Survival of the fittest? Financial and economic distress and restructuring outcomes in Chapter 11

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Abstract

We employ straightforward proxies to identify firms in financial versus economic distress and show that Chapter 11 outcomes and asset restructurings vary according to these firm types. The results from our sample of large bankruptcies from 1991 to 2004 are consistent with the view that the Chapter 11 process preserves the going concern value of financially distressed firms while redeploying the assets of economically distressed firms. These results hold for asset redeployments resulting both from liquidations or acquisitions and those resulting from partial asset liquidations of firms that reorganize in Chapter 11. The empirical findings run counter to concerns that inefficiencies and conflicts of interest severely compromise the Chapter 11 process. Further, we provide the first empirical evidence that the put option inherent in lease contracts is frequently exercised in Chapter 11, that the disposition of lease contracts in bankruptcy constitutes a large portion of asset restructurings, and that the ability to put lease contracts may mitigate the indirect costs of asset fire sales. We also find that unionized firms experience smaller debt reductions in Chapter 11 than do non-unionized firms.

1. Introduction

There is an ongoing debate in both the legal and finance literature as to whether Chapter 11 of the US Bankruptcy Code achieves the goal of restructuring financially distressed firms with going concern value and liquidating firms whose continued operation would destroy value. Baird and Rasmussen (2002) note that, "A Chapter 11 petition raises the question whether the assets that legally belong to *this firm* should remain with *this firm*" (original emphasis). Whether this question is resolved in a manner consistent with the goals of Chapter 11 hinges on whether viable and non-viable firms are distinguishable in Chapter 11 (White, 1994; Harris and Raviv, 1990) and also on the ability to overcome incentive distortions and conflicts of interest among the various stakeholders as discussed in Bradley and Rosenzweig (1992), Gertner and Scharfstein (1991), LoPucki and Whitford (1993), and Hotchkiss (1995).

As described by Bebchuk (1998), a desirable property of a well-functioning bankruptcy procedure is that the assets of the firm will continue to function as a going concern if and only if the continuation value exceeds the liquidation value. In our analysis, we attempt to distinguish between firms entering Chapter 11 primarily as a result of financial distress and those entering primarily due to economic distress. Firms facing financial distress are viable as going concerns, but are currently having difficulty repaying debts. In contrast, firms facing economic distress are characterized by low or negative operating profitability and have questionable going concern value even in the absence of leverage. We construct multiple proxies for financial distress and economic distress and investigate whether the changes that firms undergo in Chapter 11 vary systematically with these proxies.

We classify firms exhibiting superior asset performance and those with higher pre-distress leverage as financially distressed. Our central question is whether Chapter 11 facilitates changes that preserve the going concern value of viable firms and redeploys the assets of firms that are unable to use them profitably. Consistent with this view, we find that 79% of financially distressed firms successfully emerge from bankruptcy

reorganization, while 63% of economically distressed firms either liquidate or are acquired in Chapter 11. We also find that higher leverage is positively associated with the likelihood of firm reorganization in Chapter 11, which is consistent with the prediction of the tradeoff theory of capital structure that firms with lower expected costs of financial distress choose higher leverage ex ante. Our tests also incorporate proxies for creditor versus management control to examine whether creditor control promotes, and management control hinders, asset redeployment by economically distressed firms. We fail to find evidence that managerial control has a significant effect on Chapter 11 outcomes. Our results on reorganization differ from the multivariate results presented in both Denis and Rodgers (2007) and Barniv, Agarwal, and Leach (2002) who find no relation between asset performance prior to Chapter 11 and bankruptcy outcome.

Our next analyses focus on the asset and debt restructuring actions taken by firms that reorganize in and emerge from Chapter 11. As LoPucki and Whitford (1993) discuss, reorganization in Chapter 11 is best described by a continuum of degrees of liquidation, where firms that are completely liquidated or are acquired constitute one end of the spectrum and firms that reorganize without reducing assets constitute the other end of the spectrum. In between these two extremes, many firms reorganize in Chapter 11 and make varying degrees of changes to their asset bases and capital structure. Thus, we investigate whether the distinction between financial distress and economic distress is useful in explaining the cross-section of asset and debt changes among firms that successfully reorganize in Chapter 11.

Both financially distressed and economically distressed firms reduce the face value of debt to similar degrees in Chapter 11. Interestingly, however, these similar levels of debt reduction between financially and economically distressed firms do *not* translate into similar changes in leverage – only financially distressed firms decrease their leverage in Chapter 11. Economically distressed firm that do emerge from Chapter 11 experience a change in leverage from pre-bankruptcy to post-emergence that is statistically indistinguishable from zero. This disparity between changes in the face value

of debt and changes in leverage is due to the fact that economically distressed firms exhibit significantly greater reductions in assets (the denominator of leverage) in Chapter 11 reorganizations compared to financially distressed firms. In our sample, financially distressed firms emerge from bankruptcy with only 7% fewer assets, while economically distressed firms reduce assets by 50%, on average. This result is consistent with our hypothesis that a well-functioning Chapter 11 process will redeploy more assets of economically distressed firms since these firms are characterized by poor asset performance. Additionally, our analysis shows that the positive relation between asset sales and economic distress is strongest when creditors have more control of the Chapter 11 process.

We also consider asset reductions that result from the disposition of off-balance-sheet operating lease commitments.[1] Graham, Lemmon, and Schallheim (1998) show that operating lease commitments make up a considerable portion (41%) of fixed claims for the average firm. Analyzing the use of leases is particularly relevant for distressed and bankrupt firms because Section 365 of the Bankruptcy Code allows firms to reject lease contracts in Chapter 11. Thus, a lessee holds a put option that is exercisable in bankruptcy. If the leased asset cannot be used profitably, the bankrupt firm is able to "put" the asset back to the lessor. Consistent with the idea that leases are particularly important to the analysis of distressed firms, Graham et al. (1998), Krishnan and Moyer (1994), and Sharpe and Nguyen (1995), show that higher-risk, lower Z-score, and lower rated firms employ more leases due to the lower expected bankruptcy costs and lower financial contracting costs of leases. Given the special treatment of lease contracts in bankruptcy, along with the evidence that firms more likely to face financial difficulties use more leased assets, it is surprising that this topic remains almost completely unstudied with respect to Chapter 11 restructuring.

[1] To our knowledge, Benmelech and Bergman (2007) is the only other study that considers the role of lease contracts in relation to firm distress. They focus exclusively on leases in the airline industry.

Using hand-collected data, we show that the lease put option is exercised extensively in Chapter 11 and that the disposition of lease commitments rivals asset sales as a means of asset reduction in bankruptcy. Furthermore, economically distressed firms make greater combined asset sales and lease dispositions than do financially distressed firms. In a subsequent analysis, we also show that bankrupt firms' propensity to dispose of leases rather than sell assets increases when their industries are in distress and during economic downturns. This result is consistent with Shleifer and Vishny (1992) who show that market liquidity affects the sale of assets, and it extends the findings of Schlingemann, Stulz, and Walkling (2002) who show that market liquidity affects firms' choice of which assets to sell. In our Chapter 11 setting, however, the choice is between whether to sell owned assets or to "put" leased assets back to the lessor.

Finally, we consider post-Chapter 11 firm performance and find that financially distressed firms exhibit stronger post-emergence operating performance than do economically distressed firms. This result provides validation for these ex ante proxies as useful sorting criteria, but to the extent that a portion of economically distressed firms emerge from Chapter 11 without resolution to their economic distress we conclude that the sorting in Chapter 11 may be imperfect.

Overall, our results support the notion that the outcomes and restructurings in Chapter 11 are broadly consistent with preserving going concern value for viable firms and with redeploying assets that are being used unprofitably. Creditor control promotes the positive relation between asset sales and economic distress, and our proxy for managers' ability to control the Chapter 11 process does not have an effect on either Chapter 11 outcomes or asset redeployments, suggesting that conflicts of interest between management and creditors are successfully managed in Chapter 11 on average.

The remainder of this paper is organized as follows. Section 2 describes both the sample and our proxies for financial distress and economic distress. Sections 3 through 6 present the results, and section 7 concludes.

2. Sample selection, variable construction, and data description

2.1 Sample selection and variable construction

Our Chapter 11 sample comes from New Generation Research's "Public and Major Company Database."[2] This database includes all firms filing for bankruptcy that have at least one publicly-traded security and also includes private firms deemed newsworthy. We begin with the universe of firms in this database that filed for Chapter 11 between 1991 and 2004. Our initial sample consists of 1,502 firms that appear in Compustat. We determine bankruptcy outcome, filing date, confirmation date, and emergence date (if any) from Lexis-Nexis and Factiva news searches and from SEC filings. Restricting the sample to firms with over $50 million in total assets (in 1997 dollars[3]) at the fiscal year end prior to bankruptcy filing reduces the sample to 634 firms. Requiring that firms have 10K filings both in the 12 months prior to bankruptcy filing and in the period between 12 and 24 months prior to bankruptcy filing reduces the sample to 610 firms. From this group, we eliminate financial firms (35), utilities (10), and those with missing values for total assets, total liabilities, or EBITDA (35), which results in 530 firms. Finally, another 17 firms are excluded that converted from Chapter 11 to Chapter 7 and another eight firms had their Chapter 11 cases dismissed, which results in our final sample of 505 firms.[4]

The large sample size gives us more statistical power than previous studies to determine the influences affecting the cross-section of firm changes in bankruptcy. We focus on large firms because smaller firms have a much greater incidence of missing data for several of our hand-collected variables. Additionally, small firms may be subject to a different set of factors in bankruptcy than are large firms. For example, small firms are

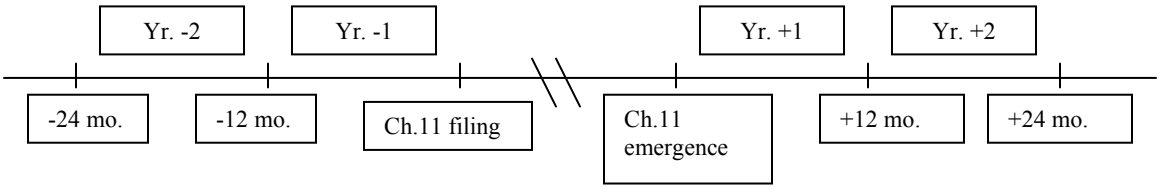
[2] www.bankruptcydata.com

[3] Adjustments to asset size are based on the Federal Reserve's GDP deflator.

[4] The liquidation of *large* firms overwhelmingly takes place from start to finish under Chapter 11 (120 firms in our sample) rather than under Chapter 7. Chapter 7 provides for a different liquidation mechanism than does Chapter 11. For example, in Chapter 7 a trustee is appointed to manage the firm and liquidate assets, whereas Chapter 11 liquidations are typically executed by the firm's managers. Cases of fraud or negligence by management often lead creditors to petition the court to liquidate under Chapter 7.

often appointed a trustee in Chapter 11. Also, for small firms, creditor committee members may have less at stake, which could result in devoting a socially suboptimal level of resources to determining the best reorganization decision (Aghion, Hart, and Moore, 1992). Our focus on a more recent sample period is because Chapter 11 case law has evolved over time and more recent Chapter 11 cases differ significantly from earlier periods across important dimensions including absolute priority rule ("APR") violations, debtor-in-possession ("DIP") financing, management turnover, and time spent in Chapter 11 (Bharath, Panchapagesan, and Werner, 2008).

We rely on a combination of Compustat, CRSP, and hand-collected data for the variables used in our study. We classify years relative to Chapter 11 filing using the following timeline.



