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Financial Distress as a Selection Mechanism: Evidence from the United States*

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Abstract:

This paper follows the process of financial distress from its onset to its resolution for a sample of 95 firms. Only about one-third of the firms survive as independent companies. A firm's short-run and long-run survival probability is positively affected by its operating performance, but its size, leverage, and debt structure complexity have no effect on its survival chances. The post-distress operating performance of the surviving firms is very close to the industry median. Filing for Chapter 11 reduces a firm's survival chances but prolongs financial distress. Overall, the evidence suggests that the U.S. financial distress environment leads to an important extent to the survival of the fittest. Chapter 11 may buy poorly performing firms some additional time, but it does not seem to allow many of them to ultimately escape the discipline of the market for corporate control.

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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. In the U.S., the volume of corporate junk bond defaults in the first half of 2002 reached a record high of $64 billion, well ahead of the pace set by the record volume reached in 2001 with $110.2 billion for the whole year.[1] Moreover, by mid-August 2002, publicly traded U.S. companies with $267.6 billion in assets had filed for bankruptcy, already surpassing the previous record for a whole year set in 2001 ($258.6 billion).[2] Many of the largest bankruptcies in U.S. history – including Enron and WorldCom - have occurred in 2001 and 2002. Given the importance of financial distress, there is great interest among academics and practitioners in understanding the process induced by it.

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 market for corporate control, 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 by giving the first detailed description and analysis of the selection process, from its onset to its resolution. The descriptive part of the paper focuses on the duration of financial distress, the incidence of Chapter 11 filings, and performance and survival rates over time. The analysis

[1] National Post, July 30, 2002, "Corporate bond defaults set record."
[2] Business Wire, August 13, 2002, "Bankruptcy Asset Levels Reach Record Levels, According to BankruptcyData.com."

focuses on two aspects of the selection process that are related to its efficiency: First, does financial distress lead to the survival of the "fittest" or best performing firms or is this process hindered by other factors such as firm size, leverage, and debt structure complexity? And second, what role does Chapter 11 play in the selection process? Are there systematic differences in the selection process between firms that file for Chapter 11 and firms that do not file for Chapter 11?

Looking at the entire financial distress process from its onset to its resolution has two advantages: First, this allows the analysis of several aspects of survival during financial distress, including the determinants of survival, the role of Chapter 11 in the selection process, and the post-distress performance of all firms that overcome financial distress and survive as independent firms. Moreover, it allows us to avoid sample selection problems. Survival is unlikely to be independent over time, because creditors and other investors learn about a financially distressed firm's viability by observing its performance over time (Kahl (2002)). 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 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. This is also important because one cannot evaluate Chapter 11 reorganization law by only looking at firms in Chapter 11. The existence of Chapter 11 may have a – positive or negative – effect on selection outside of Chapter 11 (Mooradian (1994)).

To investigate the selection process triggered by financial distress, we follow 95 firms that become financially distressed between 1979 and 1983 from the onset to the resolution of financial distress. This period for the onset of financial distress is chosen because it is subsequent to the Bankruptcy Reform Act of 1978, but at the same time early enough to allow the analysis of the entire financial distress process and a subsequent five years of post-distress performance for all sample firms. Financial distress lasts up to eleven years in our sample and the resolution of financial distress occurs only in 1992 for several sample firms. 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 an independent entity and the reallocation of its assets to a different user. In that sense, they are similar to what would occur under a bankruptcy system that led to the liquidation of all firms. The other possibility is that the firm survives the entire process of financial distress and emerges from it as an independent entity, having overcome its difficulties in making debt payments.

Our main findings are as follows. There is substantial selection pressure, mainly emanating from the acquisition market. Only about one third of all firms survive financial distress as independent companies; the remaining firms are acquired or liquidated. Firms lose their independence relatively quickly, within a median time of 33.5 months. While 48 firms experience operating losses at the onset of financial distress, the number of firms that remain in financial distress and have operating losses declines relatively quickly, mainly due to the large number of acquisitions and liquidations, to 21 two years later, 9 four years later, and 3 six years later.

There is substantial evidence that the "fittest" firms – or the best performers – have the highest chance of survival. In-distress operating performance has a strong positive impact on a firm's survival chances. In particular, we estimate that a one standard deviation improvement in a firm's average return on assets during financial distress increases its survival probability from 0.30 to 0.62. Firm characteristics unrelated to a firm's economic viability have no impact on its survival chances. Neither a firm's size, its leverage ratio, nor the complexity of its debt structure – measured by the fraction of its debt that is public and the number of long-term debt contracts – has an impact on its survival probability. This is also true separately for both the subsamples of firms filing and not filing for Chapter 11.[3] Firms that file for Chapter 11 have a lower chance of survival for a given performance, even if one controls for the endogeneity of the Chapter 11 filing decision.

Whether the "fit" firms survive can also be inferred from the surviving firms' 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 very close to the industry median. Moreover, they overcome

financial distress relatively quickly, within a median time of 37 months. However, there is some evidence that Chapter 11 allows somewhat worse firms to emerge from financial distress. The post-distress performance of firms that at some point during the financial distress process have filed for Chapter 11 is somewhat lower than the industry median, while the post-distress performance of firms avoiding Chapter 11 is above the industry median.[4] Finally, one other difference between firms filing and not filing for Chapter 11 is that the selection process takes substantially longer for those firms that file for Chapter 11 at some point (median: 45 instead of 26.5 months).

The one aspect of the selection process during financial distress that has been investigated in detail 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.[5] While our sample of firms with post-Chapter 11 data available is extremely small because only 17 firms emerge from Chapter 11 as independent companies and hence should be interpreted with caution, our results concerning their performance are comparable to the ones in Hotchkiss (1995) and much 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 after emerging from Chapter 11, eliminating some of the worse performers.

Poor post-bankruptcy performance has been interpreted as an indication of the excessive continuation of inefficient firms (Hotchkiss (1995)).[6] This interpretation lends support to an important and widely held view that in the U.S., one aspect of selection during financial distress – selection in Chapter 11 - is inefficient, because it allows the excessive continuation of inefficient firms (e.g., Baird (1986), White (1989), Bradley and

[3] However, for firms that avoid Chapter 11 the number of long-term debt contracts has an almost statistically significant negative effect on a firm's survival probability.
[4] However, the post-distress performance of both subsamples is typically not statistically significantly different from the industry median, probably due to the small number of firms that overcome financial distress as independent companies.
[5] However, post-Chapter 11 performance is much better in Hotchkiss and Mooradian (1997).
[6] While this is a plausible interpretation, poor post-bankruptcy performance could alternatively be explained as a consequence of dynamic learning strategies of creditors (see Kahl (2002)).

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 have mixed and limited implications for this debate. One reason for this is that selection during financial distress is not only affected by Chapter 11 reorganization law, but also by other factors such as the market for corporate control, which turns out to be very important. Any efficiency judgment arising from our analysis should be interpreted as a joint evaluation of all the institutions affecting selection during financial distress, not only of Chapter 11.

Our results 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. However, the picture that emerges from looking at the whole process of financial distress is more positive than that arising from looking at post-Chapter 11 performance in isolation. The U.S. financial distress environment overall leads to an important extent to the survival of the fittest and there is relatively little excessive continuation of inefficient firms. Selection outside of Chapter 11 does not seem to be negatively affected by the possibility of filing for Chapter 11 and biased towards excessive continuation. Filing for Chapter 11 does not increase survival chances and also does not eliminate the positive relationship between performance and survival chances. 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 market for corporate control, both in and out of Chapter 11. Chapter 11 may buy poorly performing firms some more time to survive, but it does not seem to allow many of them to ultimately escape the discipline of the market for corporate control.

