

Destruction of Value in the New Era of Chapter 11

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Abstract

The Bankruptcy Reform Act of 1978 placed corporate managers in control of corporate debtors in bankruptcy and of the bankruptcy process. Although the act remains law, between 2000 and 2001 it became common for creditors to control financially distressed firms and the bankruptcy process. This study tests whether the change from manager to creditor control created or exacerbated managerial incentive to delay filing for bankruptcy or gave secured creditors an opportunity to delay such filing. We observe a significant and prolonged deterioration in the financial condition of firms that filed for bankruptcy after 2001 as compared to firms that filed before 2000. We also observe patterns of operating losses and liquidations that suggest adverse economic consequences from such delay.

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Corporate bankruptcy frequently leads to the dismissal of a debtor's managers and the elimination of its equity interest. To protect their own jobs and to extend the option held by the shareholders who appoint them managers may delay a firm's bankruptcy filing. The greater the likelihood of a harsh landing for managers and shareholders, the greater the incentive to delay. Chapter 11 bankruptcy practice effectively cushioned managers and shareholders from bankruptcy's consequences. Pre-bankruptcy managers typically retained control of the debtor and the reorganization process at least for a time after the bankruptcy case was filed. These managers were often able to use such control to obtain new, management-friendly finance. At the end of the bankruptcy process, the debtor often avoided liquidation and the pre-bankruptcy shareholders frequently retained an interest in the reorganized debtor even though creditors were not paid in full. Many managers ultimately lost their jobs, nonetheless, and the return to equity was small. Still, the results were less severe for managers and shareholders than an immediate turnover of the firm to creditors, or forced liquidation, at the outset of the case. Between 2000 and 2001, this dynamic changed. Creditors, and particularly secured creditors, began to take a more active role in the management of financially distressed debtors, both before and after a debtor filed a Chapter 11 bankruptcy petition. The new role of these creditors and management's reaction are the subject of this paper.

The recent changes in finance and bankruptcy practice are not the result of an amendment to the Bankruptcy Code and have no single cause. Rather they represent a holistic change prompted by an alteration in investor approach, perhaps facilitated by a change in the Uniform Commercial Code ("UCC"). In a development that became prominent in or about the year 2000, dominant lenders now routinely write control provisions into their debt instruments. Once triggered by specified events of financial distress, these provisions shift control over a debtor's financial decisions from equity-appointed management to the creditor. A reinforcement of this development was the widespread adoption in 2001 of UCC §9-104, which newly permits a security interest in bank accounts. This provision allows a dominant creditor to insist on a broad security interest and thereby eliminate a financially distressed debtor's free cash as the debtor declines toward bankruptcy. Consequently, in the period after 2001 more than in the period prior to 2000, a corporate debtor enters bankruptcy without discretion over

its operating capital and with a dominant creditor as the sole source of such capital. Even though a debtor's managers formally retain control of the debtor, as a practical matter, a creditor who controls liquidity is in command of the debtor and the bankruptcy process.

There has been a transformation as well in judicial attitude. Between 2000 and 2001 it became common for courts to approve creditor-control terms in Debtor-in-Possession ("DIP") financing. Moreover, in the post 2001 period, courts were much more likely to approve the liquidation of debtors in bankruptcy and a zero return to pre-bankruptcy shareholders.

We offer the following two hypotheses: First, these new-era changes in finance and bankruptcy practice delay the onset of bankruptcy, where delay is measured as the degree of financial distress at the time of a debtor's bankruptcy petition. Second, the delay permits destruction in economic value, where destruction is measured by a debtor's continued operating losses at the time of bankruptcy. The first of these is a joint hypothesis. Managers may retain control of the debtor pre-bankruptcy despite the expansion of secured credit and creditor-control provisions, or secured creditors may use this expansion to gain control early. If the former, managers on their own behalf or on behalf of shareholders favor delay and the hope of a turnaround. If the latter, secured creditors favor delay rather than early bankruptcy, which may impose on the secured creditor costly collection delay or otherwise impede collection despite the relatively more favorable recent bankruptcy regime. In either case, control-party self interest externalizes the costs of delay in bankruptcy initiation and the bankruptcy process loses the opportunity to stem any economic loss. Thus, our second hypothesis.

Our data on large, publicly traded U.S. companies support our hypotheses. At the time of bankruptcy petition, debtors that filed after 2001 are in significantly worse financial condition than debtors that filed prior to 2000. Either managers are able to evade creditor-control covenants and otherwise forestall creditor control as debtors sink into financial distress, or secured creditors obtain control early and share managers' incentive for the delay of bankruptcy initiation. Our data do not support an alternative hypothesis that secured creditors both gain early control and exercise such control to insist on bankruptcy petitions earlier in the course of a debtor's financial distress. Importantly, our data also

suggest that delay is costly. Debtors that filed for bankruptcy after 2001 suffer significantly greater economy- and industry- adjusted operating losses than those that filed before 2000. Put simply, the delay of a bankruptcy petition burns value.

Our results do not appear to be a product of screening, or censored-sample effect. Specifically, if in the post-2001 period more than in the pre-2000 period, creditors gain control of debtors and rescue the economically viable debtors with out-of-bankruptcy workouts, only the weakest debtors would be left to file for bankruptcy. This hypothesis predicts a lower incidence of bankruptcy in the post 2001 period. We find no such reduction in bankruptcy rates even after we control for general economic conditions. Thus, we reject the hypothesis of a screening or censored sample effect driving our results.

Our results notwithstanding, it is possible the changes brought about in the new era of Chapter 11 (post 2001) may be, on net, economically beneficial as compared to the earlier regime (pre 2000). As noted, liquidations in the new era are far more common than in the past. Where liquidation prevents the reorganization of inviable firms, it may preserve more value than destroyed by the delay in bankruptcy petitions. Nevertheless, because the new era engenders delay in bankruptcy filing and consequent waste, a better regime would address the bankruptcy initiation problem as well as the disposition of assets in bankruptcy.

In the next section, we review the academic literature and discuss recent changes in bankruptcy practice as well as how these have reduced the incentives of managers to file for bankruptcy early; we also discuss the possible role of the dominant secured creditor in the bankruptcy initiation decision in the context of our hypotheses and summarize our results.

In Section 3 we present our data and methodology. Our main results are contained in Section 4. Section 5 discusses the relationship between our results and various assumptions we make. Finally, Section 6 provides our conclusions.

I Background

A standard, if imprecise, characterization of the relationship between corporate debt and equity is to say that equity is a call option on the firm's assets with the strike price equal to the amount of the debt. Bankruptcy accelerates the maturity of debt, and thus of equity's option. Consequently, one might expect that neither equity nor its agent, corporate management, has an incentive to bring a debtor into bankruptcy, particularly if the debtor is insolvent and equity's option thus out of the money. From these premises (and because the Bankruptcy Code §302(h) permits the debtor to quash a creditor's bankruptcy petition unless a debtor fails to pay its debts when due), Jackson (1986) reasons that one should expect firms to enter bankruptcy late even if an earlier bankruptcy filing would permit (or require) the firm to allocate its resources more efficiently, either in reinvestment of funds otherwise devoted to debt service or in liquidation of an unprofitable business venture.

Studies by Bris et al. (2004) and Donohue (2004) support the supposition that the option value of equity induces managers to delay the filing of a bankruptcy petition. To date, however, evidence of the potential harm caused by such delay has been sparse and mixed. Standard finance theory, dating from Jensen and Meckling (1976), predicts that managers of an insolvent firm will substitute unjustifiably risky projects for safer more profitable ventures, a phenomenon known as the "debt overhang problem" or as "overinvestment" (in the risky projects) and "underinvestment" (in the safer ones). In an attempt to verify this theory, researchers have examined firms to see if they alter their business practices as they face financial distress. These studies have concluded that firms do not alter their practices. See, e.g., Andrade and Kaplan (1998); Dahiya et al. (2003); Eckbo and Thorburn (2003).