We use only annual data for both Compustat variables and hand-collected data, and thus the variables measured at "year -1" correspond to data in 10K filings for periods that ended in the month of or in the 12 months prior to the Chapter 11 filings.

Our measure of firm size is the natural logarithm of total assets at year -1. To measure firm operating performance, we use industry-adjusted EBITDA-to-total assets.[5] Industry adjustments are made by subtracting the industry median EBITDA-to-total assets from the sample firms' EBITDA-to-total assets. Industry medians are calculated based on 4-digit SIC codes provided that five or more firms reside in the industry, excluding the sample firm. If the 4-digit SIC code contains fewer than five firms, we define the industry median using the 3-digit SIC code, again with the required minimum

[5] On several occasions, Compustat included non-cash write-downs in EBITDA. We used information from the 10K filings to correct these EBITDA values in our analysis.

of five firms. In a handful of cases, the five firm minimum is not met at the 3-digit SIC level and the industry adjustments for these firms are made at the 2-digit SIC level.

We measure firm leverage as the ratio of total liabilities to total assets. Once a firm is in default, which can be well in advance of its bankruptcy filing, cross-default provisions typically result in all of the long-term debt becoming due immediately. Thus, using total debt in the numerator of our leverage measure avoids data errors that can arise from reclassifications of long-term debt in the 10K filings and in Compustat.

Throughout our analyses, we consider the effects of industry distress and of economic downturns. We define industry distress as in Acharya, Bharath, and Srinivasan (2007) who show that industry distress is associated with lower creditor recoveries for defaulted firms. To determine whether a sample firm's industry is distressed, we calculate the industry median stock return for the 12 full months immediately prior to the Chapter 11 filing. The industry median is based on the 4-digit SIC code, again provided that five firms reside in the industry. If the 4-digit SIC code contains fewer than five firms, we then move to the 3-digit, or if necessary 2-digit, SIC code to calculate the industry median. An industry whose median 12-month stock return is less than -30% is considered distressed and is identified with an "industry distress" indicator variable equal to one. To control for the effects of economic downturns, we use an indicator variable equal to one if the sample firm filed for bankruptcy in a year in which the percent change in GDP was in the bottom quartile of GDP changes over our sample period. The years encompassed by the bottom GDP quartile correspond to the two recessionary periods that occurred during our sample; specifically 1991, and 2001 to 2002.

We hand-collect data on whether a firm obtained debtor-in-possession ("DIP") financing during Chapter 11 and on the percent of employees covered by union contracts. We obtain information on DIP financing from firms' 10K filings that took place both during Chapter 11 and post-emergence. Firms that secure DIP financing in bankruptcy are identified by an indicator variable equal to one. DIP loans are typically 6-month to 18-month revolving lines of credit, often accompanied by a term loan, that receive high

seniority and enhanced security in bankruptcy (Altman and Hotchkiss, 2006). Gertner and Scharfstein (1991) discuss how DIP financing can potentially lead to overinvestment in Chapter 11, but Gilson, John, and Lang (1990) note that DIP can be used to overcome debt overhang problems (Myers, 1977). Recent studies, however, argue that DIP financing is used by creditors to exert control over the restructuring decisions of bankrupt firms (Skeel, 2003; Baird and Rasmussen, 2003; Adler, Capkun, and Weiss, 2006; Dahiya, John, Puri, and Ramirez, 2003). Thus, we use the existence of DIP financing as a proxy for creditor control of the Chapter 11 process.

We proxy for managers' ability to exert control over the Chapter 11 process by the ratio of the firm's R&D-to-assets. We expect this measure to capture the degree of managers' information advantage in Chapter 11 (LoPucki and Whitford, 1993), and we test whether this affects Chapter 11 outcomes and restructurings in light of the typical assumption that managers are opposed to liquidation (White, 1994; Mooradian, 1994; LoPucki and Whitford, 1993).

We obtain data on firms' unionization rates from 10K filings and from the "Contract Listings" and "National Labor Relations Board Elections" databases of the Bureau of National Affairs (BNA). Bronars and Deere (1991) and Matsa (2007) show that firm debt issuances are used to influence labor contract negotiations. Thus, we consider the extent to which firm unionization affects restructuring in Chapter 11. In our sample, 55% of firms stated an explicit number or percentage of unionized workers in their 10K filing prior to Chapter 11 (year -1). Another 15% of firms, while not providing an explicit number, provided sufficient information in their 10K filing to determine whether unionization is above or below the 20% cutoff that we employ in this study.[6] For the remaining 30% of firms, we searched the BNA databases to determine the extent of unionization at these firms. A handful of ambiguous cases were resolved by subsequent news searches on Lexis-Nexis and Factiva to determine whether the firm's

[6] Examples include, "Less than 5% of our employees belong to labor unions," and "Substantially all of our hourly workers are subject to collective bargaining agreements."

labor unions were mentioned during the bankruptcy process. Firms whose unionization rate equals or exceeds 20% are identified with an indicator variable equal to one. Additionally, we hand-collect data on lease rejection and renegotiation, asset sales, and asset writedowns over the Chapter 11 period. These data are described in detail in section 4.

2.2 Financial distress versus economic distress

Conceptually, firms facing primarily financial distress are viable as going concerns, have business models that are without fundamental problems, but have high leverage and currently face difficulty repaying debts. Firms facing primarily economic distress also have difficulty repaying debts, but are also characterized by very low or negative operating performance and a business model with fundamental problems. Several studies on financial distress acknowledge the distinction between financial distress and economic distress and employ proxies that are associated with one or the other. For example, Hotchkiss (1995) cites negative operating performance prior to Chapter 11 filing as evidence of economic distress. Denis and Rogers (2007) associate higher leverage with greater financial distress and less economic distress. Studies that more explicitly isolate the effects of financial versus economic distress include Andrade and Kaplan (1998) who study the effects of "pure financial distress" using a small sample of 31 highly levered transactions (HLTs). They consider these HLTs financially rather than economically distressed in part because many firms in their sample exhibit above-industry operating margins. Similarly, Denis and Denis (1995) study the causes of financial distress using a sample of 29 leveraged recapitalizations.

We employ three measures to distinguish financial distress from economic distress: a continuous measure, a "combined rank" measure, and a categorical measure. Our continuous measure uses two variables, the first of which is the firm's pre-bankruptcy (year -1) industry-adjusted EBITDA-to-total assets. This continuous variable proxies for viability as a going concern and for the degree of financial versus economic

distress. The industry adjustment procedure is detailed in section 2.1. All else equal, we expect that Chapter 11 firms with stronger operating performance suffer from a higher degree of financial, as opposed to economic, distress. The second variable in the continuous measure is firm leverage, which we define as the ratio of total liabilities to total assets prior to Chapter 11 (year -1). Highly levered firms will experience financial distress after only small declines in operating performance (Jensen, 1989), and thus we expect that firms entering Chapter 11 with higher leverage are suffering from greater financial, rather than economic, distress.

Both the second (combined rank) and the third (categorical) measures that we construct are based on the idea that the *combination* of leverage and operating performance provides a more reliable differentiation between financially and economically distressed firms than do these variables used individually. Specifically, firms facing primarily economic distress are characterized by a combination of relatively low leverage and low or negative operating performance prior to Chapter 11. Firms facing primarily financial distress are characterized by a combination of high leverage and operating performance that is relatively strong.

The combined rank measure of financial and economic distress is calculated by ranking firms into deciles from zero to nine based on industry-adjusted EBITDA-to-assets averaged over years -2 and -1, and again ranking firms from zero to nine based on leverage averaged over years -2 and -1. For each firm, these rankings are then summed, resulting in a combined rank from zero to 18. For example, a firm in the highest decile for industry-adjusted EBITDA-to-assets and the highest decile for leverage would receive a combined rank of 18, the highest level of "pure" financial distress.

The third, categorical measure to distinguish financial distress from economic distress initially sorts our sample firms into two groups – above median and below median industry-adjusted EBITDA-to-assets averaged over years -2 and -1. Within each of these two groups we then sort on above and below median leverage, again averaged over years -2 and -1. Those firms with both above median industry-adjusted EBITDA-to-

assets and above median leverage are categorized as financially distressed, and those with both below median industry-adjusted EBITDA-to-assets and below median leverage are categorized as economically distressed. By construction, 25% of the firms are categorized as financially distressed, 25% as economically distressed, and 50% as having a combination of financial distress and economic distress. Both the combined rank and categorical measures of financial and economic distress capture the combination of operating performance and leverage. Compared to the categorical approach, however, the combined rank measure more finely stratifies the magnitude of operating performance and the degree of leverage. Thus, we initially report summary statistics for both measures, but focus on the combined rank measure in our multivariate tests. Both the combined rank and categorical measures exhibit similar results throughout our analysis.

2.3 Data description

Table 1 contains descriptive statistics for our sample firms. Panel A shows that the number of Chapter 11 filings varies substantially from year to year, and that filings peak during recessions. In Panel B, we classify firms into five outcomes. Reorganizations comprise 55% of the sample, liquidations 24%, and mergers/acquisitions 15%. The outcome of Chapter 11 is undetermined for 5% of the sample, and a final 1% of firms are still in Chapter 11.[7]

Table 2 contains pre-Chapter 11 (year -1) summary statistics for our sample firms. On average, at the fiscal year end prior to Chapter 11 filing, sample firms have assets of $955 million (median of $257 million). Our sample firms are highly levered with a ratio of total liabilities to total assets of 1.10 (median of 0.96), and have a present value of operating lease commitments that averages 29% (median of 24%) of property, plant, and equipment (PPE) plus operating lease commitments. Operating leases pertain to leased

[7] Our 5% of undetermined outcomes is substantially lower than the percent of undetermined outcomes documented in other studies such as Kalay, Singhal, and Tashjian (2007). This greater data availability is primarily due to our sample having a higher size requirement ($50 million in total assets in 1997 dollars) than that used in most studies.

assets whose contractual terms do not call for the lessee to assume the risks and benefits of ownership. Such leased assets are *not* recorded as assets on the balance sheet. Firms are required, however, to report their operating lease commitments for each of the subsequent five years in their 10K filings. Our calculation of the present value of operating lease commitments follows Graham et al. (1998) who discount these five-year operating lease commitments to present value using a 10% discount rate. The summary statistics above show that these off-balance-sheet assets make up a sizable proportion of fixed assets for our sample firms.

Also shown in Panel A is that the average ratio of R&D to total assets is 1%. Approximately 22% of our sample firms are in distressed industries based on our definition of industry median stock returns of -30% or lower. Although "Low GDP" years account for only three of our 14 sample years, approximately 39% of the Chapter 11 filings occur in these three years. Finally, 24% of our sample firms have a unionization rate that exceeds 20%.

Panel B shows that firm performance in year -1 is generally poor and exhibits considerable skewness. The average EBITDA-to-assets at year -1 is -0.01 (median of 0.03). The average industry-adjusted EBITDA-to-assets is -0.09 (median of -0.07). The sample firms' industry median stock returns calculated over the 12-month period immediately preceding the sample firm's Chapter 11 filing average -4.5% (median of -5.1%). Overall, the average sample firm has high leverage, poor performance, and is frequently in an industry that is also performing poorly.