Our paper is related to a number of other papers. 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. Asquith, Gertner, and Scharfstein (1994) comprehensively analyze how a sample of firms with high yield public debt responds to the onset of financial distress by engaging in, among other actions, private and public debt restructurings, asset sales, and capital expenditure reductions. Their primary goal is to analyze which firms avoid Chapter 11 and how they accomplish this, and hence they do not follow the firms after they enter Chapter 11. Finally, acquisitions and liquidations are not the only way in which assets are reallocated away from financially distressed firms. A substantial amount of asset reallocation is accomplished through partial liquidations (asset sales), as shown by Asquith, Gertner, and Scharfstein (1994), Brown, James, and Mooradian (1994), and Franks and Torous (1994).

The remainder of the paper is structured as follows. Section II develops the hypotheses guiding our analysis. Section III describes our sample. Section IV gives an overview of the financial distress process. Section V describes the survival of firms throughout the process of financial distress. Section VI documents the firm's pre- and in-distress operating performance. Section VII analyzes the factors that affect the probability that a firm survives the entire process of financial distress. Section VIII looks at the determinants of survival over different time horizons. Section IX analyzes the determinants of survival separately for firms filing for and firms avoiding Chapter 11. Section X describes the post-distress operating performance of the surviving firms. Section XI concludes.

II. Hypotheses

One aim of this paper is to give a first detailed description of the selection process during financial distress. In addition, we aim to investigate two questions: First, does the selection process lead to the survival of the "fittest" firms or do financial characteristics of the firms or other factors not related to economic viability matter for survival? And second, what is the role of Chapter 11 in the selection process? How does the selection process differ between firms that file and that do not file for Chapter 11? In the following, we

discuss several hypotheses related to these questions that will be addressed in the paper. All of these hypotheses would hold true if the selection process during financial distress were efficient.

Economic efficiency would dictate that the "fittest" firms – those with the highest future economic performance - should survive as independent firms while the other firms should lose their independence. There is no perfect measure of future economic performance – and it can be observed only for firms that indeed emerge as independent firms from financial distress. The best proxy for future economic performance is presumably current – in-distress - economic performance. It seems to be the best observable predictor of future economic performance that investors can base acquisition and liquidation decisions on. If a firm is economically viable, it should overcome its poor economic performance relatively quickly. Survival should be sensitive to economic performance, so that assets are reallocated away from poorly performing firms to presumably better uses. Hence, in an efficient selection process, one should expect that:

H1: A stronger in-distress performance increases a firm's survival chances.

Moreover, the effect of in-distress performance on survival chances should be economically significant. In contrast, some of the literature on financial distress argues that survival is not sufficiently linked to economic performance and poor performers survive for far too long (e.g., Baird (1986), White (1989), Bradley and Rosenzweig (1992)).

In reality there might be a number of factors that affect a firm's survival chances but that are not related to its efficiency or "fitness". Larger firms may have a higher chance of survival, because they are less likely to be acquired (Hasbrouck (1985), Palepu (1986)). Moreover, firms in more severe financial difficulties – due to higher leverage – may be less likely to survive (see Zingales (1998)). Firms with more complex debt structures may have a lower chance of survival. For example, since free-rider problems among small bondholders may make a renegotiation leading to a reduction in debt more difficult (Gilson, John, and Lang (1990), Gertner and Scharfstein (1991)), firms with more public debt might be less likely to survive. Moreover, because a larger number of debt contracts might

hurt a firm's ability to implement a debt restructuring (Gilson, John, and Lang (1990)), firms with a larger number of debt contracts may be less likely to survive. All these factors should not affect survival chances in a perfectly efficient world, because they are not related to a firm's economic viability. Hence, we hypothesize that:

H2: A firm's leverage ratio, size, and complexity of its debt structure at the onset of financial distress do not have an effect on its survival chances.

One other factor that may interfere with the survival of the fittest during financial distress is Chapter 11 reorganization law. In particular, it has been argued that Chapter 11 allows inefficient firms to survive or survive for too long (Baird (1986), White (1989), Bradley and Rosenzweig (1992), Hotchkiss (1995)). A different kind of inefficiency would arise if Chapter 11 would decrease a firm's survival chances, controlling for its performance and other characteristics, and hence lead to excessive liquidation. In an efficient selection process, Chapter 11 status should not have an impact on survival chances for a given operating performance. Hence, we will test:

H3: Filing for Chapter 11 does not affect a firm's survival chances.[7]

To test the effect of performance and other factors on survival, we first will look at survival over the entire financial distress process. However, it might be that the determinants of survival depend on the survival horizon. For example, it might be that size matters for short-run, but not for long-run survival. Hence, we will test hypotheses H1, H2, and H3 over different survival horizons: the short-run, the medium-run, and the long-run, which we will define more precisely below.

If Chapter 11 helps to insulate firms from market forces pushing towards the survival of the fittest, one might expect that performance has no impact on survival for firms that at

[7] Of course, the decision to file for Chapter 11 is endogenous, and we will have to address this issue in our analysis. Moreover, firms that file for Chapter 11 may be the worse performing firms, and hence they may be and should be more likely to lose their independence. Hence, we need to control for operating performance when we analyze the effect of Chapter 11 status on survival chances.

some point file for Chapter 11. Of course, this would not be consistent with an efficient selection process. Moreover, in Chapter 11, free-rider problems are alleviated, because the creditors vote on reorganization plans and how a creditor fares does not depend on how he voted if the reorganization plan is approved (Gertner and Scharfstein (1991)). Outside of Chapter 11, it might be more difficult to restructure a firm's debt comprehensively and hence one might expect an effect of debt structure complexity on a firm's survival chances, although there should be no such effect in a perfectly efficient world. Hence, Chapter 11 could have a positive impact on the efficiency of the selection process in that it may mitigate the effect of debt structure characteristics on survival chances, because it allows a more comprehensive debt restructuring. For all these reasons, we will test hypotheses H1 and H2 separately for both the subsample of firms that enter Chapter 11 and the subsample of firms that do not enter Chapter 11.

One other way to address the question of whether financial distress leads to the survival of the fittest is to look at the post-distress performance of the surviving firms. If the "fit" firms survive, their post-distress performance should be reasonably good. While it is not entirely clear how good it should be, the literature often compares the sample firms' performance to the industry median in making such a judgment (e.g., Hotchkiss (1995)). We will also do so and test the following hypothesis:

H4: The post-distress performance of the surviving firms is not worse than the industry median firm's performance.

If Chapter 11 helps worse firms to survive, the post-distress performance of firms filing for Chapter 11 may be poor (substantially below industry median). However, in an efficient selection process, both firms that file for Chapter 11 and those that do not should have a reasonably good post-distress performance. Hence, we test hypothesis H4 separately for both the subsample of firms that enter Chapter 11 and for the subsample of firms that do not enter Chapter 11.

Before we will address these hypotheses, we first introduce the sample and then give an overview of the selection process. We will address the hypotheses directly starting in

section VII.

