)
5	0.088***	26	5 (19.2%)	-0.008	16 (61.5%)	-0.000	13 (50.0%)

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 10: Median Operating Performance Of Surviving Firms From Onset Of Financial Distress On

This table describes the operating performance of all firms that survive the process of financial distress as independent companies. Year 0 is the year of the onset of financial distress, year +1 the first full year after the onset of financial distress, etc. Not all firms have their performance data available in all years. N denotes the number of observations. ROA is the return on assets, EBITDA/Assets. The median industry-adjusted return on assets is calculated as follows. For the SIC2 (SIC4)-adjusted return on assets, the median return on assets of all firms in the same 2-digit (4-digit) SIC code as the sample firm is subtracted from each firm's return on assets. The median of this industry-adjusted performance measure for the sample firms is reported in the table. All data are from *Compustat*.

Year	N	Median ROA	Number (%)<0	Median SIC2-adjusted ROA	Number (%)<0	Median SIC4-adjusted ROA	Number (%) <0
0	34	0.030*	13 (38.2%)	-0.076***	27 (79.4%)	-0.051***	27 (79.4%)
1	34	0.034	14 (41.2%)	-0.070***	24 (70.6%)	-0.048***	24 (70.6%)
2	32	0.068***	6 (18.8%)	-0.031**	23 (71.9%)	-0.011**	18 (56.3%)
3	33	0.061**	10 (30.3%)	-0.038**	22 (66.7%)	-0.008*	19 (57.6%)
4	31	0.080***	6 (19.4%)	-0.005	16 (51.6%)	0.000	15 (48.4%)
5	26	0.088***	4 (15.4%)	-0.021	16 (61.5%)	0.003	12 (46.2%)
6	27	0.114***	4 (14.8%)	0.006	13 (48.1%)	0.024	10 (37.0%)

***statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 11: Post-Distress Operating Performance And Creditor Equity Stakes

This table describes the operating performance of firms that emerge from financial distress as independent companies. Year 1 is the first post-distress year, year 2 the second post-distress year, etc. Performance data are not available for all firms in all years. N denotes the number of observations. The median industry-adjusted return on assets is calculated as follows. For the SIC2 (SIC4)-adjusted return on assets, the median return on assets of all firms in the same 2-digit (4-digit) SIC code as the sample firm is subtracted from each firm's return on assets. The median of this industry-adjusted performance measure for the sample firms is reported in the table. All data are from *Compustat*.

Year	Median ROA of firms in which creditors take no equity stake (N)	Median ROA of firms in which creditors take equity stake (N)	Median ind.-adjusted (SIC2) ROA of firms in which creditors take no equity stake	Median ind.-adjusted (SIC2) ROA of firms in which creditors take equity stake	Median ind.-adjusted (SIC4) ROA of firms in which creditors take no equity stake	Median ind.-adjusted (SIC4) ROA of firms in which creditors take equity stake
1	0.097*** (15)	0.101** (19)	0.000	-0.010	0.005	0.000
2	0.135*** (15)	0.080* (17)	0.021	-0.029* c)	0.032	-0.053* b)
3	0.172*** (14)	0.086*** (15)	0.037	0.003	0.042	0.028
4	0.148*** (11)	0.055** (15)	0.032*	-0.046 c)	0.012*	-0.050 b)
5	0.116* (11)	0.078** (15)	-0.002	-0.018	0.014	-0.013

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

a) indicates that median performance of firms in which creditors take equity stake is statistically significantly different at the 1% significance level from median performance of firms in which creditors do not take equity stake

b) indicates that median performance of firms in which creditors take equity stake is statistically significantly different at the 5% significance level from median performance of firms in which creditors do not take equity stake

c) indicates that median performance of firms in which creditors take equity stake is statistically significantly different at the 10% significance level from median performance of firms in which creditors do not take equity stake

Table 12: Post-Chapter 11 Operating Performance

This table describes the operating performance of firms that emerge from Chapter 11 as independent companies. Year 1 is the first full fiscal year after the firm emerges from Chapter 11, year 2 the second full year, etc. Performance data are not available for all firms in all years. N denotes the number of observations. The median industry-adjusted return on assets is calculated as follows. For the SIC2 (SIC4)-adjusted return on assets, the median return on assets of all firms in the same 2-digit (4-digit) SIC code as the sample firm is subtracted from each firm's return on assets. The median of this industry-adjusted performance measure for the sample firms is reported in the table. All data are from *Compustat*.