3. Financial distress versus economic distress and Chapter 11 outcome

3.1 Chapter 11 Outcome

If Chapter 11 promotes the preservation of going concern value for viable firms and the redeployment of assets for firms whose continued operation would destroy value, then we expect that firms entering Chapter 11 primarily because of financial distress will be more likely to reorganize and emerge, and that firms entering Chapter 11 primarily

due to economic distress will be more likely to have their assets redeployed via liquidation or acquisition. Harris and Raviv (1990) present a model in which bankruptcy proceedings are assumed to generate sufficient information for an optimal liquidation versus reorganization decision, and Mooradian (1994) presents a model in which Chapter 11 sorts efficient from inefficient firms. This latter model, however, relies on the assumption of frictionless bargaining in Chapter 11. Alternatively, the presence of frictions may lead to inefficiencies in Chapter 11. In White's (1994) game-theoretic model, a sorting breakdown in Chapter 11 can lead to reorganization of inefficient firms because creditors cannot distinguish between efficient and inefficient firms. Similarly, Hotchkiss (1995), Bradley and Rosenzweig (1992), Frost (1992), and LoPucki and Whitford (1993) argue that management power in Chapter 11 can result in inefficient outcomes, and Gertner and Scharfstein (1991) show that the incentives in and provisions of Chapter 11 can lead to the inefficient continuation of investment.[8]

3.2 Univariate results

Panels A and B of Table 3 compare the median pre-bankruptcy attributes and Chapter 11 outcomes of the firms classified as financially distressed and those classified as economically distressed based on the combined rank and categorical measures described in section 2.2. Panel A considers combined rank groups zero through five to be primarily economically distressed and groups 13 through 18 to be primarily financially distressed. By construction, both pre-Chapter 11 leverage and operating performance are higher in the financial distress group. The magnitude of the differences, however, indicates substantial heterogeneity in the cross-section of firms filing for Chapter 11. For the financial distress group in Panel A, the median firm's year -1 industry-adjusted EBITDA-to-assets is three percentage points *higher* than the industry median. Thus, these firms classified as financially distressed have pre-Chapter 11 operating performance

[8] Management holds the exclusive right to propose a Plan of Reorganization for the first 120 days of the Chapter 11 process. LoPucki and Whitford (1990) show that the management exclusivity period is commonly extended and in the majority of cases persists throughout the entire Chapter 11 process.

that is similar to or better than the median firms in their respective industries on average. Andrade and Kaplan (1998) find similar pre-bankruptcy operating performance in a sample of 31 highly-levered transactions (HLTs) that is also intended to isolate the effects of financial distress. Other notable differences between the financial distress and economic distress groups are that financially distressed firms tend to be larger, more unionized, and have fewer lease commitments. The results in Panel B are based on the categorical distinction of financial and economic distress and are very similar to the results presented in Panel A.

Panels A and B of Table 3 also present results for the proportion of financially and economically distressed firms that reorganize and emerge from Chapter 11. Both the combined rank distinction and the categorical distinction show that financially distressed firms are almost twice as likely to reorganize in Chapter 11 than are economically distressed firms. Equivalently, economically distressed firms are significantly more likely to liquidate or be acquired in Chapter 11 than are financially distressed firms.

3.3 Multivariate results - Chapter 11 outcomes

Table 4 presents evidence examining the relationship between financial and economic distress and the outcomes of Chapter 11. In our logistic regression specifications, the dependent variable equals one if the Chapter 11 outcome is reorganization, and equals zero if the Chapter 11 outcome is liquidation or acquisition.[9]

In Model 1, the variables industry-adjusted EBITDA-to-assets and leverage are included separately. The coefficient estimates on both variables are positive and significant at the 1% level. In similar multivariate settings, Denis and Rodgers (2007) and Barniv et al. (2002) do not find a relation between pre-filing performance and the likelihood of reorganization. The result that higher leverage is positively associated with

[9] Our analysis groups together liquidations and acquisitions. Empirically, unreported analysis shows no significant differences between liquidations and acquisitions. Conceptually, both liquidations and acquisitions constitute 100% redeployment of the bankrupt firm's assets, the distinction being that in liquidation assets are sold piecemeal to multiple buyers, whereas in acquisitions all of the firm's assets are sold to a single buyer.

reorganization in Chapter 11 is also consistent with the prediction of the tradeoff theory of capital structure that firms with lower expected costs of financial distress choose higher leverage ex ante.

The second specification in Table 4 uses the combined rank measure of EBITDA and leverage to proxy for the degree of financial versus economic distress (as described in section 2.2). The combined rank of EBITDA and leverage is significant at the 1% level (z = 5.54), and the pseudo R-squared of this specification is similar to that in the first specification. Both model specifications correctly classify between 68% and 69% of Chapter 11 outcomes compared to the 58% unconditional probability of reorganization in our sample.[10] The third column reports the marginal effects of the logistic regression for the specification with the combined rank variable and shows that a one standard deviation change in the combined rank measure (approximately 4.3 points on a 19-point scale) is associated with a 15% change in the likelihood of reorganization. This result is consistent with Chapter 11 achieving the goals of preserving going concern value of viable firms, and redeploying the assets of firms whose continued operation would destroy value.

Consistent with the results of Denis and Rogers (2007) and Barniv et al. (2002), larger firms are also more likely to reorganize rather than be liquidated or acquired. It is likely that larger firms may be more costly to liquidate or sell due to larger asset fire sale costs or financing constraints of potential buyers (Aghion et al., 1992). The other regression variables that proxy for industry distress, low GDP, and firm unionization are not significant in either of the regression specifications. If unionized firms make extensive "strategic" use of Chapter 11 to break or renegotiate union contracts, we would expect unionized firms to reorganize more frequently, on average. Our proxy for managers' ability to control the reorganization process, R&D-to-assets, is also insignificant in explaining Chapter 11 outcomes.

[10] The categorical measure of financial distress and economic distress has been omitted from this and subsequent analyses. The unreported results of the categorical measure are similar to those of the combined rank measure throughout the analyses.

4. Asset changes in Chapter 11 and the choice between asset sales and lease disposition

4.1 Asset Changes in Chapter 11

The previous section analyzed the binary outcome of liquidation or acquisition versus reorganization. As LoPucki and Whitford (1993) discuss, however, reorganization in Chapter 11 is best described by a continuum of degrees of liquidation, and firms that do reorganize in and emerge from Chapter 11 typically undergo some degree of partial liquidation of their asset base through asset sales and lease dispositions. Thus, among firms that reorganize in and emerge from Chapter 11, we expect asset redeployments to increase in the degree of economic distress if Chapter 11 is functioning to preserve going concern value for viable firms and to redeploy more assets of those firms with more fundamental business difficulties.

Maksimovic and Philips (1998) also analyze asset sales in Chapter 11 and conclude that the "analysis of plant sales and closures provides little evidence that Chapter 11 facilitates asset sales by less efficient firms."[11] Outside of bankruptcy, Ofek (1993) and Opler and Titman (1994) find evidence that firms with higher leverage sell more assets in response to firm distress. Asquith, Gertner, and Scharfstein (1994) also examine distressed but non-bankrupt firms, but they find no relation between the propensity of distressed firms to sell assets and traditional measures of distress such as leverage, EBITDA, or interest coverage. Hotchkiss (1995) and Gilson (1997) measure the change in firms' total assets from pre-bankruptcy to post-emergence and find reductions of 50% and 60%, respectively. Neither study, however, distinguishes between asset sales and asset writedowns, and nor do they incorporate the role of leased assets. In contrast to the large changes in total assets cited above, Denis and Denis (1995) find that

[11] Their proprietary dataset has a sample period from 1978 to 1990 and consists of firms in SIC 2000 to 3999. Firms in this SIC range constitute only 33% of the sample in our study.

distressed firms in their sample of leveraged recapitalizations exhibit surprisingly low levels of asset sales.

To our knowledge, previous literature has not explored in detail the specific sources of asset changes that take place in Chapter 11 bankruptcy. In order to understand and analyze the asset changes that firms undergo in Chapter 11, we hand-collect data on fixed asset sales, gains and losses on these sales, and fixed asset impairment writedowns during the Chapter 11 period.

4.2 Univariate results

Table 5, Panel A shows that from pre-bankruptcy filing to post-bankruptcy emergence, net PPE on the balance sheet decreases by an average of 33% (median of 32%). To determine actual sales and sale amounts of property, plant, and equipment (PPE) over the Chapter 11 period, we hand-collect 10K data for all of the years that span the Chapter 11 period (year -1 to year +1). The cash value of the sale of PPE over this period is the sum of cash and the value of other consideration received for these sales. [12] The average sale of PPE over the Chapter 11 period is 12% of post-emergence PPE plus asset sales (median of 4%). The denominator of this variable is the cash value of the PPE sale plus post-emergence PPE, which should closely approximate the market value of PPE due to fresh-start and asset impairment accounting guidelines.[13] Thus, both the numerator and denominator of this asset sales variable are in approximate market value terms.

Asset sales, however, represent only one means of asset disposition in Chapter 11. Prior literature has not addressed the role of lease disposition in Chapter 11 despite the legal provisions of Chapter 11 that allow for leases to be rejected in bankruptcy and

[12] For sales of divisions or entire lines of business, we estimate the value of the PPE portion of the sale by the proportion of the division's total assets that PPE comprises. In cases where this breakdown is unavailable at the division level, we estimate the value of the PPE portion of the sale by the proportion of the firm's total assets that PPE comprises.

[13] Gilson, Hotchkiss, and Ruback (2000) show evidence of a "strategic" aspect to the valuation of firms emerging from Chapter 11. It is not clear, however, that this affects the valuation of PPE specifically.

despite the finding that firms more likely to be in distress make greater use of leased assets (Graham et al., 1998; Krishnan and Moyer, 1994; Sharpe and Nguyen, 1995). Section 365 of the Bankruptcy Code provides firms with broad latitude to reject leases in Chapter 11.[14] Thus, a lease contract contains a put option that is exercisable in bankruptcy. We calculate the present value of operating lease commitments as described in section 2.3, and we refer to the decrease in this measure from year -1 to year +1 as the disposition of lease commitments over the Chapter 11 period. This disposition of lease commitments as a proportion of year -1 PPE plus year -1 lease commitments has an average value of 9% (median of 4%). Interestingly, the disposition of lease commitments rivals asset sales as a source of asset restructuring over the Chapter 11 period. Finally, Panel A of Table 5 shows that the combination of the book value of assets sales plus the decrease in the present value of lease commitments constitutes an average of 15% (median of 9%) of the combined pre-Chapter 11 PPE plus lease commitments, where the book value of asset sales equals the cash value plus the loss on the sale (or minus the gain).

With the exception of Maksimovic and Phillips (1998) who analyze data on sales of manufacturing plants, papers that consider asset changes in Chapter 11 do not specifically identify asset changes that arise from assets sales versus those due to asset writedowns. Conceptually, the distinction is relevant because an asset sale constitutes a redeployment of assets whereas a writedown of assets is merely a change in the accounting valuation of an unchanged asset base. Our hand-collected data on the magnitude of asset writedowns in Chapter 11 indicates that this distinction is relevant.

Panel B of Table 5 details the specific sources of PPE decreases from year -1 to year +1 and includes hand-collected data on PPE impairment writedowns over the Chapter 11 period. SFAS 121, which was implemented in 1995, standardized when and

[14] Prior to the Bankruptcy Act of 2005, Chapter 11 firms were supposed to assume or reject lease contracts within an initial period of 60 days after the Chapter 11 filing, but courts commonly granted multiple extensions to this time period. The Bankruptcy Act of 2005 extends the initial period to 120 days but limits the total period for lease assumption or rejection to 210 days.

how firms should take and report asset impairments. Prior to this accounting pronouncement, the timing and reporting of asset impairments was not systematic, and in Panel B we examine only firms that emerge from Chapter 11 in this post-SFAS 121 period. Firms that adopt fresh-start accounting (108 of the 149 firms in this analysis) are required at emergence from Chapter 11 to state their assets at market values.[15] Thus, writedowns of PPE and other assets occur when the carrying value of the asset on the balance sheet is greater than the firm's estimated market value of the asset. In addition, Chapter 11 firms frequently take impairment writedowns on assets *during* the Chapter 11 process irrespective of whether they adopt fresh-start accounting at the *emergence* of Chapter 11.