III. Sample Selection and Descriptive Statistics

This paper analyzes the process of financial distress from its beginning to its end for 95 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.[8] The interest coverage ratio is calculated from *Compustat* by dividing operating performance *before* interest expense, income taxes, and depreciation (EBITD) 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 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 indeed in financial distress, i.e., it 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.[9] The *Wall Street Journal* Index was searched for all articles covering the firms that pass the interest coverage filter. As in Gilson, John, and Lang (1990), a debt restructuring is defined as a transaction that replaces an existing debt contract with a new contract, which reduces interest or principal, extends debt maturity, or gives equity securities to creditors. The debt restructuring must be undertaken to avoid a default. 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

[8] 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.
[9] Defaults include technical defaults and violations of debt covenants.

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 about 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 at any point during the 5 years prior to the year we defined as the onset of financial distress. We eliminate the 21 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 95 firms.

A. Descriptive Statistics at the Onset of Financial Distress

Four of the firms became financially distressed in 1979, 15 in 1980, 14 in 1981, 41 in 1982, and 21 in 1983. 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. The median book value of the assets is $70.1 million (the mean is $323.6 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 77.1%.

While the sample firms stem from 31 different 2-digit SIC codes, Panel B of Table 1 shows that close to half of all firms come from five industries: oil and gas extraction (13), primary metal (9), transportation by air (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 examined in Hotchkiss (1995).

IV. Overview: Duration and Resolution of Financial Distress

In this section, we give an overview of the financial distress process from its onset to 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 in

making debt payments and is likely to have difficulties with it in the near future. However, if a firm has a lower leverage ratio 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.

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.

The median time spent in financial distress is 35 months. Fifty-five (57.9%) of the firms are in financial distress between 13 and 48 months. For 12 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. There are no great differences between the surviving firms and the firms that are acquired or liquidated with respect to the duration of financial distress. Table 2 also shows that firms that avoid Chapter 11 spent a much shorter time in financial distress (median: 26.5 months) than firms that file for Chapter 11 (median: 45 months). The difference in the median (and also the mean) is statistically significant at the 1% level.[10] The table also shows that all of the 11 longest histories of financial distress (above 6 years) involve firms that file for Chapter 11.

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

B. The Incidence of Chapter 11

Panel A of Table 3 shows that 53 firms (54.9%) file for Chapter 11 at some point during the financial distress process (none files twice[11]) and 42 firms do not. Most firms that file for Chapter 11 file early on in the process of financial distress. 25 firms file within one year of the onset of financial distress and 10 more within the second year after the onset of financial distress. However, 5 firms file for Chapter 11 after more than 5 years in financial distress. Panel B of Table 3 shows the length of time the firms spent in Chapter 11. The median time spent in Chapter 11 (not reported in the table) is 19 months. For most firms, Chapter 11 takes less than 2 years (34 out of 53 firms) and for only 4 firms it takes longer than 3 years.

Panel C of Table 3 shows that the majority of firms that file for Chapter 11 lose their independence and are either acquired or liquidated.[12] Twenty firms are acquired and 16 are liquidated. Seventeen (32.1%) emerge from Chapter 11 as independent companies. Eleven of these firms exit financial distress as independent companies, but 6 remain in financial distress after emerging from Chapter 11 and are acquired (5) or liquidated (1) later outside of Chapter 11 (this is not reported in the table).

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 file for Chapter 11 (20.8%) than among firms that never file for Chapter 11 (47.6%). This finding does not fully address hypothesis H3 – that filing for Chapter 11 does not affect a firm's survival chances - since we need to control for the firms' performance as well as for other factors.

V. Survival Over Time

In this section, we describe how many firms survived as independent firms over different time horizons. The information concerning liquidations and acquisitions covers the years from the onset of financial distress until the last year of financial distress. For most firms we searched all articles in which the firm was mentioned first in *Dow Jones Interac-*

[11] 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.

[12] The fraction of firms that emerge from Chapter 11 as public companies is also very low (24%) in Hotchkiss (1995).

tive. 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*.

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 of the assets of the firm are sold. In several instances, firms were continued without almost any operating business (at least for a while). For some financially distressed 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 distressed firm's net operating loss carryforwards (NOLs) (for details see Gilson (1997)). 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.

In this paper, we contrast firms that remain independent (surviving firms) with firms that lose their independence either through an acquisition or a liquidation. We group acquisitions with liquidations, because both lead to the reallocation of all the assets away from the financially distressed firm. One motivation underlying our analysis is the claim that the U.S. financial distress system (and more narrowly the bankruptcy system) prevents a sufficient degree of asset reallocation away from poorly performing firms that would automatically occur under a liquidation-oriented bankruptcy code (Baird (1986), Bradley and Rosenzweig (1992)). But once a firm is acquired, one cannot argue that the bankruptcy system has prevented the reallocation of the firm's assets. Its assets are removed from the influence of the bankruptcy system. The acquirer always has the option to engage in further asset reallocation and sell the assets of the acquired firm piecemeal if this is value-maximizing. Even under liquidation-oriented bankruptcy codes, firms can be liquidated as going concerns instead of piecemeal. In fact, one indication that this may often be the optimal form of asset reallocation is that in the Swedish bankruptcy auctions (essentially mandated by the liquidation-oriented bankruptcy code), 75% of liquidations are going concern liquidations, which correspond to acquisitions (Thorburn (2000)). Moreover, Hotchkiss and Mooradian (1997, 1998) provide some evidence that acquisitions of financially distressed firms seem indeed to lead to the reallocation of their assets to better

uses.[13]

Figure 1 summarizes the aspects of the survival process that were already described above, in particular, Chapter 11 status and survival rates. Table 4 gives 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), 25 (26.3%) of the 95 firms lost their independence (were acquired or liquidated). By the end of year 3, this number had grown to 37 (38.9%) and by the end of year 5 to 53 (55.8%). Overall, 64 firms (67.4%) did not survive financial distress as independent companies. Most firms lost their independence because they were acquired (45) rather than liquidated (19).

VI. Pre- and In-Distress 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.[14] All data are calculated from *Compustat*. 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.

[13] 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 5 acquisitions involve the purchase of at least 50% of the firm's shares.

[14] We do not look at stock performance in this paper because this has little to do with the efficiency 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

Performance is reported as a return on assets (ROA), EBITD/ASSETS, or an operating margin (EBITD/SALES). 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 accounting changes. We will see that both performance measures present a similar picture and subsequently focus only on the return on assets. Table 5a describes the evolution of the median ROA and operating margin. Table 5b illustrates the evolution of the median industry-adjusted return on assets of the sample firms.[15] 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 (or 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. The number of observations declines mainly because many firms are acquired or liquidated or emerge from financial distress.[16] 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.[17]

Table 5a shows that the median raw 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. In the first year after the onset the performance is almost identical to the performance in the onset year. 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 years 7 and 9 when only very few firms have data available). The median return on assets increases already in the second year after the onset (in the following, year 2) by

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market, but not the efficiency of the selection process in financial distress. Kahl and Torous (2002) analyze the stock performance of the firms in this sample.

[15] Industry-adjusted operating margins present a similar picture and hence are not reported here.

[16] 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.

[17] There are 5 firms with no performance data on *Compustat* in year 0, 9 in year 1, 12 in year 2, 12 in year 3, 11 in year 4, and 5 in year 5. Afterwards, the maximal number of missing observations is 3.

about 4.5 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 continues to be well below the industry median (see Table 5b).