These results, however, do not imply the absence of a debt overhang problem, or that a delay in bankruptcy filing does not exacerbate any such problem, because an insolvent debtor's baseline of business as usual may itself indicate over- and underinvestment. Consider, for example, the following illustration. Suppose a firm must choose among its current activity but with an increased investment in inventory, the status quo of operation despite thin inventory, and liquidation where all of its assets are sold off to other firms. Without a recapitalization, and cancellation of equity, the firm might be unable

to finance the new inventory and liquidation might directly eliminate equity's stake. Consequently, the firm might choose the status quo even if, from an efficiency perspective, the status quo is the worst of the three options. Yet a study equating debt-overhang inefficiency with a change from the status quo would (falsely) find no inefficiency.

Although upon financial distress both economically sound and economically unsound firms may continue as before, one can indirectly examine the relationship between financial and economic distress. Hotchkiss (1995) examines publicly traded firms filing for bankruptcy between 1979 and 1988 and finds these firms suffer operating losses in the years preceding (and following) bankruptcy, and these losses are greater than any general downward trend in the industry would explain. She concludes that these firms are not merely financially distressed but economically distressed as well. This conclusion seems reasonable to us. To be sure, a firm might suffer operating losses as part of an inevitably difficult process towards profitability, and undoubtedly this is true for many start-up firms. However, the 1980s experiment with highly leveraged transactions notwithstanding, we do not suppose investors will set up their firms to fail financially while they are economically sound, and so we do not believe a firm experiencing both financial distress and continuing operating losses is proceeding according to expectations. Indeed, a core function of debt in capital structure is to establish hard earnings targets that a firm must meet as a price of continuation. See, e.g., Hart and Moore (1998). As suggested by Jensen (1988) and explored by Adler (1998), while financial distress can be the result of a single or limited number of exogenous shocks, continuing losses are more likely to be the product of an endogenous defect in the firm.

More recent studies ostensibly call Hotchkiss' (1995) results into question. For example, Andrade and Kaplan (1998), cited above, examine firms that became highly leveraged in the 1980s and then filed for bankruptcy. The authors observe that these firms operated efficiently up until and through their bankruptcy filings. But Andrade and Kaplan specifically chose highly leveraged firms to isolate the effects of financial distress (defined as operating profit insufficient to cover interest costs) and those of economic distress (defined as operating losses). Thus, their paper does not offer (or intend to

offer) any insight into whether as a general matter financially distressed firms are also economically distressed. Another example is Maksimovic and Phillips (1998), which studies manufacturing firm bankruptcies for the same period studied by Hotchkiss (1995). These authors find no difference in the operating efficiency of manufacturing plants of firms that filed for bankruptcy and their financially sound counterparts. This study, however, does not attempt to examine other aspects of a firm's efficiency, including a firm's distribution or sales operation. It may well be that the difference between a viable firm and an inviable one, particularly in a competitive industry, turns on these or related factors rather than on a manufacturer's ability to churn out product. To illustrate this point, albeit at the risk of caricature, one would not be surprised if a stapler fastened paper together as well at Enron as it did at Microsoft, yet one would not conclude from this that the two firms were equally efficient. Consequently, one might conclude, as did Hotchkiss (1995), that many debtors in bankruptcy are not only financially distressed but economically distressed as well.

While the literature does address the questions of whether financially distressed firms delay bankruptcy filings and whether such firms suffer economic distress at the time of such filings, to the best of our knowledge, no prior study has examined the important question of whether bankruptcy law or its process affects the timing of bankruptcy filings. Recent changes in United States commercial law and bankruptcy practice create an opportunity to answer this question. Between 1978-when the current Bankruptcy Code was enacted-and about 2001, a bankruptcy petition did not mean the end of management control over the debtor.

Unlike the law of other countries (e.g. Canada and the U.K.), the U.S. Bankruptcy Code does not mandate that a trustee takes over the control of a firm upon the filing of a bankruptcy petition. Quite to the contrary, Code §1104 provides for the appointment of a trustee only after a hearing establishes that such an appointment is in the interest of the creditors or shareholders.

Appointment of a trustee is an unusual event in the United States. Instead it is typical for the firm to remain under the control of the debtor's managers, referred to in the Bankruptcy Code as simply the "debtor" or the "debtor-in-possession." Significantly, such control ordinarily extends beyond

management of the firm's operations but to the reorganization process itself. The Code, §1121, grants the debtor the exclusive right for 120 days to propose a plan of reorganization and an additional 60 days to have the plan approved by the affected classes of claims or interests. Moreover, as documented by Weiss and Wruck (1998), at least until recently, judges often extended the exclusive period.¹ These rules had significant consequences, not only for managers but for shareholders whose option on a debtor's assets expire in bankruptcy. Bebchuk and Chang (1992) model how management's ability to delay resolution of the bankruptcy process can lead to concessions by creditors to managers and shareholders, and there is evidence to support the validity of this model. Although Gilson (1990) reports that 57% of CEOs and 54% of directors do lose their jobs when a debtor files for bankruptcy (in a 5 year period starting with the year of bankruptcy filing), the residual who retain their jobs do much better, of course, than they would under a more draconian system, such as those of other countries, that ousts management upon the firm's bankruptcy petition.² Regarding a firm's equity owners, Weiss (1990), among others, documents concessions to shareholders who received a return even when assets were insufficient to repay creditors in full.³ Thus, until recent changes, the bankruptcy process represented a relatively "soft landing" for corporate managers and shareholders⁴.

Prompted in part by a change in the Uniform Commercial Code, as noted in the introduction, in or around the year 2000, a sea change occurred away from debtor control, and toward creditor control of the Chapter 11 bankruptcy process. As adopted by the states in the late 1990s the new UCC §9-104 permits a creditor to take a security interest in a debtor's bank accounts. Armed with this new tool, it is now common for a debtor's dominant secured creditor to secure pledges of a debtor's liquid assets as the firm moves toward insolvency or becomes more deeply insolvent. As insolvency sets in or worsens, it has become more common for debtors to trigger loan covenants that vest control

¹The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 now limits the court's discretion to grant extensions, but for reasons that should become clear below, this recent development is inapposite to the discussion of this paper.

²Gilson (1990) finds that only 17% of CEOs and 15% of board members leave a firm in the year of bankruptcy filing compared to the year before the filing.

³See also Franks and Torous (1989) and Eberhart et al. (1990).

⁴As noted above, managers will not always serve shareholder interests. Moreover, as a legal matter, a director's fiduciary duty may shift from shareholders towards creditors as a firm sinks into insolvency. See, e.g., *Credit Lyonnais Bank Nederland v. Path Communications* 1991 WL 277613 (Del. Ch. 1991), which holds that once a firm is in the vicinity of insolvency, the directors' duties are to the corporation as an entity, and thus in part to creditors, rather than to the shareholders alone. Still, managers, many themselves shareholders, may represent shareholders' interests at least while there is a possibility of a return to shareholders.

of the debtor in the secured creditor. Moreover, in 2001 almost all U.S. jurisdictions adopted the new UCC §9-104, which permits a creditor to take a security interest in a debtor's bank accounts. Armed with this new tool, it is now common for a debtor's dominant secured creditor to secure pledges of a debtor's liquid assets as the firm moves toward insolvency or becomes more deeply insolvent. Consequently, debtors now frequently enter bankruptcy with little or no liquid assets and require an immediate debtor-in-possession (or "DIP") loan to continue in business, with the pre-bankruptcy secured lender, who already has an interest in and knowledge of the debtor, in a unique position to provide such a loan. Given the strong creditor position, and a new judicial attitude that favors creditor control, secured lenders are as a practical matter increasingly able to dictate the outcome of the reorganization process. The Bankruptcy Code continues formally to grant control of the debtor and the reorganization process to the DIP, but as a condition of the DIP loan, the secured creditor demands that the debtor's managers contractually cede such control if the transfer of control has not already taken place. These demands are frequently met, often before the bankruptcy petition is even filed, and courts now enforce such bargains. Not only do managers lose control of the debtor and reorganization process, but once in control, creditor concessions to shareholders become unnecessary.⁵ Since the beginning of this decade, therefore, for many or most publicly traded firms, the bankruptcy process has represented a "hard landing" as compared to earlier times.