Year	Median EBITDA/Assets	N	Number (%) <0	Median industry-adjusted EBITDA/Assets (SIC2)	Number (%)<0	Median industry-adjusted EBITDA/Assets (SIC4)	Number (%)<0
1	0.031	14	6 (42.9%)	-0.053**	11 (78.6%)	-0.062*	10 (71.4%)
2	0.062	13	4 (30.8%)	-0.055**	10 (76.9%)	-0.039**	9 (69.2%)
3	0.083	10	3 (30.0%)	-0.032	7 (70.0%)	-0.039	6 (60.0%)
4	0.096	11	4 (36.4%)	-0.031	6 (54.5%)	-0.057	6 (54.5%)
5	0.021	10	3 (30.0%)	-0.062	7 (70.0%)	-0.027	6 (60.0%)

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

Table 13: Post-Distress Operating Performance And Chapter 11 Status

This table describes the operating performance of firms that emerge from financial distress as independent companies. Year 1 is the first post-distress year, year 2 the second post-distress year, etc. Performance data are not available for all firms in all years. N denotes the number of observations. The median industry-adjusted return on assets is calculated as follows. For the SIC2 (SIC4)-adjusted return on assets, the median return on assets of all firms in the same 2-digit (4-digit) SIC code as the sample firm is subtracted from each firm's return on assets. The median of this industry-adjusted performance measure for the sample firms is reported in the table. All data are from *Compustat*.

Year	Median EBITDA/Assets of firms that never file for Chapter 11 (N)	Median EBITDA/Assets of firms that file for Chapter 11 (N)	Median ind.-adjusted (SIC2) EBITDA/Assets of firms that never file for Chapter 11	Median ind.-adjusted (SIC2) EBITDA/Assets of firms that file for Chapter 11	Median ind.-adjusted (SIC4) EBITDA/Assets of firms that never file for Chapter 11	Median ind.-adjusted (SIC4) EBITDA/Assets of firms that file for Chapter 11
1	0.101*** (21)	0.093 (13)	0.000	-0.026	0.007	-0.008
2	0.098*** (21)	0.071 (11)	0.002	-0.031	0.003	-0.060
3	0.150*** (20)	0.099* (9)	0.024	0.006	0.031*	0.028
4	0.130*** (17)	0.102** (9)	0.024	0.007	0.005	0.010
5	0.092*** (17)	0.073 (9)	-0.004	-0.018	0.006	-0.006

*** statistically significantly different from zero at the 1% significance level

** statistically significantly different from zero at the 5% significance level

* statistically significantly different from zero at the 10% significance level

a) indicates that median performance of firms that file for Chapter 11 is statistically significantly different at the 1% significance level from median performance of firms that do not file for Chapter 11

b) indicates that median performance of firms that file for Chapter 11 is statistically significantly different at the 5% significance level from median performance of firms that do not file for Chapter 11

c) indicates that median performance of firms that file for Chapter 11 is statistically significantly different at the 10% significance level from median performance of firms that do not file for Chapter 11