In Panel B of Table 5, each variable is expressed as a percent of the combined pre-Chapter 11 (year -1) PPE plus the pre-Chapter 11 present value of operating lease commitments. On average, depreciation expense exceeds capital expenditure by 2.0% (median of 4.8%) of pre-Chapter 11 PPE plus lease commitments. Impairments on assets in use constitute an average of 11.2% (median of 4.0%) of pre-bankruptcy PPE plus lease commitments, which represent the greatest source of fixed asset decreases in Chapter 11. Impairments on asset closures average 4.1% (median of 0.2%) of pre-bankruptcy PPE plus lease commitments, and the book value of asset sales constitutes an average of 6.8% (median of 1.9%) of pre-Chapter 11 PPE plus lease commitments. The combination of the book value of assets leaving the firm through closures and through asset sales averages 10.9% (4.1% + 6.8%) of PPE plus lease commitments and is similar in magnitude to the 11.2% book value decrease that results from impairment writedowns of assets in use. The decrease in the present value of lease commitments from year -1 to year +1 constitutes an average of 6.0% (median of 3.1%) of pre-Chapter 11 PPE plus lease commitments. The total decrease in PPE and lease commitments over the Chapter

[15] Fresh-start accounting is mandated by SOP 90-7 when the following two conditions are met: 1) the reorganization value of the debtor is less than post-petition liabilities and allowed claims, and 2) existing voting shares immediately before confirmation receive less than 50 percent of the voting shares of the emerging entity.

11 period is 30.1% (median of 27.5%).[16] Overall, Panel B shows that asset sales are just one component of the reductions in PPE over the Chapter 11 period, and that these PPE reductions are also heavily influenced by impairments, lease dispositions, and depreciation.

Panel C of Table 5 provides the first empirical evidence of which we are aware on the incidence of lease rejection and renegotiation in Chapter 11. Data on lease rejection and lease renegotiation were hand-collected from 10K filings and from Factiva and LexisNexis news searches. We only consider a lease to have been rejected or renegotiated in Chapter 11 if the rejection or renegotiation took place between the Chapter 11 filing date and the emergence date.

As shown in the table, among reorganizing firms, 54% (81 of 149) reject lease contracts, 58% (86 of 149) either reject or renegotiate lease contracts, 26% (39 of 149) renegotiate lease contracts, and 23% (34 of 149) both reject and renegotiate leases in Chapter 11. Furthermore, it is possible that additional sample firms rejected or renegotiated leases in Chapter 11 but did not report this information in 10K filings or in other media releases. Thus, we consider the incidence of lease rejection and renegotiation detailed above to be a lower bound. Even as a lower bound, however, it is clear that the put option inherent in lease contracts is exercised extensively in Chapter 11 proceedings.

4.3 Multivariate results – asset sales and lease dispositions in Chapter 11

Table 6 analyzes asset sales and lease dispositions in Chapter 11 to provide additional evidence on how financial and economic distress affect asset restructuring decisions in Chapter 11. The dependent variable in specifications one through three of Table 6 is the cash value of asset sales from year -1 to year +1 divided by the sum of year +1 PPE and the cash asset sales. As discussed previously, year +1 PPE should closely

[16] The median total decrease in PPE and lease commitments is considerably larger than the sum of the component median decreases because of skewness in the component distributions.

approximate the market value of PPE due to fresh-start and asset impairment accounting guidelines.

The first model specification shows that pre-filing industry-adjusted EBITDA-to-assets is negative and marginally significant ($p = 0.054$), indicating that firms with poorer operating performance sell more assets in Chapter 11 than do their better-performing Chapter 11 counterparts. This result is consistent with the Chapter 11 process promoting asset redeployment when assets are being used unprofitably. This negative relation between asset sales and firm performance is in contrast to the findings of Asquith et al. (1994) who show no relation between asset sales and firm performance in a sample of distressed but non-bankrupt firms. Our study does not directly compare out-of-court restructuring actions to bankruptcy restructuring actions. Nonetheless, the contrast in the results presented here with those in Asquith et al. (1994) raises the possibility that once firms operate under bankruptcy protection and presumably have less immediate liquidity concerns, their asset sale decisions may be more driven by efficiency considerations.

The second specification in Table 6 distinguishes financial distress and economic distress using the combined rank variable. This variable is negative and significant at the 1% level indicating that firms in greater economic distress sell more assets and firms in greater financial distress sell fewer assets in Chapter 11, which again is consistent with Chapter 11 functioning in accordance with its goals of preserving going concern value and redeploying assets being used unprofitably. It is noteworthy that the adjusted R-squared of this second specification is considerably larger than that in the first specification that uses the continuous leverage and industry-adjusted EBITDA-to-assets variables, indicating that the combined rank proxy constructed to account for the interaction of asset performance and leverage better explains the cross-sectional variation in Chapter 11 asset sales.

Our analysis also focuses on the role of debtor-in-possession ("DIP") financing since recent literature has emphasized that creditors may be able to exert considerable control over the Chapter 11 process through this mechanism (Skeel, 2003; Baird and

Rasmussen, 2003; Dahiya, et al., 2003; Adler et al. (2006)). This influence and control is achieved by increased monitoring and restrictive DIP covenants that can dictate performance targets and include remedial action if such targets are not achieved (Altman and Hotchkiss, 2006; Skeel, 2003). Additionally, DIP financing is often provided by existing creditors who also have an incentive to take into account the repayment of their existing debt with the firm (Dahiya et al., 2003). Consistent with the view that greater creditor control leads to increased asset sales in Chapter 11, the indicator variable for debtor-in-possession ("DIP") financing is positive and significant at the 10% level in the first and second model specifications. In our sample, 51% of reorganizing firms receive DIP financing while in Chapter 11.

The third specification in Table 6 includes an interaction term between DIP financing and combined rank. With this interaction included in the regression, the variable combined rank (which now measures the effect of the combined rank in the absence of DIP financing) is still negative but is no longer significant. The interaction term between DIP and combined rank is negative and significant at the 5% level, and the absolute value of this interaction term's coefficient is more than twice that of the coefficient on combined rank alone. Additionally, the regression specification that includes this interaction term provides a better fit than does either of the first two specifications. These results are consistent with creditor control being an important factor in promoting greater asset sales by economically distressed firms in particular. The proxy for managements' ability to control the Chapter 11 process, the ratio of R&D-to-assets, is insignificant in all three specifications.

The other independent variables in specifications one through three – firm size, industry distress, low GDP quartile, and firm unionization – are not consistently significant in explaining asset sales in Chapter 11. The indicator variable "low GDP quartile" is negative and significant at the 10% level in the second specification only. To the extent that this result holds, it is consistent with Shleifer and Vishny (1992) and

Schlingemann et al. (2002) who argue that a less liquid asset market can restrict asset sales and reduce the prices obtained in asset sales.

The final specification in Table 6 analyzes assets decreases that take place through both asset sales and the disposition of operating leases. The numerator of the dependent variable is the book value of asset sales during the Chapter 11 period plus the decrease in present value of lease commitments from year -1 to year +1. The denominator is the year -1 net PPE plus the year -1 present value of operating lease commitments. Both the numerator and denominator of the dependent variable are in book value terms. The results show that firms in economic distress have significantly greater levels of combined asset sales and lease decreases than do firms in financial distress. Filing for Chapter 11 in a "low GDP quartile" year is again associated with fewer asset sales and lease decreases, and this variable is significant at the 1% level.

One difference between the results in specifications three and four is regarding the interaction of DIP and combined rank. This interaction is not significant in explaining lease dispositions in Chapter 11, whereas it is significant in explaining asset sales in Chapter 11. It may be the case that creditor control, to the extent that it promotes redeployment of assets by economically distressed firms, is focused on asset sales since that brings in immediate cash to the firm. Another difference between the results in specifications three and four is the coefficient on R&D-to-assets, which is positive and significant only in specification four. The result that more R&D intensive firms exhibit greater combined asset sales and lease dispositions in Chapter 11 runs counter to the notion that managers' ability to influence the Chapter 11 process results in a lower propensity to liquidate firm assets. Across model specifications, the distinction between firms facing financial distress and those facing economic distress is central to understanding the asset redeployment decisions that take place in Chapter 11.

4.4 Multivariate results – the choice between selling assets and shedding leases

In this section, we investigate whether the decrease in lease commitments constitutes a greater portion of the combined asset sales and lease dispositions when firms are most subject to market liquidity constraints on asset sales; i.e., when either the industry or the economy is weak. In Shleifer and Vishny's (1992) model of asset sales and market liquidity, industry-wide or economy-wide downturns can result in asset fire sales by distressed firms, and these fire sales can have considerable private and social costs. Several subsequent papers have documented that industry conditions affect whether assets are sold, which assets are sold, and the proceeds from these sales (Acharya et al., 2007; Maksimovic and Phillips, 1998; Kruse, 2002; Schlingemann et al., 2002; Opler and Titman, 1994; Asquith et al., 1994). Furthermore, Pulvino (1999) shows that sales of aircraft in Chapter 11 and Chapter 7 are subject to similar fire-sale prices, and he concludes that the Chapter 11 process is unable to mitigate costs associated with asset fire sales. Benmelech and Bergman (2007), however, show that the ability of airlines to lower their lease payments is concentrated in those years in which the airline industry is in distress. Based on this finding, we conjecture that the ability to dispose of leases in Chapter 11 can potentially mitigate the cost of asset fire sales.

In Table 7, the dependent variable is the decrease in the present value of lease commitments from year -1 to year +1 divided by the lease commitment decrease plus the cash amount of PPE sales. This dependent variable measures the proportion of the total fixed asset reduction that is comprised of lease dispositions and has a range from zero to one. Firms that neither decrease lease commitments nor engage in asset sales are omitted from this analysis. Firms that only decrease lease commitments and have no asset sales are given a value of one, and firms that engage in asset sales but do not decrease lease commitments are given a value of zero. In this analysis, we only consider firms that have a combined asset sale plus decrease in the present value of lease commitments greater than 5% of PPE. This restriction enables us to focus on firms making non-trivial changes

to their asset base, and on firms for which the decision to reduce lease commitments versus sell assets is potentially more relevant.[17]

Across all three specifications in Table 7, the indicator variable for industry distress is positive and significant at approximately the 10% level (p = 0.076, 0.103, and 0.090, respectively). This result suggests that firms may rely more heavily on asset reductions through lease dispositions rather than through asset sales during times of industry distress.[18] Similarly, across all three specifications the indicator variable for firms that file Chapter 11 during "low GDP" years is positive and significant at either the 5% or 1% level. Shleifer and Vishny (1992) consider that both industry-wide and economy-wide conditions can lead to asset fire sales. Our results show that in times of industry distress and economic downturns firms rely less upon asset sales and more upon lease dispositions as a means of reducing assets in Chapter 11. These results are consistent with the disposition of lease commitments in Chapter 11 potentially mitigating costs associated with asset fire sales.[19]

All specifications in Table 7 include a control variable for the pre-bankruptcy ratio of lease commitments to PPE. Firms with a greater amount of lease commitments may naturally rely on lease disposition for a greater proportion of their asset restructuring, and our results are consistent with this notion. Specification two includes industry dummy variables, which results in very similar coefficients on explanatory variables but a slightly lower adjusted R-squared than in specification one that does not include industry dummy variables.