These changes have been documented, prominently, by other scholars. Skeel (2003) describes the new practice as "adjustments creditors have made in an effort to reassert control in bankruptcy". Baird and Rasmussen (2002, 2003) argue that DIP lenders "have come effectively to control the bankruptcy process." There is disagreement over whether the changes have been for better or worse. Baird and Rasmussen (2002, 2003), for example, conclude that creditor control has been largely beneficial, permitting creditors efficiently to screen viable firms from inviable ones without interference from managers or shareholders who have a perverse investment incentive. In contrast, Skeel (2003), as well as LoPucki (2003) and Warren and Westbrook (2003), believe that creditor control unduly permits creditor destruction of viable firms. More specifically, Warren and Westbrook (2003) decry

⁵Weiss and Capkun (2006) support this argument and find a sharp decrease in absolute priority violations in the 2000-2001 period compared to the pre-2000 period.

the shift from the DIP to what they call the SPIP (secured-party-in-possession), and lament that Chapter 11 has become “a sort of Super Article 9, invoked for the benefit of a single secured creditor,” a development they see as a problem that requires congressional response. Regardless of the academic debate over the merits of the shift in bankruptcy practice, no one disputes that such a shift has occurred.

The increased role creditors now have in Chapter 11 leaves managers and shareholders more at the mercy of creditors than was the case under prior practice. This leads to a proposition we test here. If managers are rational, all else equal, they should have been more willing to bring a firm under the supervision of the bankruptcy process, where the capital structure can be corrected and the perverse investment incentives of debt overhang eliminated, in the pre 2000 soft landing period than under current practice. Managers now may more frequently exacerbate or extend financial distress, including by incurring new debt, rather than filing for bankruptcy. This relationship should hold true even for firms that are economically distressed. As we explain more fully below, our data support this proposition. Even after controlling for economy-wide and industry-wide effects, financial ratios of firms filing for bankruptcy prior to 2000 were significantly better than the same ratios for firms filing after 2001. By contrast, a sample of non-bankrupt firms showed no change or an improvement in financial ratios post 2001. This suggests that in the more recent period managers are resisting bankruptcy longer than in the past all while the firm’s finances deteriorate.

It is also possible that the dominant secured creditor who gains control of the debtor prior to bankruptcy⁶ will delay filing for bankruptcy to satisfy its own claims in advance of the bankruptcy. A secured creditor might prefer payment to bankruptcy if its control over the bankruptcy process would be incomplete such that the secured creditor, despite its dominance, would make concessions to junior claims, as a prudential matter or by operation of the law.⁷ Our results are consistent with secured creditor delay of bankruptcy but may simply reflect that secured creditor control prior to bankruptcy is either not extensive or not fully effective. That is, one would expect the opposite of our results

⁶As described in Baird and Rasmussen (2005), the seeds of creditor control can predate financial distress, as bank loans, made in good times, often contain control-shift triggers in the event of such distress.

⁷See, e.g., *United Savings v. Timbers of Inwood Forest*, 484 U.S. 365 (1988), which denied a secured creditor the reinvestment income for the duration of the bankruptcy case on the value of the creditor’s collateral.

if secured creditors had an incentive to file early petitions, perhaps in the interest of efficiency, and routinely gained early pre-bankruptcy control of debtors in the post-2001 period. Thus, our results support the conjecture that either secured creditors share management's incentive for delay or management can delay the onset of secured creditor control. Moreover, our results are consistent with management using a relatively early bankruptcy petition in the pre 2000, debtor friendly, bankruptcy process to avoid creditor control both pre and post filing.

Our data also identify firms that suffer continual operating losses at the time of their bankruptcy filings (operating losses for at least a year prior to the bankruptcy filing). Consistent with Hotchkiss (1995), most firms in our sample filing for bankruptcy have suffered continued operating losses, and to a greater extent than industry counterparts outside of bankruptcy. For these firms, which are destroying value as they operate, worsening financial ratios reflect not only accruing unpaid interest but a reduction in asset value. We find for these firms relative deterioration in financial ratios and extended, greater operating losses at the time of filing in the later (post 2001) period compared to the earlier (pre 2000) period. Moreover, to a much greater extent in the latter period than in the former, liquidation is the resolution of insolvency in bankruptcy. We have not conducted a formal analysis of continuation or liquidation decisions in bankruptcy, and it is possible the delay in filing does not imply a delay in liquidation. However, the increased number of liquidations is consistent with the delay in filing for bankruptcy permitting an inefficient continuation of operations that might have been avoided by an earlier filing. Our results support the hypothesis that delayed filing in the post 2001 period delays inevitable, efficient liquidation, renders an otherwise salvageable company unsalvageable, or both.

As a theoretical matter, we cannot rule out the possibility of a censored sample in the post 2001 period. Specifically, in the latter period more than in the earlier, managers or secured creditors in control of debtors may solve financial distress without resort to bankruptcy. If a larger number of firms now restructured or liquidated outside of bankruptcy were disproportionately higher quality firms, with poorer firms eventually filing for bankruptcy, then the greater deterioration of bankrupt firms in the

later period may be an artifact of our sample. If this were the case, however, we would expect a higher incidence of bankruptcy in the pre 2000 period than in the post 2001 period, controlling for general economic conditions, and we do not observe this pattern. Rather we find that bankruptcy rates in the US (inversely) followed GDP growth rates over our sample periods and that bankruptcy rates are higher in the SPIP than in the DIP period despite relative improvements in GDP. These observations are documented in Table I. Thus, we do not attribute our results to the nature of our sample.

These results challenge, or at least limit, the conclusion, in Baird and Rasmussen (2002, 2003), e.g., that the new hard landing regime in Chapter 11 is beneficial as it allows creditors quickly to liquidate firms that should not continue under current management.⁸

Regarding these last points, on the potential benefits of the new Chapter 11, creditor control of Chapter 11 may permit efficient resolutions once a debtor enters bankruptcy. However, the very creditor control yielding such a benefit ex post may exacerbate losses ex ante due to the incentive it provides managers of those firms to delay bankruptcy filing. Put simply, although a creditor controlled bankruptcy process (at least one in which the creditor in control cannot exploit others) may facilitate beneficial liquidation, it may be that by the time creditors gain control in bankruptcy there is less to liquidate; it is not certain, as a theoretical matter, whether the old soft landing regime or the new hard landing regime is more efficient. (For other work discussing the ex ante versus ex post tradeoffs between a hard and soft-landing regime, see Bebchuk (2002), Povel (1999), and Adler (1992)). One might have thought that a trend toward creditor control before bankruptcy would eliminate this tradeoff and simply favor early, efficient liquidations, but our data do not support this hypothesis. A more complete solution to debtor misbehavior should include not only creditor control of the bankruptcy process but, as proposed by Adler (1998), some remedy to the bankruptcy initiation problem, such as a rule that would impede out-of-bankruptcy loans to an insolvent firm.

⁸See also Jensen (1991), which argues that private workouts, such as those that are now routine within Chapter 11 practice, are likely to enhance efficiency.

II Data and Methodology

In this section we describe the collection of the sample of bankrupt firms, our choice of economic measures and financial ratios, as well as our methodology for analyzing the data. We also document several characteristics of changes in bankrupt firms over time compared to the changes in the economic environment and non-bankrupt firms.

A Firms Filing for Chapter 11

We identify 827 firms filing for Chapter 11 over the 12 year period from January 1993 to March 2004 using Edward Altman's database of corporate bankruptcies. This database provides a comprehensive list of all large firms filing for bankruptcy (with liabilities exceeding \$100 million).⁹ Next, we obtained the date of the last reported financial statements from the Compustat database. All financial information about these firms we also obtained from the Compustat database. We eliminated all financial institutions (they have unique financial statements that are not comparable with other industrial firms), all firms that had not published an annual or quarterly financial report within 365 days prior to the Chapter 11 filing, and all firms with total liabilities (in at least one of the 4 quarters prior to bankruptcy filing) less than \$ 100 million. Our final sample contains 443 firms.