Table 5a also describes the evolution of the number and percentage of firms with a negative return on assets. The percentage of firms that experience operating losses increases until it reaches its peak (53.3%) in the year of the onset of financial distress and the year thereafter. Afterwards, the percentage of firms with operating losses declines somewhat and varies between 30% and 50% (excluding year 9, in which only one firm has data available). The number of firms experiencing negative operating performance reaches its peak in the year in which the firms become financially distressed (48). However, already two years later, this number is cut to 21. In no year after year 4 there are more than 5 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, more importantly, the reduction in firms that survive without being acquired or liquidated.[18] As a consequence, the number of poor performers that continue is very limited. For the same reasons, the number of firms underperforming the industry median declines quickly (see Table 5b).

VII. Determinants of Survival

In this section, we will investigate the determinants of survival, i.e., the factors that affect the probability that a firm emerges from financial distress as an independent company. This will help us address the hypotheses H1, H2, and H3. The underlying idea behind these hypotheses was that if the financial distress process is an efficient selection mechanism, the "fittest" firms should survive - 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, debt structure complexity, and Chapter 11 status, should have no impact on a firm's survival chances.

The firm's prospects or viability cannot be directly measured. However, the firm's

[18] 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*.

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 firm 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. 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 return on assets 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.[19]

We use the following other variables in the regressions. CH11 is a dummy variable that takes on the value of one if the firm ever files for Chapter 11 and zero otherwise. LEV measures the firm's book leverage ratio at the onset of financial distress as defined previously. We also consider two measures of a firm's debt structure complexity. A more complex debt structure may make a renegotiation of debt claims more difficult and also negatively affect survival chances. Our first measure, NUMBERCON, is the number of different long-term debt contracts (private or public) that the firm has at the onset of financial distress. The second measure, PROPORTION, is the fraction of long-term debt held by private debtholders (as opposed to more widely held public debt). It is also measured at the onset of financial distress. A larger fraction of private debt may make debt renegotiation and hence survival more likely. The information necessary to construct the variables NUMBERCON and PROPORTION is collected from the annual reports of the sample firms. SIZE measures the logarithm of the book value of assets in the year of the onset of financial distress.

[19] If the year of the onset of financial distress is the only year during financial distress with performance data available, PERFIMPROV cannot be constructed and hence is not available.

A. Regression Results

Table 6a shows 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 an independent entity and zero otherwise. For some firms not all of the variables included in the regressions are available. Hence, we have 80 observations for one specification in Table 6a and 68 observations for the other one.[20] We report the coefficients, the associated z-statistics, and the marginal effects (evaluated at the means of the independent variables, as is standard in the literature).

While we report two different specifications for the regressions, the results are overall very similar. In particular, the coefficients of all performance variables are statistically significant at least at the 5% level, and positive. This suggests that firms that perform better have a higher likelihood of survival. This is true for both regression specifications – the one in which performance is measured by AVERPERF as well as the one in which performance is measured by ONSETPERF and PERFIMPROV. Hence, hypothesis H1 is confirmed: A stronger in-distress performance increases a firm's survival chances.

The economic significance of AVERPERF 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 in the average in-distress ROA by one standard deviation from its mean value (for the 80 observations included in the regression: -0.027) to 0.098. 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 0.30 to 0.62. Of course, the one standard deviation increase in ROA is rather large (more than 12 percentage points). We can also consider a smaller increase in AVERPERF from its mean of –0.027 by 5 percentage points. This increases the survival probability from 0.30 to 0.43. An increase in ONSETPERF from its mean (for the 68 observations) of –0.020 by one standard deviation (0.104) increases the survival probability from 0.35 to 0.56. An increase by 0.05 increases the survival probability from 0.35 to 0.45. An increase of PERFIMPROV from its mean (for the

[20] We exclude six 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.

68 observations) of 0.012 by one standard deviation (0.175) increases the survival probability from 0.35 to 0.59. An increase by 0.05 increases the survival probability from 0.35 to 0.42. 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.

In neither of the two regression specifications, SIZE, LEV, NUMBERCON, or PROPORTION are statistically significant. Hence, we can confirm hypothesis H2: A firm's size, leverage, and measures of its debt structure complexity do not affect its survival chances.

The only non-performance variable that is statistically significant in the regressions is CH11. It is statistically significant at the 5% level and enters negatively. Hence, we can reject hypothesis H3: Filing for Chapter 11 has an effect on a firm's survival chances (even controlling for its performance), but it is negative (suggesting excessive liquidation) and not positive, as some of the literature has suggested (for example, Bradley and Rosenzweig (1992)). One can calculate that if a firm files for Chapter 11, this reduces its survival probability from 0.46 to 0.17 (in the regression specification using AVERPERF)[21] or from 0.53 to 0.20 (in the regression specification using ONSETPERF and PERFIMPROV), respectively.

There is some evidence (not reported in a table) that firms that eventually enter Chapter 11 experience a deterioration in their in-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: -0.023 rather than –0.001. This contrasts with the overall tendency of an improvement in the in-distress performance for the whole sample of firms illustrated in Table 5a, in particular early on.[22] Moreover, the firms that file for Chapter 11 experience an overall reduction in their median ROA during financial distress

[21] The survival probability, evaluated at the means of all other variables, is 0.46 if CH11 takes on the value of zero and 0.17 if it takes on the value of 1. This is calculated from the regression result. Note that the marginal effect for the dummy variable CH11 reported in Table 6a closely approximates the difference (0.46-0.17 = 0.29) in the survival probabilities, but is not identical to it, as is typical in probit regressions.

[22] 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 rarely statistically significant.

(median PERFIMPROV is –0.031), while the firms that avoid filing for Chapter 11 experience a clear improvement in their in-distress operating performance (median PERFIMPROV: 0.067; the difference is statistically significant at the 1% level). These data on in-distress performance suggest that firms that file for Chapter 11 perform substantially worse during financial distress and – due to a similar effect of performance on survival – this is one reason why they have a much lower chance of survival. However, the statistical significance of the CH11 variable in the survival regression suggests that even for the same operating performance firms that file for Chapter 11 have a lower survival chance than firms that avoid Chapter 11.[23]

To summarize, operating performance has a statistically and economically significant and positive effect on survival. Having filed for Chapter 11 seems to reduce survival chances. Firm size, the leverage ratio, and measures of debt structure complexity at the onset of financial distress seem to have no effect on a firm's likelihood of survival. Hence, hypotheses H1 and H2 are confirmed, but hypothesis H3 is rejected.

B. Potential Endogeneity of the Chapter 11 Dummy Variable

One issue with the regression specifications is that CH11 is arguably endogenous.[24] Firms choose whether to file for Chapter 11 or not. We can cast this decision process into a probit regression with CH11 as the dependent variable and some observable firm characteristics as independent variables. Then we have two probit regressions – one estimating the probability of survival and the other one estimating the probability of filing for Chapter 11. However, if one specifies such a model with two probit equations, it may not be possible to obtain consistent estimates of the parameter coefficients in the survival regression by estimating it in isolation from the Chapter 11 probit regression. It is, for example, possible that both CH11 and SURV depend on the same unobserved omitted variable. But if this is the case, the error terms in the survival regression and the Chapter 11 regression could be correlated. But then, CH11 could be correlated with the error term in the survival equation, which would render the coefficient estimates in the survival regression inconsis-

[23] If a dummy variable interacting CH11 and the performance variables is included, its coefficient is statistically insignificant.

tent. To obtain consistent estimates in the survival regression, one then would have to estimate the system of the two probit equations simultaneously. However, if there is no correlation between the error terms in the two probit equations, estimating the survival regression in isolation, as done in subsection A, generates consistent parameter estimates.