Figure 1: Overview of Survival Process

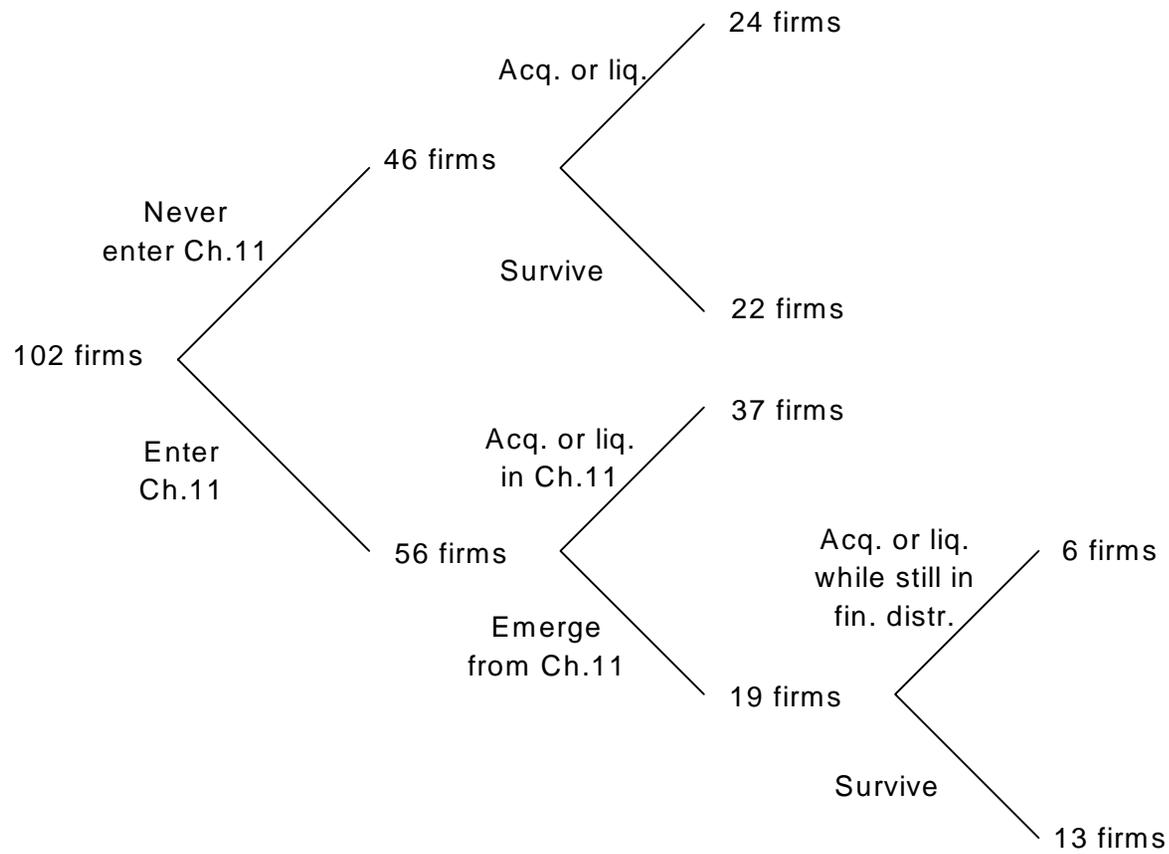


Figure 2: Status of Firms By Year

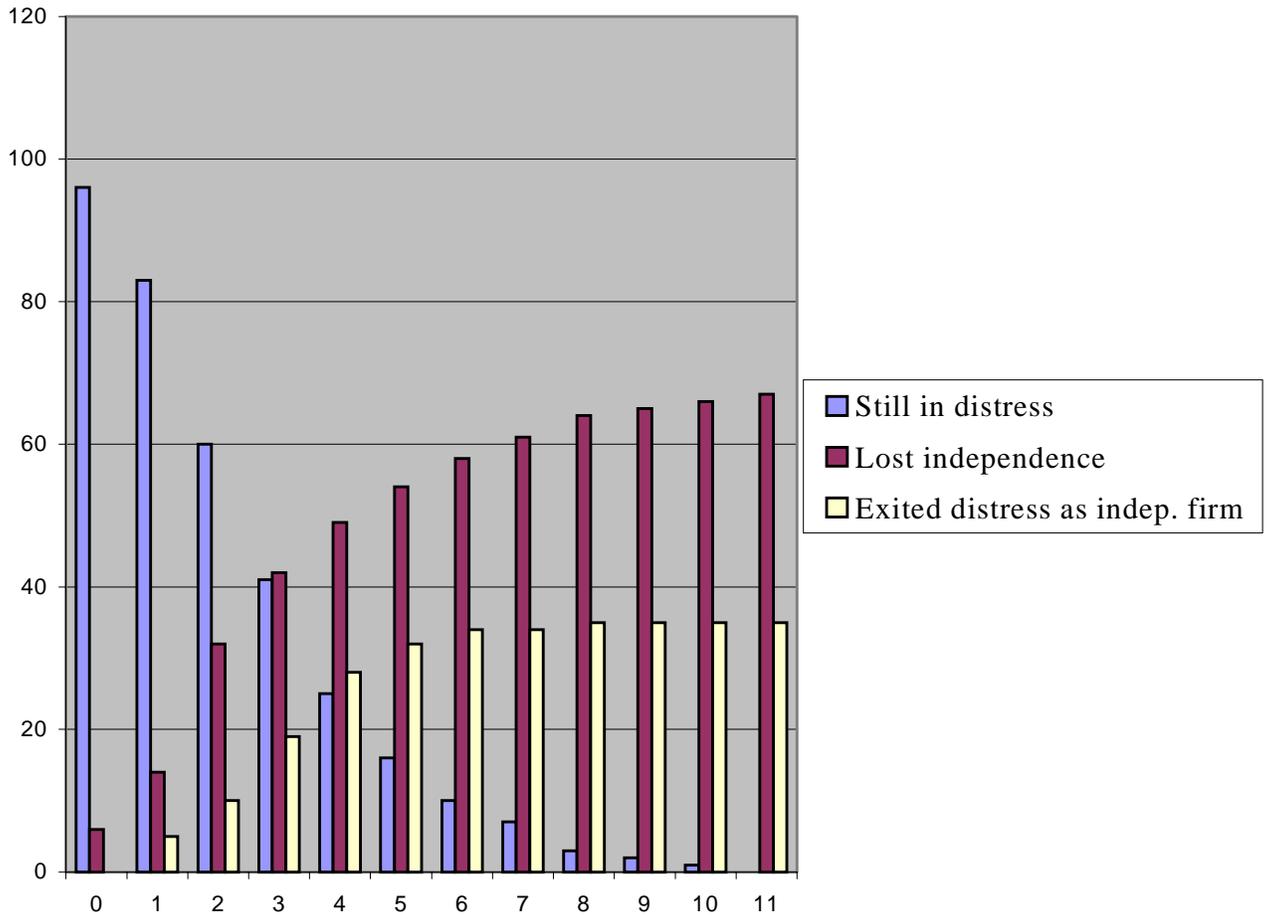