The Compustat database provides the SIC codes of the firms in our sample and we classified firms with SIC codes above 6000 as service firms and all the others as non-service firms. Table II presents the sample of bankrupt firms and their selected financial characteristics prior to Chapter 11 filing. Out of the total number of firms in the sample, 358 are non-service firms and 85 are service firms. On average, firms in the sample have total assets and total liabilities prior to bankruptcy of just under \$1.5 billion and just over \$1.34 billion, respectively. The range includes firms with assets from \$23 million to \$104 billion and with debt from \$59 million to \$52 billion prior to the bankruptcy filing. Average long term debt prior to bankruptcy filing is \$464 million, ranging from \$82 million to \$29.3

⁹Adjusting total liabilities for inflation would not change our conclusions as such adjustment would leave our sample virtually unchanged.

billion. Sales in the last four quarters range from \$1.24 million to \$179.4 billion with a mean of \$1.35 billion and a median of \$378 million, while net income ranges from \$-7.3 billion to \$920 million with a mean of -\$294 million and a median of \$-81 million. On average, bankrupt firms have a leverage (total liabilities/total assets) of 1.25 (median of 1.05) and a current ratio (current assets/current liabilities) of 0.85 (median of 0.58). Operating income before and after depreciation average -1.62% (median of 1.75%) and -8.42% (median of -4.53%), respectively.

Table III presents the annual distribution of Chapter 11 filings. The largest number of bankruptcies were filed in 2001 (109) and 2002 (77) equaling 25% and 17% of the sample, respectively. This is consistent with what Altman and Jha (2003) find for defaulted and distressed securities.

B Economic Measures and Financial Ratios

We predict the economic and financial health of firms filing for bankruptcy will deteriorate in the SPIP period as managers will delay filing. We consider also the possibility that in the SPIP period secured creditors may take control of a debtor prior to a bankruptcy petition. If such creditors favor early bankruptcy petitions and gain control of debtors soon enough to accomplish such early filing, our prediction will not be supported by the evidence. To test our prediction, we use financial reports to compute fourteen measures of economic or financial condition for every firm in the sample as follows:

Predicted change in economic measures and financial ratios is shown by \Downarrow and \Uparrow arrows.

1. $\Downarrow \Rightarrow$ 4-quarter operating income

$$\frac{4 - \text{quarter} - \text{Operating} - \text{Income} - \text{Before} - \text{Depreciation} - \text{and} - \text{Amortization}}{\text{Beginning} - \text{Balance} - \text{of} - \text{Total} - \text{Assets}} \quad (1)$$

The 4-quarter operating return on assets variable proxies for the ability of a firm to generate positive cash flow in the year prior to bankruptcy filing. We believe that in the SPIP period, as compared to the DIP period, there will be a longer interval between the onset of economic

distress and the filing of a bankruptcy petition. So we predict that this ratio will be lower in the SPIP period than the DIP period. This said, if distress typically occurs in both periods more than a year prior to a bankruptcy filing, the explanatory power of this variable may be weak.

2. $\Downarrow \Rightarrow$ 4-quarter operating income-da

$$\frac{4 - \text{quarter} - \text{Operating} - \text{Income} - \text{After} - \text{Depreciation} - \text{And} - \text{Amortization}}{\text{Beginning} - \text{Balance} - \text{of} - \text{Total} - \text{Assets}} \quad (2)$$

The 4-quarter operating income after depreciation variable proxies for operating performance and economic distress. We believe that in the SPIP period, as compared to the DIP period, there will be a longer interval between the onset of economic distress and the filing of a bankruptcy petition. So we predict that this ratio will be lower in the SPIP period than the DIP period. This said, if distress typically occurs in both periods more than a year prior to a bankruptcy filing, the explanatory power of this variable may be weak.

3. $\Downarrow \Rightarrow$ 4-quarter operating income-da-ei

$$\frac{4 - \text{quarter} - \text{Operating} - \text{Income} - \text{After} - \text{Depreciation}, \text{Extraord.} - \text{Items}, \text{DO}}{\text{Beginning} - \text{Balance} - \text{of} - \text{Total} - \text{Assets}} \quad (3)$$

The 4-quarter operating income variable proxies for performance in the year prior to bankruptcy filing including adjustments for discontinued operations and extraordinary items. We believe that in the SPIP period, as compared to the DIP period, there will be a longer interval between the onset of economic distress and the filing of a bankruptcy petition. So we predict that this ratio will be lower in the SPIP period than the DIP period. This said, if distress typically occurs in both periods more than a year prior to a bankruptcy filing, the explanatory power of this variable may be weak.

4. \Downarrow 8-quarter operating income

$$\frac{8 - \text{quarter} - \text{Operating} - \text{Income} - \text{Before} - \text{Depreciation} - \text{and} - \text{Amortization}}{\text{Beginning} - \text{Balance} - \text{of} - \text{Total} - \text{Assets}} \quad (4)$$

The 8-quarter operating income variable proxies for the ability of firm to generate positive cash flow and economic distress in the two year period prior to bankruptcy filing. The firm will have less difficulties meeting its obligations if the positive cash flow increases. We believe that in the SPIP period, as compared to the DIP period, there will be a longer interval between the onset of economic distress and the filing of a bankruptcy petition. So we predict that this ratio will be lower in the SPIP period than the DIP period.

5. \Downarrow 8-quarter operating income-da

$$\frac{8 - \text{quarter} - \text{Operating} - \text{Income} - \text{After} - \text{Depreciation} - \text{And} - \text{Amortization}}{\text{Beginning} - \text{Balance} - \text{of} - \text{Total} - \text{Assets}} \quad (5)$$

The 8-quarter operating income after depreciation variable proxies for the operating performance and economic distress in the two year period prior to bankruptcy filing. As profitability increases, the firm will have less difficulties meeting its obligations. We believe that in the SPIP period, as compared to the DIP period, there will be a longer interval between the onset of economic distress and the filing of a bankruptcy petition. So we predict that this ratio will be lower in the SPIP period than the DIP period.

6. \Downarrow 8-quarter operating income-da-ei

$$\frac{8 - \text{quarter} - \text{Operating} - \text{Income} - \text{After} - \text{Depreciation}, \text{Extraord.} - \text{Items}}{\text{Beginning} - \text{Balance} - \text{of} - \text{Total} - \text{Assets}} \quad (6)$$

The 8-quarter operating income variable proxies for the performance in the two-year period prior to bankruptcy filing including adjustments for discontinued operations and extraordinary items. As profitability increases, the firm will have less difficulties meeting its obligations. We believe that in the SPIP period, as compared to the DIP period, there will be a longer interval between the onset of economic distress and the filing of a bankruptcy petition. So we predict that this ratio will be lower in the SPIP period than the DIP period.

7. \uparrow Quarters of operating losses

$$\text{Number-of-Quarters-of-Operating-Losses-in-8-Quarters-Prior-to-Filing} \quad (7)$$

The number of quarterly operating losses proxies for the duration of economic distress. We predict this number will increase in the SPIP period compared to the DIP period as firms suffer a longer period of economic distress prior to filing for bankruptcy.

8. \uparrow Quarters of operating losses -da-ei

$$\text{Number-of-Quarters-of-Operating-Losses-in-8-Quarters-Prior-to-Filing} \quad (8)$$

The number of quarterly operating losses after depreciation, amortization, extraordinary items and discontinued operations proxies for the duration of economic distress. We predict this number will increase in the SPIP period compared to the DIP period as firms suffer a longer period of economic distress prior to filing for bankruptcy.

9. $\Downarrow \Rightarrow$ Change in assets-1 year

$$\frac{\text{Ending - Balance - of - Total - Assets}}{\text{Beginning - Balance - of - Total - Assets}} \quad (9)$$

The 4-quarter change in assets variable proxies for the reduction in a firm's value in the year prior to its bankruptcy filing. Because we wish to test whether firms have a greater incentive to delay filing in the SPIP than in the DIP period, and because we assume that firms weaken as they approach bankruptcy, we predict that this ratio will be lower in the SPIP period compared to the DIP period. This said, if distress typically occurs in both periods more than a year prior to a bankruptcy filing, the explanatory power of this variable may be weak.