To address the potential endogeneity of CH11, we need to specify a model of which firms file for Chapter 11. To capture the firm's financial situation at the onset of financial distress, we look at LEV, ONSETPERF, the ratio of current assets to current liabilities (denoted by CACL), and the firm's stock returns in the two years preceding the onset of financial distress (denoted by 2YEARRET). Table 6b shows the probit regression with the dependent variable CH11. We use a parsimonious specification with the explanatory variables ONSETPERF, NUMBERCON, PROPORTION, CACL, and 2YEARRET.[25] The regression result shows that firms with a higher proportion of private debt are less likely to file for Chapter 11. This is consistent with the results in Gilson, John, and Lang (1990). Moreover, if the stock returns in the two years before the onset of financial distress are higher, a firm is also less likely to file for Chapter 11 (2YEARRET is statistically significant at the 10% level). This is consistent with the findings in Franks and Torous (1994). Perhaps surprisingly, firms with a better operating performance in the year of the onset of financial distress have a higher likelihood of filing for Chapter 11 ultimately (ONSETPERF is statistically significant at the 10% level). However, as suggested above, it may well be that later on the performance of firms that file for Chapter 11 is worse than that of the other firms.[26]

Having a regression model for Chapter 11 allows us to test for exogeneity of CH11 in the survival regression by using the Rivers-Vuong test based on Rivers and Vuong (1988)

[24] Leaving out CH11 from the regressions leads to very similar results with respect to the coefficients and the statistical significance of the remaining independent variables.

[25] The differences in the median size and leverage ratios of firms that file for Chapter 11 and firms that do not file for Chapter 11 are not statistically significant.

[26] Our results on the determinants of filing for Chapter 11 are not quite comparable to the literature. Some papers (including Gilson, John, and Lang (1990)) look at firms that attempt an out-of-court debt restructuring only and analyze the factors that determine whether the debt restructuring is successful in the sense that it avoids a Chapter 11 filing for some time. Other papers, including Chatterjee, Dhillon, and Ramirez (1996), analyze which factors determine whether a firm even attempts a (successful or unsuccessful) out-of-court debt restructuring before filing for Chapter 11. They find that Chapter 11 firms owe a larger fraction of their debt to banks and less to bondholders, in contrast to the findings by Gilson, John, and Lang (1990). Since we follow firms from the onset to the resolution of financial distress, our sample includes both types of firms.

and described in Wooldridge (2002). This test incorporates the residuals from the Chapter 11 regression in the survival regression. Then, it tests for the statistical significance of the parameter coefficient of the residuals. If the parameter coefficient is not significant, then the null hypothesis of no correlation between the residuals in the Chapter 11 regression and the survival regression cannot be rejected. But that means that the parameter coefficients in the survival regression are estimated consistently.

In performing the Rivers-Vuong test, the model for Chapter 11 uses the same variables as the regression in Table 6b.[27] The t-statistic arising from the Rivers-Vuong test (not reported in a table) is 1.264 for regression specification (1) in Table 6a and 1.082 for regression specification (2). Both are clearly not statistically significant. Hence, we cannot reject the null hypothesis of exogeneity of Chapter 11. As a consequence, we can conclude that we do not have an endogeneity problem in our survival regressions in Table 6a and our estimates are consistent. However, for completeness, we report the survival regression results using a more complicated estimation procedure. In particular, we perform a full maximum likelihood estimation of the conditional joint distribution of the dependent variable SURV and the potentially endogenous discrete explanatory variable, CH11. This method is explained in more detail in Wooldridge (2002, pp.477-478) and leads to consistent parameter estimates even if CH11 were endogenous in the econometric sense. We use the following variables as independent variables in the CH11 probit regression: a constant, PROPORTION, NUMBERCON, ONSETPERF, CACL, and 2YEARRET. The results are shown in Table 6c. For brevity, the estimated coefficients of the Chapter 11 equation are not reported and we only report the coefficients for the survival regression, which we are ultimately interested in. Relative to the estimation in Table 6a, we lose one observation, due to the additional data requirements to construct the independent variables in the Chapter 11 equation. The results using this alternative method are very similar to the results in Table 6a. Only two variables are statistically significant: AVERPERF (at the 5% level) and CH11 (at the 1% level). The coefficients are also very similar to the ones reported in Table 6a, suggesting a similar economic significance of the variables. Hence, our results

[27] We lose up to two of the 80 observations used in regression (1) in Table 6a and the 68 observations used in regression (2) in Table 6a due to the additional data requirements involving the independent variables in the Chapter 11 regression.

are not driven by any endogeneity of the CH11 variable.

VIII. 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 as an independent company. Because financial distress is resolved for all firms by the end of year 11, the regressions in section VII 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. We report separate regressions for three horizons: survival at least until the end of the second, fourth, and seventh 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 (and one could refer to the results in section VII as survival over the very long-run). The dependent variable is the dummy variable for survival over the relevant horizon. If a firm has exited financial distress as an independent company, this dependent variable takes on the value of one for all survival horizons, since the firm has not lost its independence during financial distress at any point.[28] 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 performance measure we us in the regressions, AVERPERF, is measured up to and including the second, fourth, and seventh year after the onset of financial distress, respectively.[29] The Chapter 11 dummy variable indicates whether the firm ever was in Chapter 11 between the onset of financial distress and the end of the second, fourth, and seventh year after the onset of financial distress, respectively. The other independent variables are defined exactly as previously: size, leverage, and the measures of debt structure complexity are measured at the onset of financial distress.

The results of the regression analysis can be found in Table 7. Overall, the results are

[28] As explained above, we do not measure any loss of independence after overcoming financial distress, because it is not related to the episode of financial distress we analyze.

[29] The results using a combination of ONSETPERF and PERFIMPROV are similar. However, in this case PROPORTION is significant at the 10% level for short-term survival (it enters negatively), SIZE is significant at the 10% level for medium-term survival (it enters positively), and CH11 is significant at the 10% level for long-term survival (it enters negatively).

similar to the survival regressions reported previously. In particular, AVERPERF always has a positive impact on the survival probability, regardless of the survival horizon, and is always statistically significant at the 1% level. Hence, we confirm the hypothesis that a stronger in-distress performance increases a firm's short-run, medium-run, and long-run survival chances. Note that the economic significance of the performance variable is lower in the short-run. On the other hand, SIZE, LEV, NUMBERCON, and PROPORTION are not statistically significant in any of the three regressions. Hence, we confirm the hypothesis that size, leverage, and debt structure complexity have no impact on survival chances in the short-run, medium-run, and long-run. The variable CH11 is not statistically significant in the regressions looking at short-run, medium-run, and long-run survival (although it is almost statistically significant at the 10% level for long-run survival). Hence, we conclude that filing for Chapter 11 does not affect a firm's short-run, medium-run, and long-run survival chances.[30]

IX. Separate Regressions for Firms Filing and Not Filing for Chapter 11

In the following we look at the subsample entering Chapter 11 and that avoiding Chapter 11 separately and examine the determinants of survival for both subsamples separately. Table 8 shows the two subsample regressions. We measure the in-distress performance by the variable AVERPERF so that we have at least 40 observations for each subsample. The firm's average performance during financial distress has a positive impact on survival for both subsamples of firms (although it is statistically significant only at the 10% level in the Chapter 11 subsample, while it is statistically significant at the 5% level in the non-Chapter 11 subsample). SIZE, LEV, NUMBERCON, and PROPORTION are not statistically significant for either subsample. One difference between the subsamples is that one measure of debt structure complexity, NUMBERCON, has an almost statistically significant negative effect on survival chances in the subsample of firms that avoid filing