Specification three in Table 7 excludes observations for which the decrease in lease commitments over Chapter 11 is greater than 50% of total pre-bankruptcy lease

[17] Results are similar when the entire sample is included. Also, results are similar when all zeros and ones are discarded, leaving only firms that engage both in asset sales and lease dispositions.
[18] Our analysis uses the Acharya et al. (2007) definition of industry distress as detailed in Section 2.1. Results are similar using the Opler and Titman (1994) definition of industry distress that requires both a median industry stock return below -30% *and* a decrease in sales compared to the prior year.
[19] We are unable to determine the proportion of lease commitments that are decreased through lease rejection, non-renewal of expired leases, and lease renegotiation. Our results in Panel D of Table 5, however, show that lease rejection is considerably more common than lease renegotiation.

commitments. This restriction is to ensure that the results are not driven by firms that are constrained by their lease reduction boundary. The results in specification three are similar to those in specifications one and two. The only significant difference is that in specification three the combined rank variable is positive and significant, indicating that financial distress (rather than economic distress) is associated with greater asset reduction through lease dispositions rather than through asset sales for this subset of firms. The results relating to industry distress and low GDP are consistent across all three specifications.

To summarize the results in sections 4.2 to 4.4, for firms that reorganize and emerge from Chapter 11, both asset sales and lease commitment decreases are greater over the Chapter 11 period for firms experiencing economic distress compared to firms experiencing financial distress. Since firms in economic distress are characterized by poor operating performance, the result that these firms redeploy a greater proportion of assets is consistent with a Chapter 11 process that preserves going concern value and redeploys asset that are being used unprofitably. DIP financing, which is our proxy for creditor control, is a significant factor in explaining the relation between asset sales and economic distress. We also provide the first comprehensive examination of operating lease commitments and of lease dispositions in Chapter 11. The put option inherent in lease contracts is used extensively in Chapter 11, and the disposition of leases constitutes a considerable portion of the asset changes in Chapter 11. Furthermore, we find evidence suggesting that asset redeployment via lease disposition is used to mitigate the potential costs of asset fire sales in Chapter 11.

5. Debt and leverage changes in Chapter 11

5.1 Debt restructuring in Chapter 11

Compared with asset restructuring in Chapter 11, the analysis of debt restructuring and leverage changes of bankrupt firms has received considerably more attention in the bankruptcy literature. Gilson (1997) finds only that the amount of firms'

asset sales are positively related to the percentage decrease in debt that firms realize from pre-Chapter 11 to post-emergence. Alderson and Betker (1995) find that firms with high liquidation costs emerge from Chapter 11 with lower leverage ratios, which reduces the likelihood of future distress, and Kahl's (2002) model of "dynamic liquidation" shows that creditors will optimally choose higher post-restructuring leverage for firms that face greater uncertainty.

5.2 Univariate results

Table 8 compares the median debt, leverage, and total asset reductions over Chapter 11 of the financially and economically distressed firms based on the combined rank measure. As in Table 3, firms in groups zero through five are considered primarily economically distressed and firms in groups 13 through 18 are considered primarily financially distressed. Of the 149 firms for which year +1 data is available, 39 were categorized as financially distressed and 23 were categorized as economically distressed at the fiscal year end prior to Chapter 11 filing. The imbalance between group sizes is due to a greater number of financially distressed firms reorganizing in Chapter 11 and a greater number of economically distressed firms liquidating or being acquired in Chapter 11.

In Table 8, both groups of firms reduce total liabilities to a similar degree in Chapter 11 (52% reduction for financially distressed firms and 46% reduction for economically distressed firms). The change in total assets that these two groups of firms undergo in Chapter 11 is, however, significantly different. Financially distressed firms reduce total assets by only 7% over the Chapter 11 period, whereas economically distressed firms reduce total assets by 50%. This disparity in asset reduction results in the change in leverage (total liabilities divided by total assets) over the Chapter 11 period being significantly different for the financially and economically distressed groups. Specifically, financially distressed firms reduce leverage by 51% from pre-bankruptcy to

post-emergence, but economically distress firms reduce leverage by only 4%, a number that is not statistically different from zero.

5.3 Multivariate results - Debt restructuring

To examine the restructuring of liabilities in more detail, we employ a specification similar to Gilson (1997) and consider whether financial and economic distress, industry distress, low GDP growth periods, and firm unionization explain the percent decrease in total debt in Chapter 11. With respect to labor unions, companies have been shown to issue debt at strategic times both to reduce funds available to labor unions (Bronars and Deere, 1991) and to influence collective bargaining negotiations (Matsa, 2007). Bronars and Deere (1991) argue that leverage reduces the power of unions and makes it easier to extract concessions. We therefore expect less debt reduction for unionized firms if companies and their creditors are reluctant to free up additional cash flow that could later become the target of union negotiations.

The dependent variable in specifications one and two of Table 9 is the percent decrease in total liabilities from year -1 to year +1, which is similar to the specification in Gilson (1997). The explanatory variable asset sales-to-PPE is positive and significant at the 1% level in each specification, which is also consistent with Gilson's (1997) result. It appears that firms in Chapter 11 use the proceeds of asset sales to reduce debt. Our first specification proxies for financial and economic distress by the continuous variables of leverage and industry-adjusted EBITDA-to-assets. The R-squared of this regression is over 40% and the pre-filing leverage variable is positive and significant at the 1% level. Thus, not surprisingly, firms with higher leverage have greater percentage decreases in debt in Chapter 11. The coefficient on industry-adjusted EBITDA-to-assets is negative and insignificant.

Specification two proxies for financial and economic distress using the combined rank measure. This second specification has less explanatory power than does the first and the coefficient on combined rank is insignificant. Consistent with the univariate

results, the classification of financial and economic distress is not relevant for explaining the extent of debt restructuring in Chapter 11.

In both specifications one and two, the indicator variable for firms with greater than 20% unionization is negative and significant.[20] Unionized firms have a smaller percent reduction in total liabilities over the Chapter 11 period, which is consistent with firms and creditors wanting to restrict the cash flow that might be targeted in union negotiations. Finally, specification two provides weak evidence that firms in distressed industries experience greater percentage reductions in debt. The indicator variable for industry distress, however, is insignificant in the first specification that produces a considerably better fit.

Finally, the last specification in Table 9 uses the percentage change in leverage as the dependent variable. In contrast to the results that examine the change in debt, the positive and significant coefficient on combined rank indicates that financially distressed firms exhibit a reduction in leverage upon emergence from Chapter 11. Recall that this result arises from the fact that economically distressed firms reduce both debt and assets to similar degrees in Chapter 11, resulting in no net change in leverage, while financially distressed firms successfully reduce their debt levels while preserving their assets.

6. Post-emergence performance and bankruptcy recidivism

Our final analysis examines post-Chapter 11 operating performance and bankruptcy recidivism. Hotchkiss (1995) finds that post-emergence operating income is systematically below firm projections and that the shortfall is greater for firms that retain pre-bankruptcy managers. Denis and Rodgers (2007) find that post-emergence performance is positively related to pre-Chapter 11 performance, and Alderson and Betker (1999) find that reorganizing firms exhibit substandard accounting profitability.

[20] Results are similar using 10% or 40% unionization indicator variables.

6.1 Operating performance

Panel A of Table 10 shows the post-emergence, year +1 and year +2, operating performance of firms that emerge from Chapter 11. At year +1, the average firm has an operating margin equal to 8.3% of total assets (median of 9.5%) and an industry-adjusted EBITDA-to-total assets of -1.9% (median of -1.9%). The unadjusted operating margin is significantly greater than zero, whereas the industry-adjusted operating margin is significantly lower than zero. By year +2, the average operating margin is 7.9% (median of 10.7%), and the average industry-adjusted operating margin is -1.6% (median of -0.7%). The unadjusted operating margin remains statistically greater than zero for the 121 firms for which year +2 data is available. The industry-adjusted operating margin, while still negative, is no longer statistically distinguishable from zero.

Panel B of Table 10 compares the median post-emergence performance of financially and economically distressed firms. On both an unadjusted and an industry-adjusted basis, and across year +1 and year +2, financially distressed firms exhibit significantly higher post-emergence operating margins than do economically distressed firms. At both year +1 and year +2, financially distressed firms have *positive* industry-adjusted operating margins (1.1% and 2.2%, respectively), indicating that their operating margins are typically above the median firms in their respective industries. Furthermore, these median industry-adjusted operating margins for financially distressed firms are significantly greater than zero based on Wilcoxon signed rank tests (unreported). Economically distressed firms that do emerge from Chapter 11 continue to exhibit operating performance that is on average significantly below their industry medians. The results in Table 10 provide a degree of confidence that the ex ante sorting measures used in our analyses are valid insofar as they also predict post-emergence performance. Yet, to the extent that some economically distressed firms reorganize and emerge from Chapter 11 only to continue experiencing losses and value destruction, this suggests that sorting in Chapter 11 may be imperfect.

6.2 Recidivism

To provide some additional evidence on firm sorting in Chapter 11, Panel A of Table 11 reports bankruptcy recidivism rates by financial and economic distress classifications. Economically distressed firms experience a significantly greater rate of bankruptcy recidivism than do financially distressed firms at both two years and three years after emerging from Chapter 11. For example, at the three-year horizon, 30% of economically distressed firms re-file for bankruptcy compared to only 10% of financially distressed firms, and this difference is significant at the 5% level.

The summary results in Panel B of Table 10 provide a qualitative understanding of firm survival and recidivism in the three years after emerging from Chapter 11. Similar to the results in Panel A, economically distressed firms appear to re-file for bankruptcy at somewhat higher rates than do financially distressed firms.[21] Of note is that approximately 13% of emerging firms are acquired in the three years post-emergence, and approximately 16% of the emerging firms re-file for bankruptcy in the three years post-emergence. This magnitude of bankruptcy recidivism is similar to that in Hotchkiss (1995), who finds that 18% of emerging firms re-file for bankruptcy in the five years following emergence.

Nevertheless, it is not clear that higher recidivism among economically distressed firms is suboptimal. For example, in Kahl's (2002) model of dynamic liquidation, it can be optimal to allow firms subject to greater uncertainty to emerge from Chapter 11 with high debt levels so that a subsequent bankruptcy is quickly triggered in the event of weak performance. It is possible that the firms we characterize as economically distressed are those subject to greater uncertainty regarding their future viability.

[21] We also perform a chi-square test for equality of cell proportions, and the p-value of the test is marginally significant. We do not report the results, however, due to the low frequencies in some of the cells.

7. Conclusion

We analyze outcomes, asset redeployments, and debt restructuring for a large sample of firms that file Chapter 11 bankruptcy. Our results show that economically distressed firms liquidate or are acquired more often, sell more assets, and dispose of more leases than do financially distressed firms. These results are consistent with a Chapter 11 process that broadly meets its aims of preserving going concern value of viable firms and redeploying assets of firms that are using assets unprofitably. Furthermore, the constructed combined rank measure of financial and economic distress does a considerably better job of explaining asset sales in Chapter 11 than do the continuous variables of leverage and EBITDA that appear frequently in other studies. We also show that the Chapter 11 restructuring actions of financially and economically distressed firms differ primarily across asset restructuring rather than debt restructuring, and that creditor control through DIP financing promotes asset sales by economically distressed firms. Our proxy for managers' ability to exert control over the Chapter 11 process is not significant in explaining Chapter 11 outcomes or asset redeployments. Hand-collected data specifying the sources of asset changes in Chapter 11 indicates that care should be taken to identify the specific sources of asset changes that are being measured since asset writedowns constitute a large portion of these asset changes. Finally, our analysis of lease dispositions in Chapter 11 shows that the put option inherent in lease contracts is used extensively in Chapter 11, that lease disposition constitutes a large portion of asset restructuring in Chapter 11, and that the ability to put lease contracts may mitigate the indirect costs of asset fire sales.