10. \Downarrow Change in assets-2 year

$$\frac{\textit{Ending} - \textit{Balance} - \textit{of} - \textit{Total} - \textit{Assets}}{\textit{Beginning} - \textit{Balance} - \textit{of} - \textit{Total} - \textit{Assets}} \quad (10)$$

The 8-quarter change in assets variable proxies for the reduction in a firm's value in the two years prior to its bankruptcy filing. Because we wish to test whether firms have a greater incentive to delay filing in the SPIP than in the DIP period, and because we assume that firms weaken as they approach bankruptcy, we predict that this ratio will be lower in the SPIP period compared to the DIP period. This variable, we predict, will explain more than the variable for one-year change in assets because we believe a two-year decline prior to bankruptcy is relatively unlikely in the DIP period.

11. Size

$$\ln(\textit{Total} - \textit{Assets}) \quad (11)$$

Ln(Total-Assets) proxies for the size of bankrupt firms. We expect firms' financial characteristics to vary across size. Controlling for this variable is expected to remove those differences. Previous research indicates that leverage and the probability of bankruptcy vary across size.

12. \Downarrow Current ratio-year end

$$\frac{\textit{Fiscal} - \textit{Year} - \textit{End} - \textit{Current} - \textit{Assets}}{\textit{Fiscal} - \textit{Year} - \textit{End} - \textit{Current} - \textit{Liabilities}} \quad (12)$$

The year end current ratio proxies for the ability of a firm to meet liabilities as they come due. Because we wish to test whether firms have a greater incentive to delay filing in the SPIP than in the DIP period, and because we assume that firms weaken as they approach bankruptcy, we predict that this ratio will be lower in the SPIP period compared to the DIP period. Using the fiscal year end current ratio instead of the current ratio from the last quarter prior to the bankruptcy avoids consideration of defaults in the last quarter where long term debt becomes current; long term debt is considered in other ratios.

13. \Downarrow Long term debt/total assets

$$\frac{Long - Term - Debt}{Total - Assets} \quad (13)$$

The long term debt ratio is a measure of a firm's indebtedness. We predict this ratio will decrease in the SPIP period compared to the DIP period as more firms will default before filing for bankruptcy increasing current liabilities and decreasing long term debt.

14. \Uparrow Leverage

$$\frac{Total - Liabilities}{Total - Assets} \quad (14)$$

Leverage is a measure of a firm's indebtedness as a proportion of its assets. Because we wish to test whether firms have a greater incentive to delay filing in the SPIP than in the DIP period, and because we assume that firms weaken as they approach bankruptcy, we predict that this ratio will be higher in the SPIP period compared to the DIP period.

These measures and ratios are standard ones that reflect the overall economic and financial health of a firm. Needless to say there are countless possible measures and ratios. Our goal is not to find the best measures and ratios for any particular purpose, but merely to determine if there is a significant change in the economic or financial health of firms in the SPIP as compared to DIP period.

In order to compute measures and ratios from quarterly financial statements we use 12 month moving cumulative sales, costs of goods sold, depreciation and amortization, as well as operating income before and after depreciation, amortization and extraordinary items, and the beginning and ending 12 month period balances for all the other accounts. Due to data availability, not all the measures and ratios could be computed for all the firms in the sample. Since 239 (54%) firms had negative equity according to the last report filed before bankruptcy, the return on equity ratio (ROE) is omitted from the presentation. However, we will continue to discuss the number of firms having negative equity in the paper as one of the indicators of firms' health.

III Empirical Analysis, Results and Discussion

In this section we present and analyze our results. We first offer some general statistics about our data, then discuss the sample as divided between the DIP and SPIP periods.

A General Observations

Table IV shows our sample of 443 bankrupt firms by industry (two-digit SIC code). We obtain information about primary SIC codes from the Compustat database. On average, our sample contains 8 firms per SIC code (the median is 6 firms per SIC code). The largest portion of our sample belongs to the Communications industry (14.22%) followed by Business Services (5.87%) and the Electronic and Other Electrical Equipment industry (4.29%).

Excluding any of these industries from the sample does not change our conclusions. Most industry sub-samples consist of up to 10 firms. As we note above, most firms in our sample are non-service firms (358). Our conclusions do not change if we analyze only non-service firms instead of the whole sample.

Following Hotchkiss (1995) we describe the operating income of firms during the eight quarters prior to the bankruptcy filing. We use two measures; operating income before depreciation and amortization and operating income after depreciation and amortization.

Both measures are used to proxy for the existence of economic losses and distress. Operating loss, as a pre-interest measure, is a strong indicator of economic distress of a firm because it does not include the costs of financing and is limited to a firm's operating activities. The operating loss also indicates whether a firm is destroying its assets. Restructuring or liquidation in bankruptcy is often cited as necessary to reverse the poor investment decisions that lead a firm to deplete its assets.

Table V shows the percentage of firms suffering quarterly operating losses in eight quarters prior to the quarter when the firm filed for bankruptcy. The number of firms suffering operating losses,

both before and after depreciation and amortization (DA), increases as a firm gets closer to filing for bankruptcy. Between eight quarters pre-bankruptcy petition and one quarter pre-bankruptcy petition, the proportion of firms with operating losses before depreciation and amortization increased from 26% to 49%. The percentages increase to 40% and 69%, respectively, for operating losses after depreciation and amortization.

Table VI shows mean and median operating losses before and after depreciation per quarter relative to the bankruptcy filing. Operating income before DA turns negative only 3 quarters prior to the bankruptcy filing and reaches the minimum of -1.05% (median of 0.07%) in the last quarter preceding the bankruptcy filing. Operating income after DA turns negative in all 8 quarters prior to the bankruptcy filing reaching its minimum of -2.85% (median of -1.72%) the last quarter prior to bankruptcy filing, with the median becoming negative 5 quarters before the filing. The first signs of economic distress for most firms in our sample (evidenced by operating losses) occur in the two year period prior to the bankruptcy filing.

We next conduct a search in the Lexis-Nexis merger and acquisition database to find firms that liquidated some or all of their assets. Of the 443 firms in our sample, 168 (37.9%) firms liquidated at least some of their assets (120 (27%) firms liquidated part of their assets and 48 (10.9%) firms were taken over after declaring bankruptcy).¹⁰

B Comparison of DIP and SPIP Periods

We divide our 12 year sample of Chapter 11 filings into two sub-samples according to the changes in bankruptcy practices that occurred in years 2000 and 2001: 1993-1999 (Debtor in Possession) and 2002-2004 (Secured Party in Possession). Firms filing for bankruptcy protection under Chapter 11 during 2000 and 2001 were not included in this analysis as this is the period during which we believe the change occurred. (As noted below, our results are not sensitive to this assumption.)

¹⁰There is a bias in our SPIP sample since part of bankruptcy cases filed in 2002-2004 period are not terminated, so the percentage of cases with asset sales can only be higher.

We perform the analysis of all the firms in the sample as well as for the non-service and service firms separately, but we present the result for all firms and non-service firms only.