[30] We performed the Rivers-Vuong test for exogeneity of the dummy variables indicating whether a firm has filed for Chapter 11 by the end of the second, fourth, and seventh year after the onset of financial distress. The t-statistics generated by the Rivers-Vuong test are 0.357 (for the SURV2 regression), 1.260 (for the SURV4 regression), and 1.371 (for the SURV7 regression). None of them is statistically significant and hence we cannot reject exogeneity of the Chapter 11 variables. As a consequence, we can conclude that our parameter coefficients are consistently estimated.

for Chapter 11, while it has a positive (but insignificant) effect on survival chances among the firms that file for Chapter 11. This suggests that Chapter 11 may help in weeding out the effect of debt structure on survival chances and in this sense plays a somewhat productive role in the selection process.

To summarize, we can confirm the hypothesis that a stronger in-distress performance increases a firm's survival chances in both the Chapter 11 and the non-Chapter 11 subsample. We also confirm the hypothesis that size, leverage, and debt structure complexity are immaterial for the survival chances of firms in both subsamples (although there is some evidence that a larger number of long-term debt contracts reduces a firm's survival chances for firms that do not file for Chapter 11).

X. 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. Table 9 describes the performance of the surviving firms after the relatively short time (median: 37 months) it takes them to overcome financial distress. 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 ROA is in general comparable to the median ROA reported for the whole sample in Table 5a in the 2 to 5 years before the onset of financial distress. 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 2.5 percentage points worse. The industry-adjusted return on assets is never statistically significantly different from zero at any conventional significance level but in year 3, in which it is positive.[31] 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

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

uses the 4-digit SIC code as the benchmark, the operating performance looks typically even a little bit better (with the exception of year 4). Hence, we confirm hypothesis H4: The post-distress performance of the surviving firms is not worse than the industry median. The surviving firms do not only perform reasonably well, they also overcome financial distress relatively quickly, within a median time of 37 months.

Table 10 indicates that the post-distress performance of the firms that avoid Chapter 11 is typically better than the industry median, although typically not statistically significantly so (perhaps due to the small sample size). The post-distress performance of the 11 firms that were at some point in Chapter 11 is typically worse than industry median (although the difference is again often not statistically significant). Hence, the evidence on hypothesis H4 evaluated separately for the two subsamples is mixed: the post-distress performance of firms avoiding Chapter 11 is at least as good as the industry median, but that is not the case for firms filing for Chapter 11.[32] However, the post-distress performance of the firms that file for Chapter 11 is quite close to the median performance in their 4-digit SIC code (with the exception of year 2) and hence arguably does not suggest a dramatic extent of excessive continuation.

The post-distress performance results obtained for our sample are much better than the post-Chapter 11 operating performance 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 income. Table 11 summarizes the post-Chapter 11 performance for the only 17 firms in our sample that emerge from Chapter 11 as independent companies at some point. Data are available at most for 13 firms and hence this evidence should be interpreted with extreme caution. The median post-Chapter 11 return on assets in our sample is much lower than the industry median. This arguably very poor performance is comparable to the results in Hotchkiss (1995).

The post-Chapter 11 operating performance is much worse than the post-distress operating performance reported previously. One reason for the difference is that the post-distress performance of firms that never enter Chapter 11 (see Table 10) is much better

[32] We draw the conclusion that the post-distress operating performance of Chapter 11 firms is below the industry median despite the lack of statistical significance for most post-distress years because we attribute the lack of statistical significance to the extremely small sample size.

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. This eliminates apparently some of the worse performers, enhancing the contrast between post-distress and post-Chapter 11 performance.

XI. Conclusion

This paper has described and analyzed the selection process during financial distress. 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. The number of firms that report negative operating income while they are still in financial distress becomes small within only a few years after the onset of financial distress due to the large number of acquisitions and liquidations. There is substantial evidence indicating that the selection process leads to the survival of the fittest: In-distress operating performance has a strong positive effect on a firm's survival chances, while size, leverage, and debt structure complexity do not affect its survival chances. This is also true separately for both the subsample of firms that file for Chapter 11 and the subsample of firms that do not file for Chapter 11. Moreover, firms that emerge from financial distress as independent companies seem to have fully overcome their financial difficulties within a median time of about 3 years and perform about as well as the industry median firm. This suggests that they are economically viable. Filing for Chapter 11 has a negative effect on a firm's survival chances, but it leads to a longer process of financial distress. Moreover, Chapter 11 allows somewhat less viable firms to emerge from financial distress.

Overall, these results suggest that the financial distress environment in the U.S. leads to an important extent to the survival of the fittest and that there is relatively little excessive continuation of inefficient firms. The possibility of filing for Chapter 11 does not seem to negatively affect selection outside of Chapter 11 by inducing a bias towards excessive continuation. Filing for Chapter 11 does not increase survival chances and does not eliminate the positive relationship between performance and survival chances. Since many firms do not enter Chapter 11 or are acquired or liquidated while in Chapter 11, poor

post-Chapter 11 performance affects only a small fraction of financially distressed firms. Any pro-continuation bias of Chapter 11 seems to have a limited impact, largely due to an active market for corporate control both in and outside of Chapter 11. Chapter 11 may buy poorly performing firms some additional time, but it does not seem to allow many of them to ultimately escape the discipline of the market for corporate control.

There are several issues raised by our analysis that could be addressed in future research. 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. It would also be interesting 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.[33]

In this paper, we wanted to capture the whole process of financial distress for all sample firms and five post-distress years for all surviving firms. This has forced us to look at a relatively early cohort of financially distressed firms that enter financial distress between 1979 and 1983. One question is whether the selection process is substantially different and less efficient for later cohorts of financially distressed firms. The literature has shown that firms entering financial distress in the late 1980s and early 1990s seem to perform better than earlier cohorts (Hotchkiss and Mooradian (1997), Andrade and Kaplan (1998)). Moreover, the selection pressure arising from the acquisition market may have increased over time, in particular due to a more active vulture market (Hotchkiss and Mooradian (1997)). 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 stronger positive relationship between performance and survival than for the sample analyzed in this paper.