References

Acharya, V.V., Bharath, S.T., Srinivasan, A., 2007. Does industry-wide distress affect defaulted firms? Evidence from creditor recoveries. Journal of Financial Economics 85(3), 787-821.

Adler, B.E., Capkun, V., Weiss, L.A., 2006. Destruction of value in the new era of Chapter 11. Unpublished working paper.

Aghion, P., Hart, O., Moore, J., 1992. The economics of bankruptcy reform. Journal of Law, Economics, & Organization 8 (3), 523-546.

Alderson, M.J., Betker, B.L., 1995. Liquidation costs and capital structure. Journal of Financial Economics 39, 45-69.

Alderson, M.J., Betker, B.L., 1999. Assessing post-bankruptcy performance: An analysis of reorganized firms' cash flows. Financial Management 28 (2), 68-82.

Altman, E.I., Hotchkiss, E., 2006. Corporate financial distress and bankruptcy. Third Edition. John Wiley & Sons.

Andrade, G., Kaplan, S.N., 1998. How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed. Journal of Finance 53 (5), 1443-1493.

Asquith, P., Gertner, R., Scharfstein, D., 1994. Anatomy of financial distress: An examination of junk-bond issuers. Quarterly Journal of Economics 109 (3), 625-658.

Baird, D.G, Rasmussen, R.K., 2002. The end of bankruptcy. Stanford Law Review 55, 751-789.

Baird, D.G., Rasmussen, R.K., 2003. Chapter 11 at twilight. Stanford Law Review 56, 673-699.

Barniv, R., Agarwal, A., Leach, R., 2002. Predicting bankruptcy resolution. Journal of Business Finance & Accounting 29 (3&4), 497-520.

Bebchuk, L.A., 1998. Chapter 11. The New Palgrave Dictionary of Economics and the Law, Vol. 3, 219-224.

Benmelech, E., Bergman, N.K., 2007. Liquidation values and the credibility of financial contract renegotiation: Evidence from U.S. airlines. Unpublished working paper.

Bharath, S.T., Panchapagesan, V., Werner, I.M., 2008. The changing nature of Chapter 11. Unpublished working paper.

Bradley, M., Rosenzweig, M., 1992. The untenable case for Chapter 11. Yale Journal of Law 101 (5), 1043-1095.

Bronars, S.G., Deere, D.R., 1991. The threat of unionization, the use of debt, and the preservation of shareholder wealth. Quarterly Journal of Economics 106 (1), 231-254.

Dahiya, S., John, K., Puri, M., Ramirez, G., 2003. Debtor-in-possession financing and bankruptcy resolution: Empirical evidence. Journal of Financial Economics 69, 259-280.

Denis, D.J., Denis, D.K., 1995. Causes of financial distress following leveraged recapitalizations. Journal of Financial Economics 37, 129-157.

Denis, D.K., Rodgers, K.J., 2007. Chapter 11: Duration, outcome, and post-reorganization performance. Journal of Financial and Quantitative Analysis 42 (1), 101-118.

Frost, C.W., 1992. Running the asylum: Governance problems in bankruptcy reorganizations. Arizona Law Review 34, 89-140.

Gertner, R., Scharfstein, D., 1991. A theory of workouts and the effects of reorganization law. Journal of Finance 46 (4), 1189-1222.

Gilson, S.C., John, K., Lang, L.H.P., 1990. Troubled Debt Restructurings: An Empirical Analysis of Private Reorganization of Firms in Default. Journal of Financial Economics 27(2), 315-353.

Gilson, S.C., 1997. Transactions costs and capital structure: Evidence from financially distressed firms. Journal of Finance 52 (1), 161-196.

Gilson, S.C., Hotchkiss, E.S., Ruback, R.S., 2000. Valuation of bankrupt firms. Review of Financial Studies 13 (1), 43-74.

Graham, J.R., Lemmon, M.L., Schallheim, J.S., 1998. Debt, leases, taxes, and the endogeneity of corporate tax status. Journal of Finance 53 (1), 131-162.

Harris, M., Raviv, A., 1990. Capital structure and the informational role of debt. Journal of Finance 45 (2), 321-349.

Hotchkiss, E.S., 1995. Postbankruptcy performance and management turnover. Journal of Finance 50 (1), 3-21.

Jensen, M.C., 1989. Active investors, LBOs, and the privatization of bankruptcy. Journal of Applied Corporate Finance, 35-44.

John, K., Lang, L.H.P., Netter, J., 1992. The voluntary restructuring of large firms in response to performance decline. Journal of Finance 47 (3), 891-917.

Kahl, M., 2002. Economic distress, financial distress, and dynamic liquidation. Journal of Finance 58 (1), 135-168.

Kalay, A., Singhal, R., Tashjian, E., 2007. Is Chapter 11 costly? Journal of Financial Economics 84, 772-796.

Krishnan, V.S., Moyer, R.C., 1994. Bankruptcy costs and the financial leasing decision. Financial Management 23 (2), 31-42.

Kruse, T.A., 2002. Asset liquidity and the determinants of asset sales by poorly performing firms. Financial Management, Winter, 107-129.

LoPucki, L.M., Whitford, W.C., 1990. Bargaining over equity's share in the bankruptcy reorganization of large, publicly held companies. University of Pennsylvania Law Review 139, 125-139.

LoPucki, L.M., Whitford, W.C., 1993. Corporate governance in the bankruptcy reorganization of large, publicly held companies. University of Pennsylvania Law Review 141(3), 669-800.

Maksimovic, V., Phillips, G., 1998. Asset efficiency and reallocation decisions of bankrupt firms. Journal of Finance 53 (5), 1495-1532.

Matsa, D.A., 2007. Capital structure as a strategic variable: Evidence from collective bargaining. Unpublished working paper.

Mooradian, R.M., 1994. The effect of bankruptcy protection on investment: Chapter 11 as a screening device. Journal of Finance 49 (4), 1403-1425.

Myers, S.C., 1977. Determinants of corporate borrowing. Journal of Financial Economics 5, 147-175

Ofek, E., 1993. Capital structure and firm response to poor performance. Journal of Financial Economics 34, 3-30.

Opler, T.C., Titman, S., 1994. Financial distress and corporate performance. Journal of Finance 49 (3), 1015-1040.

Pulvino, T.C., 1999. Effects of bankruptcy court protection on asset sales. Journal of Financial Economics 52, 151-186.

Schlingemann, F.P., Stulz, R.M., Walkling, R.A., 2002. Divestitures and the liquidity of the market for corporate assets. Journal of Financial Economics 64, 117-144.

Shleifer, A., Vishny, R.W., 1992. Liquidation values and debt capacity: A market equilibrium approach. Journal of Finance 47 (4), 1343-1366.

Skeel, D.A., 2003. Creditors' ball: The "new" new corporate governance in Chapter 11. University of Pennsylvania Law Review 152, 917-951.

Sharpe, S.A., Nguyen, H.H., 1995. Capital market imperfections and the incentive to lease. Journal of Financial Economics 39, 271-294.

White, M.J., 1994. Corporate bankruptcy as a filtering device: Chapter 11 reorganizations and out-of-court debt restructurings. Journal of Law, Economics, & Organization 10 (2), 268-295.

Zender, J.F., 1991. Optimal financial instruments. Journal of Finance 46 (5), 1645-1663.

Table 1. Descriptive statistics of sample of Chapter 11 filings

The sample consists of firms that filed for Chapter 11 bankruptcy between 1991 and 2004. Sample firms are required to have Compustat annual data in each of the two years prior to Chapter 11 filing. Firms must also have a minimum of $50 million in total assets (in 1997 dollars) in the 10K immediately prior to Chapter 11 filing. Financial firms, utilities, and Chapter 11 cases that were converted to Chapter 7 are excluded from the sample. The year of filing is the calendar year in which the firm filed for Chapter 11.

Panel A. Distribution of Chapter 11 filings by year

Year of Ch.11 filing	Number of firms	Percent
1991	35	6.9%
1992	25	5.0
1993	25	5.0
1994	14	2.8
1995	16	3.2
1996	29	5.7
1997	21	4.2
1998	24	4.8
1999	34	6.7
2000	57	11.3
2001	88	17.4
2002	74	14.7
2003	43	8.5
2004	20	4.0
Total	505	100.0%

Panel B. Chapter 11 outcomes

Chapter 11 outcomes are classified into five groups: reorganized, liquidated, acquired/merged, still-in, and undetermined. Reorganized firms successfully reorganize and emerge from Chapter 11. Liquidated firms sell or otherwise liquidate the entirety of their assets on a piecemeal basis in Chapter 11. Acquired/merged firms sell "substantially all" of their assets to a single buyer. Firms still in Chapter 11 have ongoing Chapter 11 cases as of June 2008. Undetermined outcomes are those for which we could not identify a specific outcome through news searches and SEC filings.

Outcome	Number of Firms	Percent
Reorganized	276	54.7%
Liquidated	119	23.6
Acquired/Merged	77	15.2
Still-in Chapter 11	7	1.4
Undetermined	26	5.1
Total	505	100.0%

Table 2. Summary statistics of sample firms

Panel A. Sample firm attributes prior to Chapter 11 filing

All firm-level pre-filing variables are measured at the fiscal year end prior to the Chapter 11 filing ("year -1"), which is required to be within twelve months of the Chapter 11 filing. The present value of operating leases is the amount of the minimum operating lease commitments for the subsequent five years, measured at year -1, and discounted back to present value using a 10% discount rate. An industry is considered distressed if the stock return of the median firm in the industry is less than -30% in the 12 months immediately prior to the sample firm's Chapter 11 filing. Low GDP quartile years consist of the years that are in the lowest quartile of GDP growth over our sample period. Unionization ≥ 20% identifies sample firms whose unionization rate equals or exceeds 20%.

Variable	N	Mean	Median
Total assets (in millions)	505	$955	$257
Total liabilities-to-total assets	505	1.10	0.96
Present value of operating leases-to-PPE plus PV of operating leases	478	0.29	0.24
R&D to total assets	505	0.01	0.00
Proportion of firms in a distressed industry	501	0.22	
Proportion of firms filing bankruptcy in "Low GDP Quartile" years	505	0.39	
Proportion of firms with ≥ 20% unionization	505	0.24	

Panel B. Sample firm operating performance and industry stock return performance prior to Chapter 11

Pre-filing variables are measured at the fiscal year end prior to the Chapter 11 filing, which is required to be within twelve months of the Chapter 11 filing. EBITDA is earnings before interest, taxes, depreciation, and amortization and is scaled by total assets. Industry adjustments are calculated by subtracting the industry median value, where the industry is defined at the 4-digit SIC level provided that it contains five or more firms. Otherwise, the industry is defined at the 3-digit or 2-digit SIC level based on the requirement of a minimum of five firms in the industry. The industry median stock return is the 12-month return to the median firm in the sample firm's industry. The 12-month period corresponds to the 12 full months immediately preceding the sample firm's Chapter 11 filing. The industry is defined at the 4-digit SIC level provided that it contains five or more firms. Otherwise, the industry is defined at the 3-digit or 2-digit SIC level based on the requirement of a minimum of five firms in the industry. The t-tests and Wilcoxon signed rank tests evaluate mean and median differences from zero. "*", "**", and "***" signify differences from zero at the 10%, 5%, and 1% levels, respectively.