Table VII presents the operating income variables and financial ratios of firms filing under Chapter 11 for the two sub-samples (DIP and SPIP) and also presents the results of the t-test and Mann-Whitney test of the difference between the means of two sub-samples for the economic measures and financial ratios. Beginning with the first six operating income variables, only the ratio for 8 quarter operating income after depreciation and extraordinary expenses shows a statistically significant difference between the two periods. As predicted this ratio was lower in the SPIP period than in the DIP period. Specifically, between the two periods the ratio decreased from -7.61% to -20.07% on average. The number of quarters of operating losses after depreciation, amortization and extraordinary items increased from 4.15 to 5.00 (median from 4 to 5) in the SPIP period compared to the DIP period. This change was significant and as predicted. The one year change of asset ratio in the DIP period was 0.85 compared to 0.78 in the SPIP period. This is significant and as predicted. This difference was even more pronounced for the two year change of asset ratio. The total assets of firms in the DIP period increased by 11% in the two-year period preceding bankruptcy contrasting with an 18% decrease for firms in the SPIP period. This too was significant and as predicted. Turning to the financial ratios, leverage increased significantly, from 1.22 (median of 1) to 1.41 (median of 1.14). The current ratio decreased significantly from 1.29 (median 0.98) to 1.00 (median 0.73). The changes in leverage and current ratio are both as predicted. There was no statistically significant change in the long term debt ratio. Additionally, the percentage of firms with negative equity prior to the bankruptcy filing increased significantly from 49% (64 out of 130) to 63% (90 out of 143).¹¹ The results are consistent with a weaker financial and economic condition and a longer period of financial distress for firms filing for bankruptcy in the SPIP compared to the DIP period. This supports our hypothesis that a change in the legal environment or finance culture induced managers or creditors to delay the filing of bankruptcy petitions.¹²

¹¹The difference in proportions is significant at 5% level

¹²Current ratio and one-year change in assets show a statistically significant change at 10% level of significance (two-tailed test) and 5% significance (one-tailed test)

Next, we separate firms in economic distress from firms merely in financial distress by using the number of quarters of operating losses as a proxy. To identify firms in economic distress, we use at least one out of eight quarters of operating losses before depreciation and amortization.¹³ Table VIII shows economic indicators and financial ratios of economically distressed firms in the DIP and SPIP periods. Although not unexpected, none of the 4-quarter operating returns show statistically significant differences between means in the DIP and SPIP periods. By contrast, all of the 8-quarter operating income return ratios deteriorated significantly in the SPIP period compared to the DIP period. The operating return ratios decreased from 0.90% to -11.85% in the DIP versus SPIP period before depreciation and amortization, from -14.36% to -26.33% after depreciation and amortization, and from -9.79% to -21.65% after depreciation, amortization and extraordinary items. Leverage of economically distressed firms increased from 1.21 to 1.47 (median from 0.99 to 1.16), while the current ratio decreased from 1.34 to 1.00 (median from 1.05 to 0.74). The number of quarters of operating losses increased significantly from 3.25 to 4.80 (operating losses) and from 4.46 to 5.20 (operating losses after depreciation, amortization and extraordinary items). While assets of DIP firms increased by 13% in the two year pre-petition period, assets of SPIP firms decreased by 22%. There was no statistically significant difference between the one-year change in assets between DIP and SPIP firms. The percentage of economically distressed firms with negative equity increased from 49% in the DIP period to 62% in the SPIP period.

In addition to a univariate analysis, we run a multivariate analysis. We use a multivariate analysis of covariance (MANCOVA) to analyze differences between the DIP and SPIP firms. The model is comprised of five dependent variables representing financial and economic condition of bankrupt firms at the time of filing: Leverage, Current Ratio, 2-year Operating Loss, 2-year Change in Assets, and Number of Quarters of Operating Losses. The independent variable represents a change from DIP to SPIP, with a value of 1 for the DIP period and 0 for SPIP period. As a covariate and control variable we use Size (log of total assets). Table IX shows the MANCOVA results for all firms in our sample and for only economically distressed firms (defined as firms suffering at least one quarter of

¹³Using other cut-offs or operating losses after depreciation and amortization does not change our conclusions.

operating losses before DA in the 2-year period prior to filing for bankruptcy). This table also shows the effect of each dependant variable considered separately. The results support our findings from the univariate analysis and suggest that that delay in bankruptcy filing leads to higher leverage and a larger decrease in total assets at the time of filing. After controlling for size, change from DIP to SPIP accounts for 34% (39% for economically distressed firms) of the variability of financial variables and economic indicators. For all firms, both effects (Size and change from DIP to SPIP) are statistically significant at the 1% level. Also, the effects of DIP to SPIP are statistically significant at the 1% level (Quarters of operating losses, Leverage and 2-year change in assets) and at the 5% (Current ratio and the 2-year operating loss) in the univariate analysis. For economically distressed firms all effects for DIPtoSPIP are statistically significant at 1% level except for the current ratio where it is significant at the 10% level.

To further study economic distress, for each of the eight quarters prior to a bankruptcy filing we identify the proportion of firms that suffered operating losses in that quarter. As shown in Table X, except for the last two pre-bankruptcy quarters, SPIP firms have a larger proportion of economically distressed firms. These results support the proposition that, at the time of a bankruptcy filing, firms in the SPIP period have suffered economic distress for a longer period of time than their DIP counterparts.

We also examine liquidation rates. In the DIP period, 23 out of 133 firms (17.29%) liquidated at least some of their assets: 15 (11.28%) firms liquidated only part of their assets while 8 (6.01%) firms were acquired by another company after the bankruptcy declaration. The number of firms liquidated in part or in whole increases substantially in the SPIP period to 51.45% (71 out of 138 firms): 50 firms (36.23%) liquidated some of their assets and 21 (15.22%) were acquired by another company after filing for bankruptcy.

Our liquidation results are consistent with the findings of Aug et al. (2003) who find that in 84% of all Chapter 11s after 2001 the investors entered bankruptcy with a deal in hand or used the process to sell the assets of the business. These data indicate a shift in major Chapter 11 bankruptcy cases from

reorganization to liquidation (and this holds whether or not the definition of liquidation includes those cases that involve the takeover of a going concern). One explanation for the shift toward liquidation may be that in the SPIP period creditor control of the bankruptcy process facilitated liquidation of non viable firms while in the DIP period the debtor control did not. Another explanation for the shift may be that a greater percentage of firms in the SPIP period deteriorated beyond salvation by the time of the bankruptcy filing. In either case, the delay in bankruptcy initiation corresponds to a deteriorated financial condition and an increase in economic losses.

As noted in part 2, we do not attribute any of these results to the possibility of a censored sample in the SPIP period. Such a sample might exist if in the SPIP period more than in the DIP period, better firms were screened out of the bankruptcy process altogether. An implication of this change, however, would be a lower incidence of bankruptcy in the latter period, controlling for the general economy, and we observe no such decline in the bankruptcy rate.

IV Sensitivity of Results to Various Assumptions

A Changes in the Economic Environment

The changes in economic measures and financial ratios from the DIP to SPIP period could be due, at least in part, to changes in the economic environment. To examine the changes in the economic environment we compute economic indicators and financial ratios of all firms in the Compustat database to see how they changed over our time period, and specifically in the DIP versus SPIP periods.¹⁴

For our sample of all firms, we use the population of US incorporated firms in the Compustat database and then eliminate all firms with total liabilities lower than \$100 million. We then eliminate the financial firms, and further separate service and non-service firms (matching our procedures for our sample of bankrupt firms). As the data described in this part demonstrate, economic indicators and

¹⁴Removing the bankrupt firms from the total sample has no significant impact on the results, due to the small number of bankruptcy firms in comparison to the entire population of bankrupt and non-bankrupt firms

financial ratios of non-bankrupt firms move in the sample period either in the opposite direction from the bankrupt sample indicators and ratios or did not experience a significant change. Thus, the deterioration in economic and financial condition of bankrupt firms in the SPIP period compared to the DIP period does not appear to be driven by any economy wide changes. The non-bankrupt firms economic and financial conditions improved while the economic and financial conditions of the bankrupt firms deteriorated.

We compute the differences between the economic indicators and financial ratios of a bankrupt firm and the median economic indicators and financial ratios of all non bankrupt firms in the same quarter to obtain median adjusted indicators and ratios (MA). The median adjusted indicators and ratios show the distance of bankrupt firm to the median of all firms in the population. The increase in distance implies a worsening financial and economic condition against a baseline of the general economic environment. This analysis supports our results for non-adjusted economic indicators and financial ratios.

Next, we analyze bankrupt firms in the DIP and SPIP periods by industry. Table XI shows the distribution of firms by two-digit SIC code in DIP and SPIP periods.

Excluding major industries or industry divisions (according to SIC classification) does not change our conclusions about changes in economic measures and financial ratios of bankrupt firms in the DIP period compared to the SPIP period.