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

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Table 1: Selected Sample Characteristics at the Onset of Financial Distress

Summary statistics are presented for 95 firms that enter financial distress between 1979 and 1983. The variables 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 EBITD to 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)	70.1 (323.6)	90
Median (mean) net sales ($ million)	90.7 (366.3)	89
Median (mean) Interest Coverage Ratio	-0.07 (-0.96)	90
Median (mean) EBITD/Assets	-0.005 (-0.032)	90
Median (mean) EBITD/Net Sales	-0.004 (-0.017)	90
Median (mean) book leverage	0.771 (0.788)	84

Panel B: Industry Classification

Industry	Number of Firms
Oil and Gas Extraction	13
Primary Metal	9
Transportation by Air	8
Durable Goods - Wholesale	7
Industrial, Commerc. Machinery, Computer Equip.	7
Real Estate	5
Transportation Equipment	5
Other	41

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 IV. 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 Acquired or Liquidated	Firms That Never File For Chapter 11	Firms That File At Some Point For Chapter 11	Whole Sample
0-12	3	9	9	3	12
13-24	6	9	10	5	15
25-36	6	17	10	13	23
37-48	9	8	6	11	17
49-60	4	7	4	7	11
61-72	2	4	3	3	6
73-84	0	3	0	3	3
85-96	0	4	0	4	4
97-108	1	0	0	1	1
109-120	0	2	0	2	2
121-132	0	1	0	1	1
>132	0	0	0	0	0
Median (Mean)	37 (36.5)	33.5 (41.7)	26.5 (27.5)	45 (49.9)	35 (40)

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 within one year, two years, etc. of the month of the onset of financial distress. Panel B shows how much time the sample firms spent in Chapter 11. This is measured by 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

Time between onset of financial distress and Ch.11 filing is up to (in years)	1	2	3	4	5	6	7	8	9	10	11	>11	Sum
Number of firms filing for Ch. 11	25	10	6	4	3	1	1	1	1	1	0	0	53

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	12	22	15	3	0	0	1	0	53

Panel C: Resolution of Chapter 11

Status at exit from Chapter 11	Number of firms
Acquired	20
Liquidated	16
Remained independent	17
Sum	53

Panel D: Chapter 11 and Survival

	Emerge as independent companies	Acquired or liquidated	Sum
Firms that file for Chapter 11	11 (20.8%)	42 (79.2%)	53
Firms that never file for Chapter 11	20 (47.6%)	22 (52.4%)	42
Sum	31	64	95

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	90	80	61	43	26	14	9	7	3	2	1	0
Acquired	*4*	*11*	*21*	*30*	*34*	*39*	*41*	*42*	*44*	*45*	*45*	*45*
Liquidated	*1*	*1*	*4*	*7*	*11*	*14*	*15*	*16*	*17*	*17*	*18*	*19*
Lost independence	5	12	25	37	45	53	56	58	61	62	63	64
Exited financial distress as independent companies	0	3	9	15	24	28	30	30	31	31	31	31

Table 5a: 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 EBITD/ Assets	N	Median EBITD/ Net Sales	N	Number of firms with negative EBITD/Assets	Percentage of firms with negative EBITD/Assets
-5	0.122***	78	0.085***	78	4	5.1
-4	0.123***	81	0.081***	81	6	7.4
-3	0.113***	86	0.076***	86	9	10.5
-2	0.090***	92	0.066***	92	12	13.0
-1	0.054***	94	0.041***	94	24	25.5
0	-0.005	90	-0.004	90	48	53.3
1	-0.007	75	-0.008	74	40	53.3
2	0.038	60	0.036*	58	21	35.0
3	0.015	36	0.017	34	16	44.4
4	0.049	23	0.025	22	9	39.1
5	0.014	13	0.039	12	5	38.5
6	0.038	10	0.009	9	3	30.0
7	-0.023	6	-0.002	6	3	50.0
8	0.082	3	0.079	3	1	33.3
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 5b: 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, EBITD/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	78	-0.005	-0.004	43	55.1	41	52.6
-4	81	-0.011*	-0.004	45	55.6	44	54.3
-3	86	-0.015***	-0.003*	54	62.8	45	52.3
-2	92	-0.042***	-0.031***	61	66.3	59	64.1
-1	94	-0.057***	-0.052***	74	78.7	72	76.6
0	90	-0.115***	-0.105***	80	88.9	77	85.6
1	75	-0.102***	-0.080***	63	84.0	60	80.0
2	60	-0.051***	-0.042***	50	83.3	45	75.0
3	36	-0.060***	-0.057***	31	86.1	31	86.1
4	23	-0.080***	-0.044***	16	69.6	16	69.6
5	13	-0.048**	-0.045**	10	76.9	9	69.2
6	10	-0.052	0.000	7	70.0	4	40.0
7	6	-0.122	-0.041	4	66.7	4	66.7
8	3	-0.018	-0.008	3	100.0	2	66.7
9	1	-0.163	-0.139	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 6a: Survival Regressions

This table shows two 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 EBITD/Assets during financial distress. ONSETPERF denotes EBITD/Assets in the year of the onset of financial distress. PERFIMPROV is the difference between EBITD/Assets in the last year of financial distress and EBITD/Assets in the year of the onset of financial distress. SIZE and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of the book value of assets. LEV is 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. NUMBERCON is the number of long-term debt contracts of the firm at the onset of financial distress. PROPORTION denotes the fraction of the firm's long-term debt at the onset of financial distress that is held privately. There are two regression specifications, denoted by (1) and (2). 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.

Variable	(1)		(2)	
Constant	1.131 (0.954)	0.393	1.022 (0.662)	0.378
AVERPERF	6.725*** (3.193)	2.339		
ONSETPERF			5.133** (2.125)	1.899
PERFIMPROV			3.564** (2.201)	1.319
SIZE	0.047 (0.304)	0.016	0.123 (0.628)	0.046
LEV	-0.314 (-1.043)	-0.109	-0.498 (-1.108)	-0.184
CH11	-0.849** (-2.517)	-0.295	-0.904** (-2.449)	-0.335
NUMBERCON	-0.047 (-0.679)	-0.016	-0.084 (-1.094)	-0.031
PROPORTION	-0.869 (-1.054)	-0.302	-0.613 (-0.619)	-0.227
LogLikelihood	-40.258		-35.536	
McFadden R^2	0.232		0.214	
N	80		68	

*** 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: Determinants of Filing for Chapter 11

This table shows a probit regression estimating the probability of filing for Chapter 11 at any point during the financial distress process. The dependent variable is a dummy variable that takes on the value of one if the firm files for Chapter 11 at any point during the financial distress process and zero otherwise. Not all variables are available for all firms. N denotes the number of observations. ONSETPERF denotes the EBITD/Assets in the year of the onset of financial distress. NUMBERCON is the number of long-term debt contracts of the firm at the onset of financial distress. PROPORTION denotes the fraction of the firm's long-term debt at the onset of financial distress that is held privately. CACL is the ratio of current assets to current liabilities at the onset of financial distress. 2YEARRET is the raw stock return of the firm in the two years preceding the onset of financial distress. The coefficient of an independent variable is reported above the associated z-statistic, which is reported in parentheses. The number to the right of the regression coefficient is the marginal effect of the relevant independent variable.

Variable		
Constant	1.094 (1.528)	0.435
ONSETPERF	2.213* (1.789)	0.880
NUMBERCON	-0.064 (-1.294)	-0.025
PROPORTION	-1.358** (-2.091)	-0.540
CACL	0.106 (0.948)	0.042
2YEARRET	-0.909* (-1.776)	-0.362
LogLikelihood	-49.836	
McFadden R^2	0.120	
N	82	

*** 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 6c: Survival Regression Using Joint Maximum Likelihood Estimation

This table shows the outcome of a probit regression estimating the probability of emerging from financial distress as an independent company (survival) when estimated jointly via maximum likelihood with a probit regression estimating the probability of filing for Chapter 11. Only the parameter coefficients for the independent variables in the survival regression are reported. 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 EBITD/Assets during financial distress. SIZE and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of the book value of assets. LEV is 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. NUMBERCON is the number of long-term debt contracts of the firm at the onset of financial distress. PROPORTION denotes the fraction of the firm's long-term debt at the onset of financial distress that is held privately. The coefficient of an independent variable is reported above the associated z-statistic, which is reported in parentheses. The model estimating the probability of filing for Chapter 11 (not reported here) uses the following independent variables: a constant, PROPORTION, NUMBERCON, ONSETPERF, CACL, and 2YEARRET. ONSETPERF denotes EBITD/Assets in the year of the onset of financial distress. CACL is the ratio of current assets to current liabilities in the year of the onset of financial distress. 2YEARRET denotes the raw stock return in the two years before the onset of financial distress.