Figure 3: Acquisitions, Liquidations, and Creditor Equity Stakes

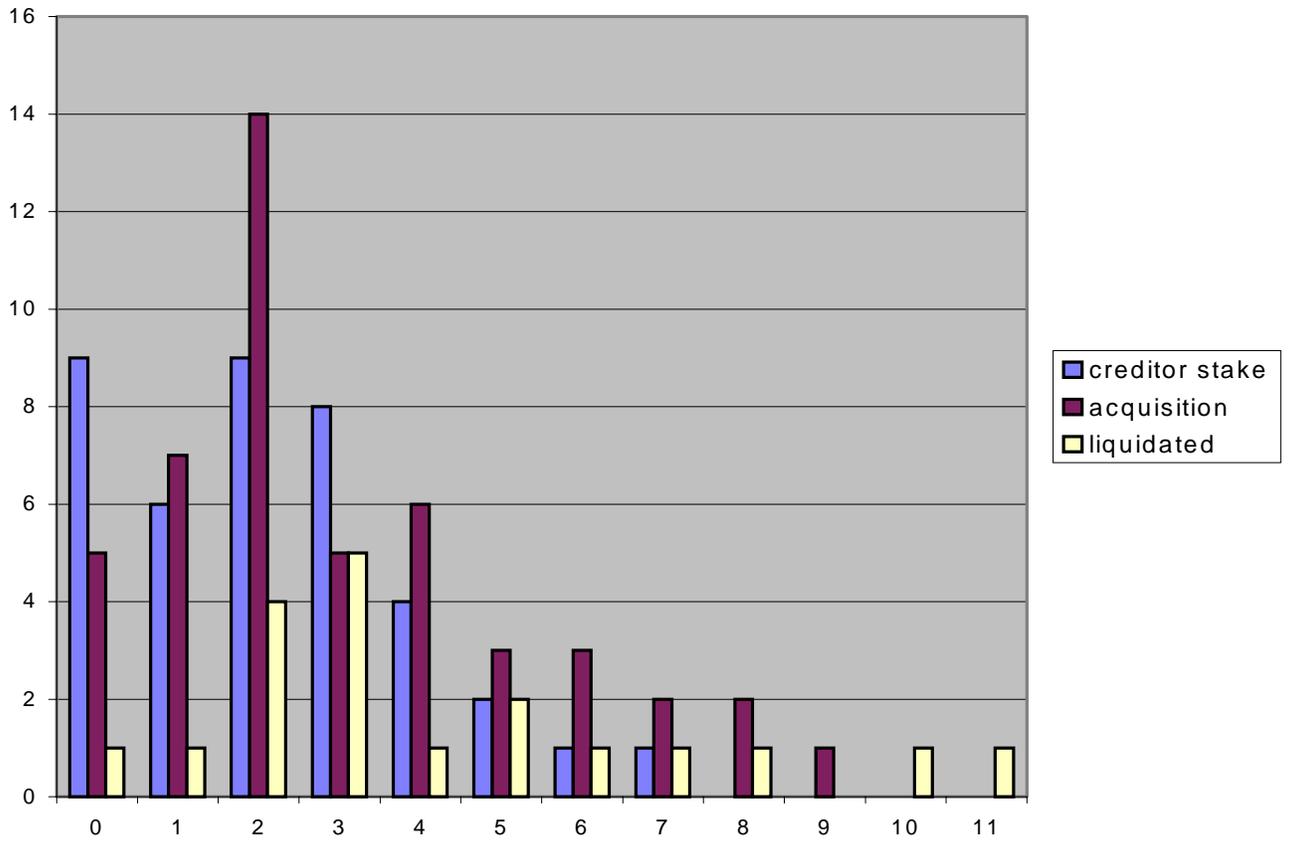
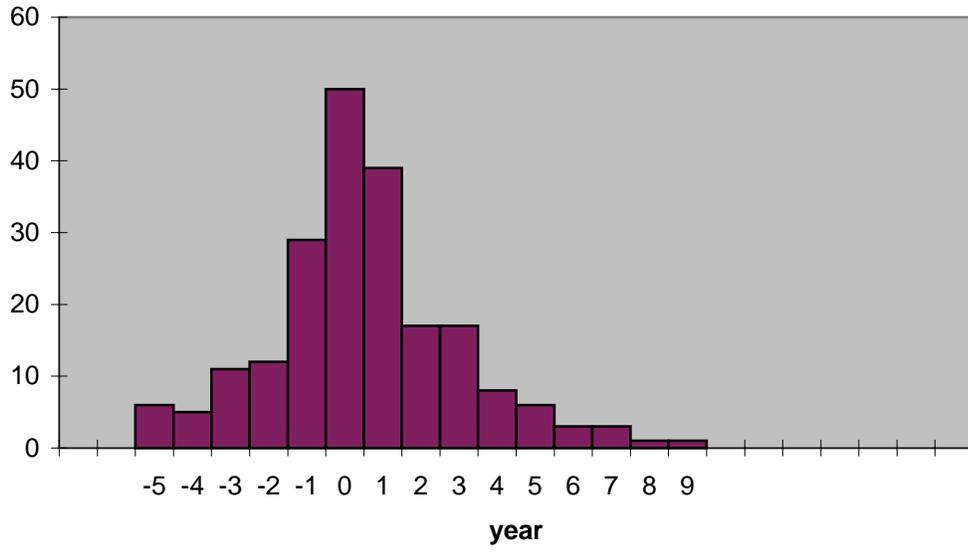


Figure 4: Number of Firms with Pre- and In-Distress Operating Losses



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