In addition, we repeat the multivariate analysis of covariance (MANCOVA) for industry adjusted ratios for all firms in our sample and then only for economically distressed firms. Table XII shows these results, which indicate that after adjusting for industry medians, the financial and economic condition of bankrupt firms again deteriorate between the DIP and SPIP periods, consistent with greater filing delay in the latter period. After controlling for size, change from DIP to SPIP accounts for 25% (33% for economically distressed firms) of the variability of industry adjusted financial variables and economic indicators. Both effects (Size and change from DIP to SPIP) are statistically significant at 1% level. The effect of DIP to SPIP is statistically significant at the 1% level for each variable in the

univariate analysis except for Current Ratio, which is significant at the 5% level for all firms and not significant for economically distressed firms.

B Period of Changes in the Legal System and Practices

As discussed above, we have assumed that the the changes in the legal system occurred between the years 2000 and 2001. In most US states (46 plus DC), the aforementioned expansion of secured creditor rights under Article 9 of the Uniform Commercial Code (UCC) took effect by July 1, 2001; these changes took effect by January 1, 2002 in the remainder. The changes in bankruptcy proceedings, while difficult to pinpoint, were underway in the year 2000. In our main results, we decided to exclude years 2000 and 2001 from the analysis. In order to examine whether our results change if the sample is divided in some other way, we tested the difference between economic measures and financial ratios of firms that filed for bankruptcy pre and post the second half of 2001. Our results do not change. Bankrupt firms' and industry median adjusted bankrupt firms' economic measures and financial ratios show statistically significant change for the whole sample, as well as for the economically distressed firms only. When we exclude the entire year 2001 from the analysis (the year when the changes of Article 9 took effect) the results also remain the same. Comparing years 1999 and 2002 also supports our main findings and show statistically significant differences between DIP and SPIP economic measures and financial ratios. Although we did not run a time series analysis, none of our conclusions would be altered if the changes we document occurred gradually over the period in question rather than at once.

C Market Variables and Bankruptcy Prediction Models

Our analysis is based on variables that in our opinion best describe a delay in bankruptcy filing. However, other tests are possible. Bankruptcy prediction variables, which are used to discriminate between firms that are likely to file for bankruptcy and those that are not, could be used to discriminate between firms filing early and those filing late. This is so because the same factors that indicate

whether a firm is likely to file for bankruptcy ex ante may also indicate that the firm delayed filing, relative to other firms, ex post. The empirical use of financial information to predict bankruptcy began with the discriminant analysis employed by Beaver (1966) and Altman (1968). Ohlson (1980) and Zmijewski (1984) extended this work with logit and probit models. Most of the subsequent research in this area has focused on the appropriate statistical methods used to develop the model, finding the variables which best discriminate between the bankrupt and non-bankrupt firms, and demonstrating the performance of the prediction model by examining the percentage of firms predicted correctly.¹⁵

The newest models of bankruptcy prediction include Begley et al.(1996) and Shumway (2001). In Table XIII we use the model from Begley et al.(1996) to compute the probability of bankruptcy of each firm in our sample¹⁶. This model has the following parameters:

$$10.4xWC/TA + 1.0xRE/TA + 10.6xEBIT/TA + 0.6xME/TL + 1.00xS/TA$$

where WC = working capital, RE = retained earnings, EBIT = earnings before interest and taxes, ME = market value of equity, S = sales, TL = total liabilities and TA = total assets.

When we run this prediction model on our DIP and SPIP samples, all variables except for EBIT show the predicted statistically significant difference between the two periods. These results are consistent with those in the previous sections of this study.

V Conclusion

Longstanding theory predicts that an insolvent debtor will file for bankruptcy only when default is imminent, even where an earlier filing might have stemmed deterioration of the firm's value. The bankruptcy reform act of 1978 built in a relatively soft landing for the debtor's managers (debtor-in-possession) and thus its owners. Generous bankruptcy treatment of managers and owners could

¹⁵For a review of the literature see Zavgren (1983) and Jones (1987).

¹⁶Using other bankruptcy prediction models described in Shumway(2001) does not change our conclusions.

encourage managers to file somewhat earlier as such treatment leaves managers relatively less incentive to permit a decline in firm value in the hope of an unlikely reversal of fortune. Recently, it has become possible to test managerial reactions to bankruptcy incentives. Between 2000 and 2001, perhaps prompted by a change in the Uniform Commercial Code, bankruptcy practice shifted from debtor control of the bankruptcy process to control by secured creditors. This paper examines the financial and economic conditions of firms that filed for bankruptcy from 1993 through 2004 to determine whether these changes exacerbated the managers' incentives to delay filing for bankruptcy.

Our investigation reveals a deterioration in the financial and economic health of firms at the time of their bankruptcy filing in the post 2001 SPIP (Secured Party in Possession) period as compared to the pre 2000 DIP (Debtor in Possession) period. This relative deterioration cannot be explained by general economic changes or related changes of firms not filing for bankruptcy. We also find that in the latter period more than the former liquidation was the final outcome of the bankruptcy process. These results support two important hypotheses. First, managers react to changes in the bankruptcy law, which is thus shown to matter as a source of ex ante incentives; in this case, the result is delayed resolution of financial distress. Managers increasingly file for bankruptcy only after financial distress becomes acute, or they cede the filing decision to a dominant secured creditor who delays filing until the debtor's finances are desperate. Second, many firms in financial distress are also in economic distress and so exacerbation of the bankruptcy initiation problem has economic consequences. Specifically, if bankruptcy corrects inefficient investment incentives through recapitalization or liquidation, a delay in bankruptcy may also delay such correction. These findings call into question the belief that bankruptcy practice in the SPIP period has effectively cured the debt overhang problem. Even for those who believe that the modern trend of creditor control in Chapter 11 is a positive one, encouraging *eventual* optimal disposition of a distressed firm, the effects of the trend are self-limited.

As such our findings have implications for legislative policy, specifically for bankruptcy law as regulation of capital structure and economic distress. In particular, our results support the need for Congress to address the bankruptcy initiation problem so that firms cannot waste assets before filing for bankruptcy just as they may have formerly wasted them afterward.

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Table I: GDP growth rates and bankruptcy filings in the 1993-2004 period

Number of firms filing for bankruptcy was identified from Altman's bankruptcy database, number of all firms per year was obtained from the Compustat database. Firms represent all firms in Altman and Compustat databases with liabilities that exceed US\$100 million. Bankruptcy rate is the percentage of bankruptcy filings in the total number of firms. GDP growth rates represent annual increase in the gross domestic product of the United States.

	GDP increase (%)	Number of bankruptcies	All Firms	Bankruptcy rate
1993	2.70	24	3662	0.66%
1994	4.00	24	3863	0.62%
1995	2.50	35	4141	0.85%
1996	3.70	32	4352	0.74%
1997	4.50	36	4459	0.81%
1998	4.20	51	4736	1.08%
1999	4.40	101	4921	2.05%
2000	3.70	125	4892	2.56%
2001	0.80	171	4678	3.66%
2002	1.90	121	4570	2.65%
2003	3.00	95	4557	2.08%
2004	4.40	44	4489	0.98%

Table II: Selected Characteristics of 443 Bankrupt Firms Filing for Chapter 11 between January 1993 and March 2004

Firms filing for Chapter 11 were identified from Altman's bankruptcy database, Pacer and filings with the Securities and Exchange Commission. Financial information was collected from the Compustat database and represent data for the last available quarter prior to bankruptcy filing. Sales, Net Income and Operating income represent data for the four quarters preceding the quarter of bankruptcy filing.