Variable	N	Mean	Median	t-statistic	z-statistic
EBITDA-to-assets	505	-0.010	0.030	-1.28	2.84***
Industry-adjusted EBITDA-to-assets	505	-0.090	-0.071	-11.47***	-12.76***
Industry median stock return in the 12 months prior to bankruptcy filing	501	-4.5%	-5.1%	-2.96***	-3.52***

Table 3. Summary statistics and outcome comparison for firms classified as financially distressed and economically distressed

Panel A divides firms into financial distress and economic distress groupings based on the "combined rank" variable and considering the highest six groups (approximately the top quartile) as primarily financially distressed and the bottom six groups (approximately the bottom quartile) as primarily economically distressed. Combined rank is constructed by 1) averaging the firm's year -2 and year -1 industry-adjusted EBITDA-to-assets and ranking this into deciles among all Chapter 11 sample firms, 2) averaging the firm's year -2 and year -1 leverage and ranking this into deciles among all Chapter 11 sample firms, and 3) summing these two decile rankings. Panel A reports the median values for each pre-Chapter 11 variable, where all firm-level pre-filing variables are measured at the fiscal year end prior to the Chapter 11 filing ("year -1"), which is required to be within twelve months of the Chapter 11 filing. Variable definitions are as described in Table 2, Panels A and B. The z-statistic is for the difference between the financial and economic distress group medians using the Wilcoxon rank sum test. "*", "**", and "***" signify differences at the 10%, 5%, and 1% levels.

Panel A: Summary statistics (medians) for financially distressed and economically distressed firms based on combined rank classification

	Fin Distress	Econ Distress	z-statistic
Number of firms	104	116	
Total assets	$412	$146	4.97***
Total liabilities-to-total assets	1.40	0.72	12.14***
Present value of operating leases-to-PPE plus operating leases	0.20	0.35	-3.64***
Proportion of firms in distressed industry	0.19	0.23	-0.69
Proportion of firms filing in a low GDP year	0.40	0.43	-0.41
Proportion of firms with ≥ 20% unionization	0.27	0.14	2.43**
EBITDA-to-total assets	0.098	-0.062	10.47***
Industry-adjusted EBITDA-to-total assets	0.032	-0.171	11.93***
Proportion of firms that reorganize and emerge from Ch.11	0.79	0.37	5.99***

Panel B: Summary statistics (medians) for financially distressed and economically distressed firms based on the categorical classification

Panel B presents median pre-Chapter 11 ("year -1") summary statistics for firms facing primarily financial distress and those facing primarily economic distress based on alternative "categorical" proxies for financial distress and economic distress. The categories are determined by initially sorting firms into above and below median industry-adjusted EBITDA-to-total assets averaged over years -2 and -1 relative to Chapter 11 filing. Within each of the two operating performance groups, firms are then separated into above and below median leverage, again averaged over years -2 and -1. The high EBITDA, high leverage group is categorized as being in financial distress, and the low EBITDA, low leverage group is categorized as being in economic distress. Firms in neither group (unreported in this table) are considered to be experiencing a combination of financial and economic distress. Variable definitions are as described in Table 2, Panels A and B. The z-statistic is for the difference between the financial and economic distress group medians using the Wilcoxon rank sum test. "*", "**", and "***" signify differences at the 10%, 5%, and 1% levels, respectively.

	Fin Distress	Econ Distress	z-statistic
Number of firms	126	126	
Total assets	$379	$187	3.84***
Total liabilities-to-total assets	1.28	0.74	13.50***
Present value of operating leases-to-PPE plus operating leases	0.21	0.32	-3.01***
Proportion of firms in distressed industry	0.17	0.25	-1.59
Proportion of firms filing in a low GDP year	0.36	0.43	-1.16
Proportion of firms with ≥ 20% unionization	0.30	0.14	3.02***
EBITDA-to-total assets	0.092	-0.035	11.21***
Industry-adjusted EBITDA-to-total assets	-0.006	-0.146	12.79***
Proportion of firms that reorganize and emerge	0.77	0.44	5.14***

Table 4. Logistic regressions for the probability of reorganization in Chapter 11

The dependent variable in first two columns equals zero if the outcome of Chapter 11 is either liquidation or acquisition and equals one if the outcome is reorganization. The third column shows the marginal effects on the probability of reorganization for a one standard deviation increase in the independent variable while holding all other variables at their mean values for the second regression. For indicator variables, the marginal effect is for a change from zero to one. Industry-adjusted EBITDA-to-assets is the sample firm's year -1 EBITDA-to-total assets minus the industry median EBITDA-to-total assets. The industry is defined at the 4-digit SIC level provided that it contains a minimum of five firms. Otherwise, the industry is defined at the 3-digit or 2-digit SIC level. Leverage is measured as total liabilities-to-total assets at year -1. Combined rank is constructed by 1) averaging the firm's year -2 and year -1 industry-adjusted EBITDA-to-assets and ranking this into deciles among all Chapter 11 sample firms, 2) averaging the firm's year -2 and year -1 leverage and ranking this into deciles among all Chapter 11 sample firms, and 3) summing these two decile rankings. The log of total assets is the natural logarithm of the sample firm's total assets at year -1. Industry distress is an indicator variable that equals one if stock return of the median firm in the industry is less than -30% in the 12 months immediately prior to Chapter 11 filing. Low GDP quartile equals one if the firm filed for Chapter 11 in any of the years that comprise the lowest quartile of GDP growth over our sample period. Unionization ≥ 20% is an indicator variable that equals one if the sample firm's unionization rate equals or exceeds 20%. The ratio of R&D to total assets is taken from Compustat. Industry dummy variables are based on Fama and French's specification of 12 industry groups. The z-statistics for individual coefficients are reported in parentheses. "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Logistic regression

Variable	Model 1 Liquid/M&A=0, Reorganize=1	Model 2 Liquid/M&A=0, Reorganize=1	Marginal Effects
Intercept	-2.199 (-3.15)***	-2.565 (-4.08)**	
Pre-filing industry-adj. EBITDA-to-TA	2.651 (3.50)***		
Pre-filing leverage (TL / TA)	0.963 (4.27)***		
Combined rank		0.149 (5.54)***	0.154
Log of total assets	0.297 (3.10)***	0.248 (2.72)***	0.074
Industry distress	-0.318 (-1.18)	-0.311 (-1.17)	-0.076
Low GDP quartile	-0.357 (-1.59)	-0.321 (-1.44)	-0.078
Unionization ≥ 20pct	0.310 (1.13)	0.316 (1.15)	0.075
R&D-to-assets	3.077 (1.11)	2.751 (1.01)	0.027
Industry dummy variables	Yes	Yes	Yes
Observations	469	469	469
Prob > Chi-squared	< 0.001	< 0.001	
Pseudo R-squared	0.12	0.12	

Table 5. Summary statistics – Asset changes in Chapter 11

The panels below provide summary statistics on the changes in assets over the Chapter 11 period. The Chapter 11 period starts at the 10K filing immediately preceding Chapter 11 filing (year -1) and goes to the 10K filing immediately following emergence from Chapter 11 (year +1). In Panel A, the decreases in net PPE is calculated as the year -1 amount minus year +1 amount divided by the year -1 amount. Cash asset sales are the market value of the sale of PPE over the Chapter 11 period, and this is scaled by the sum of year +1 PPE plus cash asset sales. The decrease in the present value of operating lease commitments is calculated as the present value of year -1 lease commitments minus the year +1 present value of lease commitments, and is scaled by the sum of year -1 PPE plus the year -1 present value of lease commitments. Book asset sales plus lease decreases is calculated as cash value of the fixed asset sales plus the loss (minus the gain) on the fixed asset sale plus the decrease in the present value of lease commitments from year -1 to year +1, and this is scaled by the sum of year -1 PPE plus the year -1 present value of lease commitments.

Panel A. Asset changes over the Chapter 11 period (year -1 to year +1)

Variable	N	Mean	Median
Decrease in net PPE and lease commitments (as a proportion of year -1 net PPE plus lease commitments)	143	0.33	0.32
Cash asset sales-to-year +1 PPE plus asset sales	144	0.12	0.04
Decrease in PV of lease commitments-to-year -1 PPE plus lease commitments	143	0.09	0.04
Book asset sales plus lease decrease-to-year -1 PPE plus lease commitments	138	0.15	0.09

Panel B. Sources of PPE decreases over the Chapter 11 period

Each variable is measured over the Chapter 11 period (year -1 to year +1) and is expressed as a percent of year -1 PPE plus the year -1 present value of operating lease commitments. Depreciation and other primarily consists of depreciation expense over the Chapter 11 period, but in occasional instances includes miscellaneous accounting changes and revisions related to PPE, and other minor changes to PPE. The hand-collected data comes from 10K filings for sample firms that emerge from Chapter 11 in 1996 or after (i.e., the post-SFAS 121 period). SFAS 121, introduced in late 1995, standardized reporting requirements for asset impairments. Impairments represent writedowns to the book value of assets and are separated below based on whether the assets are still in use. Book asset sales are the market value of the sale of PPE plus the loss (minus the gain) on the sale. The decrease in the present value of operating lease commitments is the present value of year -1 lease commitments minus the year +1 present value of lease commitments.

Source of PPE decrease over Chapter 11	N	Mean	Median
Depreciation (and other) minus capital expenditure	101	2.0%	4.8%
Impairments on assets in use	101	11.2	4.0
Impairments on closures	101	4.1	0.2
Asset sales (book value)	101	6.8	1.9
Decrease in the PV of operating lease commitments	101	6.0	3.1
Total decrease in PPE and operating lease commitments	101	30.1%	27.5%

Panel C. Rejection and renegotiation of leases

Lease rejection and renegotiation during Chapter 11 is determined from statements in 10K filings and from news searches on Factiva and LexisNexis. Lease rejection and renegotiation only considers the period while the firm is in Chapter 11; i.e., from the date of filing to the date of emergence.