Variable	
Constant	0.598 (0.077)
AVERPERF	7.122** (2.199)
SIZE	0.084 (0.018)
LEV	-0.222 (-0.035)
CH11	-1.213*** (-8.942)
NUMBERCON	-0.061 (-0.015)
PROPORTION	-0.164 (-0.027)
LogLikelihood	-89.268
N	79

*** 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 7: Estimating the Survival Probability Over Different Time Horizons

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 during financial distress) until at least the end of the second (fourth, seventh) full year after the onset of financial distress and zero otherwise. It is called SURV2 (SURV4, SURV7). Not all variables are available for all firms. N denotes the number of observations. AVERPERF denotes the average EBITD/Assets during financial distress up to and including the second (fourth, seventh) full year after the onset of financial distress. SIZE and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of the book value of assets. LEV is 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, seventh) full year after the onset of financial distress and zero otherwise. NUMBERCON is the number of long-term debt contracts of the firm (measured at the onset of financial distress). PROPORTION denotes the fraction of the firm's long-term debt that is held privately (measured at the onset of financial distress). There are three regression specifications, denoted by the dependent variable, SURV2, SURV4, and SURV7. 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.

Variable	Coefficient (z-stat.)	Marginal Effect	Coefficient (z-stat.)	Marginal Effect	Coefficient (z-stat.)	Marginal Effect
	SURV2		SURV4		SURV7	
Constant	0.390 (0.278)	0.085	-0.171 (-0.146)	-0.068	0.712 (0.626)	0.267
AVERPERF	4.245*** (2.582)	0.930	7.085*** (3.551)	2.797	6.570*** (3.243)	2.465
SIZE	0.143 (0.735)	0.031	0.211 (1.354)	0.083	0.108 (0.709)	0.040
LEV	-0.004 (-0.012)	-0.001	-0.032 (-0.097)	-0.013	-0.341 (-1.165)	-0.128
CH11	0.502 (1.139)	0.110	-0.130 (-0.391)	-0.051	-0.529 (-1.627)	-0.198
NUMBERCON	0.091 (1.147)	0.020	-0.060 (-0.930)	-0.024	-0.064 (-0.945)	-0.024
PROPORTION	-0.679 (-0.704)	-0.149	-0.029 (-0.037)	-0.011	-0.561 (-0.714)	-0.210
LogLikelihood	-30.174		-42.437		-43.276	
McFadden R^2	0.218		0.222		0.202	
N	80		80		80	

*** 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 8: Survival Regressions for Chapter 11 And Non-Chapter 11 Subsamples

This table shows probit regressions estimating the probability of emerging from financial distress as an independent company (survival) for two subsamples: for firms that do not file for Chapter 11 and for firms that file for Chapter 11 at some point during the financial distress process. 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 EBITD/Assets during financial distress. SIZE and LEV are measured in the year of the onset of financial distress. SIZE is the logarithm of the book value of assets. LEV is short-term debt plus long term debt, divided by the same expression plus the book value of common equity. NUMBERCON is the number of long-term debt contracts of the firm at the onset of financial distress. PROPORTION denotes the fraction of the firm's long-term debt at the onset of financial distress that is held privately. There are two regressions, denoted by (1) and (2). The coefficient of an independent variable is to the left of the number of the regression, with the z-statistic in parentheses. The number to the right of the regression coefficient is the marginal effect of the relevant independent variable.

Variable	(1)		(2)	
	Non-Chapter 11 Subsample		Chapter 11 Subsample	
Constant	1.981 (0.792)	0.788	0.856 (0.434)	0.215
AVERPERF	6.296** (2.037)	2.503	6.377* (1.720)	1.602
SIZE	0.214 (0.852)	0.085	-0.194 (-0.751)	-0.049
LEV	0.304 (0.377)	0.121	-0.737 (-1.415)	-0.185
NUMBERCON	-0.177 (-1.606)	-0.070	0.058 (0.526)	0.015
PROPORTION	-2.246 (-1.222)	-0.893	-0.556 (-0.400)	-0.140
LogLikelihood	-20.541		-16.943	
McFadden R^2	0.259		0.206	
N	40		40	

*** 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 EBITD/Assets	N	Number (%) <0	Median industry-adjusted EBITD/Assets (SIC2)	Number (%) <0	Median industry-adjusted EBITD/Assets (SIC4)	Number (%) <0
1	0.088***	30	4 (13.3%)	-0.013	17 (56.7%)	0.000	12 (40.0%)
2	0.095***	28	5 (17.9%)	-0.025	15 (53.6%)	0.000	13 (46.4%)
3	0.127***	26	2 (7.7%)	0.020*	9 (34.6%)	0.029**	6 (23.1%)
4	0.130***	23	2 (8.7%)	0.025	10 (43.5%)	0.008	9 (39.1%)
5	0.092***	23	5 (21.7%)	-0.009	14 (60.9%)	0.000	11 (47.8%)

*** 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: Post-Distress Operating Performance and Chapter 11 Status

This table describes the operating performance of firms that emerge from financial distress as independent companies for two subsamples: for firms that have not filed for Chapter 11 and for firms that have filed for Chapter 11 at some point during the financial distress process. 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 EBITD/ Assets of firms that never file for Chapter 11 (N)	Median EBITD/ Assets of firms that file for Chapter 11 (N)	Median ind.-adjusted (SIC2) EBITD/ Assets of firms that never file for Chapter 11	Median ind.-adjusted (SIC2) EBITD/ Assets of firms that file for Chapter 11	Median ind.-adjusted (SIC4) EBITD/ Assets of firms that never file for Chapter 11	Median ind.-adjusted (SIC4) EBITD/ Assets of firms that file for Chapter 11
1	0.101*** (19)	0.072 (11)	0.000	-0.032 c)	0.007	-0.007 b)
2	0.117*** (19)	0.042 (9) b)	0.011	-0.046* b)	0.005	-0.085* b)
3	0.168*** (18)	0.096 (8)	0.037	-0.004	0.035**	0.012
4	0.135*** (15)	0.087* (8)	0.029	-0.012	0.015	-0.021
5	0.098** (15)	0.041 (8)	-0.004	-0.038	0.010	-0.021

*** 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

Table 11: 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 EBITD/Assets	N	Number (%) <0	Median industry-adjusted EBITD/Assets (SIC2)	Number (%)<0	Median industry-adjusted EBITD/Assets (SIC4)	Number (%)<0
1	-0.010	13	7 (53.8%)	-0.105***	12 (92.3%)	-0.120***	10 (76.9%)
2	0.034	12	4 (33.3%)	-0.073***	11 (91.7%)	-0.083***	10 (83.3%)
3	0.077	10	3 (30.0%)	-0.032*	8 (80.0%)	-0.039*	8 (80.0%)
4	0.053	11	4 (36.4%)	-0.047	7 (63.6%)	-0.057	7 (63.6%)
5	0.006	10	4 (40.0%)	-0.081	7 (70.0%)	-0.065	7 (70.0%)

*** 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

Figure 1: Overview of Survival Process