	Number	Total	Percent
Firms rejecting leases	81	149	54.4%
Firms either rejecting or renegotiating leases	86	149	57.7
Firms renegotiating leases	39	149	26.2
Firms both rejecting and renegotiating leases	34	149	22.8

Table 6. OLS Regression analysis of asset sales in Chapter 11

The dependent variable in models 1 through 3 is the cash value of PPE sales over the Chapter 11 period divided by the sum of post-emergence (year +1) PPE and the cash value of the sale of PPE. The dependent variable in model 4 is the book value of PPE sales plus the decrease in the present value of operating lease commitments over the Chapter 11 period divided by pre-Chapter 11 (year -1) PPE plus the present value of operating lease commitments at year -1. DIP financing is an indicator variable that equals one if the sample firm obtained debtor-in-possession financing during Chapter 11. The remaining independent variable definitions match those in Table 4. The t-statistics are reported in parentheses. "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1 Asset Sales	Model 2 Asset Sales	Model 3 Asset Sales	Model 4 Asset Sales Plus Lease Decrease
Intercept	0.151 (1.33)	0.252 (2.50)**	0.156 (1.46)	0.397 (3.87)***
Pre-filing industry-adj. EBITDA-to-TA	-0.219 (-1.94)*			
Pre-filing leverage (TL / TA)	-0.037 (-1.31)			
Combined Rank		-0.015 (-3.87)***	-0.008 (-1.58)	-0.018 (-3.89)***
Log of total assets	0.014 (0.90)	0.019 (1.33)	0.017 (1.19)	0.014 (0.33)
Industry distress	0.039 (0.89)	0.028 (0.68)	0.022 (0.53)	0.017 (0.43)
Low GDP quartile	-0.046 (-1.30)	-0.060 (-1.77)*	-0.041 (-1.19)	-0.095 (-2.94)***
Unionization ≥ 20pct	-0.016 (-0.40)	-0.011 (-0.29)	0.004 (0.10)	-0.050 (-1.36)
R&D-to-Assets	0.766 (1.06)	0.498 (0.72)	0.408 (0.60)	1.254 (1.98)**
DIP financing	0.064 (1.73)*	0.062 (1.76)*	0.251 (2.84)***	0.027 (0.032)
DIP * Combined Rank			-0.019 (2.32)**	0.003 (0.36)
Industry dummy variables	Yes	Yes	Yes	Yes
Observations	143	143	143	141
p-value of F-statistic	0.038	0.002	0.001	<0.001
R-squared	0.19	0.24	0.27	0.33
Adjusted R-squared	0.09	0.15	0.18	0.24

Table 7. Regression analysis of the choice between disposing of leases and selling assets

The dependent variable in each OLS specification is the decrease in operating leases as a percent of the combined PPE sales plus operating lease decrease. This is calculated as the decrease in the present value of operating leases from year -1 to year +1 divided by the sum of the cash value of asset sales plus the decrease in the present value of operating leases from year -1 to year +1. Firms that neither decrease lease commitments nor engage in asset sales are excluded from the analysis. Firms that only decrease lease commitments and have no asset sales are given a value of "1," and firms that engage in asset sales but do not decrease lease commitments are given a value of "0." The analysis only considers firms that have a combined asset sale plus decrease in the present value of lease commitments of greater than 5% of PPE. The log of total assets is the natural logarithm of the sample firm's total assets at year -1. The variable Year -1 lease-to-PPE is the present value of operating leases at year -1 divided by the sum of year -1 net PPE plus the year -1 present value of operating lease commitments. All other variables are as described in Table 4. Models 2 and 3 add industry dummy variables based on Fama and French's specification of 12 industry groups. Model 3 excludes observations for which the decrease in lease commitments over Chapter 11 is greater than 50% of total lease commitments. This restriction is to ensure that the results are not driven by firms that are constrained by their lease reduction boundary. The t-statistics are reported in parentheses. "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1	Model 2	Model 3
Intercept	0.316 (2.04)**	0.413 (2.22)**	0.093 (0.37)
Combined rank	0.008 (1.22)	0.009 (1.22)	0.020 (2.06)**
Log of total assets	-0.015 (-0.63)	-0.016 (-0.64)	-0.025 (-0.84)
Industry distress	0.120 (1.79)*	0.118 (1.65)*	0.153 (1.72)*
Low GDP quartile	0.139 (2.52)**	0.131 (2.27)**	0.227 (3.32)***
Unionization ≥ 20pct	-0.087 (-1.43)	-0.088 (-1.17)	-0.084 (-0.98)
R&D-to-assets	0.488 (0.62)	-0.249 (-0.85)	-0.092 (-0.06)
DIP financing	-0.038 (-0.69)	-0.052 (-0.85)	-0.005 (-0.06)
Year -1 lease-to-PPE	0.989 (7.69)***	0.973 (6.57)***	0.918 (4.53)***
Industry dummy variables	No	Yes	Yes
Observations	98	98	69
p-value of F-statistic	<0.001	<0.001	<0.001
R-squared	0.49	0.53	0.58
Adjusted R-squared	0.44	0.43	0.44

Table 8. Debt and leverage changes for financially distressed and economically distressed firms

Firms are divided into financial distress and economic distress groupings based on the combined rank variable and considering the highest six groups (approximately the top quartile) as primarily financially distressed and the bottom six groups (approximately the bottom quartile) as primarily economically distressed. Combined rank is constructed by 1) averaging the firm's year -2 and year -1 industry-adjusted EBITDA-to-assets and ranking this into deciles among all Chapter 11 sample firms, 2) averaging the firm's year -2 and year -1 leverage and ranking this into deciles among all Chapter 11 sample firms, and 3) summing these two decile rankings. We report the median value for each variable within the financially distressed and economically distressed groups, respectively. The z-statistic is for the difference between the medians of the financial distress and economic distress groups using the Wilcoxon rank sum test. "*", "**", and "***" signify differences at the 10%, 5%, and 1% levels, respectively.

Variable	Fin Distress	Econ Distress	z-statistic
Number of firms	39	23	
Decrease in total liabilities (as a proportion of year -1 TL)	0.52	0.46	0.28
Decrease in total assets (as a proportion of year -1 TA)	0.07	0.50	-5.40***
Decrease in leverage (as a proportion of year -1 leverage)	0.51	0.04	4.47***

Table 9. OLS Regression analysis of debt and leverage reduction in Chapter 11

The dependent variable in specifications one and two is the percent *decrease* in total liabilities over the Chapter 11 period. The dependent variable in specification three is the percent *decrease* in leverage over the Chapter 11 period. These dependent variables are calculated as year -1 total liabilities (leverage) minus year +1 total liabilities (leverage) divided by year -1 total liabilities (leverage). DIP financing is an indicator variable that equals one if the sample firm obtained debtor-in-possession financing during Chapter 11. The variable asset sale-to-PPE is the cash value of PPE sales over Chapter 11 divided by the sum of year +1 PPE and the cash value of PPE sales. The remaining independent variable definitions match those in Table 4. The t-statistics are reported in parentheses. "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1 % Change in Liabilities	Model 2 % Change in Liabilities	Model 3 % Change in Leverage
Intercept	0.280 (1.77)*	0.479 (3.10)***	0.105 (0.57)
Industry-adj. EBITDA-to-assets	-0.096 (-0.61)		
Leverage (total liabilities / TA)	0.151 (3.83)***		
Combined Rank		0.009 (1.47)	0.045 (5.91)***
Log of total assets	0.015 (0.70)	-0.013 (-0.63)	-0.067 (-2.58)**
Industry distress	0.083 (1.38)	0.118 (1.91)*	0.118 (1.59)
Low GDP quartile	-0.008 (-0.16)	0.018 (0.36)	-0.016 (-0.26)
Unionization ≥ 20pct	-0.131 (-2.41)**	-0.112 (-1.97)**	0.003 (0.04)
R&D-to-assets	-0.004 (0.01)	0.765 (0.74)	1.875 (1.51)
DIP financing	0.065 (1.25)	0.089 (1.68)*	0.118 (1.84)*
Asset sale-to-PPE	0.461 (3.72)***	0.473 (3.55)***	0.150 (0.93)
Industry dummy variables	Yes	Yes	Yes
Observations	143	143	143
p-value of F-statistic	<0.001	<0.001	<0.001
R-squared	0.41	0.35	0.39
Adjusted R-squared	0.32	0.26	0.30

Table 10. Summary statistics for post-emergence operating performance

Panel A. All reorganizing firms

Year +1 variables are measured at the fiscal year end immediately following the Chapter 11 emergence date. Year +2 variables are measured at the second fiscal year end following the Chapter 11 emergence date. Industry-adjustments are calculated by subtracting the industry median value based on the 4-digit SIC code if there are five or more firms in the industry. Otherwise, the median EBITDA-to-assets value of the 3-digit SIC code or 2-digit SIC code is subtracted from the sample firm's EBITDA-to-assets based on the requirement of a minimum of five firms in the industry. The t-tests and Wilcoxon signed rank tests are mean and median differences from zero. "*", "**", and "***" signify differences from zero at the 10%, 5%, and 1% levels, respectively.

Variable	N	Mean	Median	t-statistic	z-statistic
Year +1 EBITDA-to-assets	149	0.083	0.095	7.73***	7.97***
Year +1 Industry-adjusted EBITDA-to-assets	149	-0.019	-0.019	-1.71*	-2.47**
Year +2 EBITDA-to-assets	121	0.079	0.107	4.07***	7.29***
Year +2 Industry-adjusted EBITDA-to-assets	121	-0.016	-0.007	-0.83	-0.52

Panel B. Post-emergence performance for financially distressed and economically distressed firms

Panel B compares median post-emergence operating performance for firms facing primarily financial distress and those facing primarily economic distress based on the combined rank variable and considering the highest six groups (approximately the top quartile) as primarily financially distressed and the bottom six groups as primarily economically distressed. Combined rank is constructed by 1) averaging the firm's year -2 and year -1 industry-adjusted EBITDA-to-assets and ranking this into deciles among all Chapter 11 sample firms, 2) averaging the firm's year -2 and year -1 leverage and ranking this into deciles among all Chapter 11 sample firms, and 3) summing these two decile rankings. We report the median value for each variable within the financially distressed and economically distressed groups, respectively. The z-statistic is for the difference between the medians of the financial distress and economic distress groups using the Wilcoxon Rank Sum test. "*", "**", and "***" signify differences at the 10%, 5%, and 1% levels, respectively.

	Fin Distress	Econ Distress	z-statistic
Number of firms year +1	39	23	
Year +1 EBITDA-to-assets	0.103	0.007	3.49***
Year +1 Industry-adjusted EBITDA-to-assets	0.011	-0.125	5.09***
Number of firms year +2	37	17	
Year +2 EBITDA-to-assets	0.110	0.052	2.54**
Year +2 Industry-adjusted EBITDA-to-assets	0.022	-0.065	3.84***

Table 11. Recidivism and firm survival

Panel A. Bankruptcy recidivism

Panel A compares the rates of bankruptcy recidivism between firms classified as financially distress and those classified as economically distressed at two years and three years after emerging from Chapter 11. Financial distress and economic distress groupings are based on the combined rank variable. The highest six groups (approximately the top quartile) are classified as primarily financially distressed and the bottom six groups are classified as primarily economically distressed. Combined rank is constructed by 1) averaging the firm's year -2 and year -1 industry-adjusted EBITDA-to-assets and ranking this into deciles among all Chapter 11 sample firms, 2) averaging the firm's year -2 and year -1 leverage and ranking this into deciles among all Chapter 11 sample firms, and 3) summing these two decile rankings. The z-statistic is for the equality of proportions for the financial distress and economic distress groups. "*", "**", and "***" signify differences between group proportions at the 10%, 5%, and 1% levels, respectively.

	Fin Distress	Econ Distress	z-statistic
Number of firms	39	23	
Proportion of firms that re-file for bankruptcy within 2 years	0.051	0.217	-2.00**
Proportion of firms that re-file for bankruptcy within 3 years	0.103	0.304	-2.01**

Panel B. Fate of firms three years after emerging from Chapter 11

Panel B shows summary statistics on whether firms survive, are acquired, or re-file for bankruptcy in the three years after emerging from Chapter 11. Financial distress and economic distress groupings are as described in Panel A above, and firms with a combined rank score in between these two groupings are classified as having a "mix" of financial and economic distress. The percentages in parentheses represent the percent of firms within each column grouping that survive, are acquired, or re-file for bankruptcy, respectively.

	Fin Distress	Mix	Econ Distress	Total
Survive	32 (82.0%)	57 (65.5%)	13 (56.6%)	102
Acquired	3 (7.7%)	18 (20.7%)	3 (13.0%)	24
Re-file for bankruptcy	4 (10.3%)	12 (13.8%)	7 (30.4%)	23
Total	39	87	23	149