Descriptive statistics					
	N	Mean	Median	Minimum	Maximum
total assets	442	1'496.67	335.31	23.58	103'803.00
total liabilities	442	1'342.80	358.20	59.28	52'185.00
long term debt	440	463.80	81.76	0.00	29'300.00
sales*	432	1'351.82	378.06	1.24	179'469.00
net income*	432	-294.29	-81.39	-7'273.88	920.00
leverage	442	1.2526	1.0524	0.0570	7.4717
current ratio	417	0.8464	0.5766	0.0395	8.4700
operating income*	376	-1.62%	1.75%	-86.72%	44.59%
operating income - da*	375	-8.42%	-4.53%	-93.68%	20.80%

* - four quarters prior to bankruptcy filing

Table III: Annual bankruptcy filings

Number of firms filing for protection under Chapter 11 of U.S. Bankruptcy Code per year. Data was collected from Altman's bankruptcy database, Pacer and filings with the Securities and Exchange Commission and presents non-financial bankrupt firms with total liabilities of over US\$ 100 million in the year preceding bankruptcy filing. Service firms have two-digit SIC code lower than 60, and Non-Service firms two-digit SIC code higher than 69

Year of filing	Bankruptcy filing per year			%
	Service firms	Non-Service firms	All firms	
1993	0	8	8	1.81%
1994	0	13	13	2.93%
1995	1	12	13	2.93%
1996	3	17	20	4.51%
1997	2	14	16	3.61%
1998	1	18	19	4.29%
1999	9	33	42	9.48%
2000	20	40	60	13.54%
2001	26	83	109	24.60%
2002	12	65	77	17.38%
2003	11	41	52	11.74%
2004	0	14	14	3.16%
Total	85	358	443	100.00%

Table IV: Bankrupt firms by industry

The sample of 443 US based firms that filed for bankruptcy in the January 1993-March 2004 period. Firms in the sample have total liabilities that exceed \$ 100 million. Industry classification is based on 2-digit SIC codes. The sample was obtained from Altman's bankruptcy database, and information about SIC codes from the Compustat database.

2-digit SIC code	Number of firms	%
01: Agricultural Production Crops	1	0.23%
10: Metal Mining	1	0.23%
12: Coal Mining	3	0.68%
13: Oil And Gas Extraction	9	2.03%
14: Mining And Quarrying Of Nonmetallic Minerals, Except Fuels	2	0.45%
15: Building Construction General Contractors And Operative Builders	2	0.45%
16: Heavy Construction Other Than Building Construction Contractors	2	0.45%
17: Construction Special Trade Contractors	3	0.68%
20: Food And Kindred Products	9	2.03%
22: Textile Mill Products	12	2.71%
23: Apparel And Other Finished Products Made From Fabrics And Similar Materials	9	2.03%
24: Lumber And Wood Products, Except Furniture	3	0.68%
25: Furniture And Fixtures	1	0.23%
26: Paper And Allied Products	9	2.03%
27: Printing, Publishing, And Allied Industries	3	0.68%
28: Chemicals And Allied Products	15	3.39%
29: Petroleum Refining And Related Industries	1	0.23%
30: Rubber And Miscellaneous Plastics Products	4	0.90%
31: Leather And Leather Products	1	0.23%
32: Stone, Clay, Glass, And Concrete Products	5	1.13%
33: Primary Metal Industries	14	3.16%
34: Fabricated Metal Products, Except Machinery And Transportation Equipment	4	0.90%
35: Industrial And Commercial Machinery And Computer Equipment	16	3.61%
36: Electronic And Other Electrical Equipment And Components, Except Computer Equipment	19	4.29%
37: Transportation Equipment	9	2.03%
38: Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks	4	0.90%
39: Miscellaneous Manufacturing Industries	4	0.90%
41: Local And Suburban Transit And Interurban Highway Passenger Transportation	2	0.45%
42: Motor Freight Transportation And Warehousing	5	1.13%
44: Water Transportation	3	0.68%
45: Transportation By Air	7	1.58%
47: Transportation Services	1	0.23%
48: Communications	63	14.22%
49: Electric, Gas, And Sanitary Services	17	3.84%
50: Wholesale Trade-durable Goods	17	3.84%
51: Wholesale Trade-non-durable Goods	6	1.35%
52: Building Materials, Hardware, Garden Supply, And Mobile Home Dealers	9	2.03%
53: General Merchandise Stores	10	2.26%
54: Food Stores	10	2.26%
56: Apparel And Accessory Stores	10	2.26%
57: Home Furniture, Furnishings, And Equipment Stores	10	2.26%
58: Eating And Drinking Places	11	2.48%
59: Miscellaneous Retail	12	2.71%
70: Hotels, Rooming Houses, Camps, And Other Lodging Places	1	0.23%
72: Personal Services	1	0.23%
73: Business Services	26	5.87%
75: Automotive Repair, Services, And Parking	3	0.68%
78: Motion Pictures	10	2.26%
79: Amusement And Recreation Services	13	2.93%
80: Health Services	17	3.84%
83: Social Services	3	0.68%
87: Engineering, Accounting, Research, Management, And Related Services	9	2.03%
99: Nonclassifiable Establishments	2	0.45%
	443	100.00%

Table V: Quarterly operating losses prior to bankruptcy filing

Quarterly operating losses of bankrupt firms prior to bankruptcy filing. -8 to -1 are quarters relative to bankruptcy filing, operating loss and operating loss after depreciation and amortization (-da) are numbers of firms with operating loss in a specific quarter. N is the number of firms in quarter and % is the percentage of firms with operating loss per quarter. List of bankrupt firms was obtained from Altman's bankruptcy database, Pacer and SEC filings. Data on operating income was collected from the Compustat database.

	operating loss	N	% operating loss	operating loss-da	N	% operating loss-da
-8	101	391	25.83%	156	391	39.90%
-7	96	388	24.74%	161	387	41.60%
-6	125	401	31.17%	182	400	45.50%
-5	130	408	31.86%	212	407	52.09%
-4	136	394	34.52%	217	393	55.22%
-3	161	401	40.15%	244	400	61.00%
-2	177	405	43.70%	266	404	65.84%
-1	202	415	48.67%	284	414	68.60%

Table VI: Quarterly operating income prior to bankruptcy filing

Quarterly operating income of bankrupt firms prior to bankruptcy filing. -8 to -1 are quarters relative to bankruptcy filing, operating income and operating income after depreciation and amortization (DA) are % operating income over total assets. The list of bankrupt firms was obtained from Altman's bankruptcy database, Pacer and SEC filings. Data on operating income was collected from the Compustat database.

quarter	operating income before DA				operating income after DA			
	mean	median		N	mean	median		N
-8	1.44%	2.13%	***	375	-0.11%	0.81%	***	375
-7	0.38%	1.76%	***	382	-1.18%	0.49%		381
-6	0.67%	1.50%	***	397	-1.07%	0.21%		396
-5	0.30%	1.29%	***	404	-1.33%	-0.11%	**	403
-4	0.25%	1.07%	***	392	-1.48%	-0.40%	***	391
-3	-0.27%	0.72%	**	399	-2.04%	-0.58%	***	398
-2	-0.52%	0.38%		404	-2.28%	-1.09%	***	403
-1	-1.05%	0.07%	**	412	-2.85%	-1.72%	***	411

***, ** - Wilcoxon signed rank test significance at 1% and 5% level respectively.

Table VII: Financial variables in DIP and SPIP periods

Financial variables of bankrupt firms in the Debtor in Possession (DIP=1993-1999) and the Secured Party in Possession (SPIP=2002-2004) periods. All financial information was collected from the Compustat database. The list of bankrupt firms was collected from Altman's bankruptcy database, Pacer and SEC and represents US non-financial firms with liabilities in excess of \$ 100 million in the year prior to filing for bankruptcy.

	Mean		Median		MW	TT
	DIP	SPIP	DIP	SPIP		
Number of firms	131	143	131	143		
4 quarter operating income	-2.04%	-1.22%	0.34%	1.15%		
4 quarter operating income - da	-8.75%	-7.90%	-5.56%	-3.85%		
4 quarter operating income - da-ei	-8.82%	-10.43%	-6.03%	-7.15%		
8 quarter operating income	7.89%	-0.54%	10.35%	6.59%		**
8 quarter operating income - da	-8.10%	-14.86%	-1.23%	-3.46%		
8 quarter operating income - da-ei	-7.61%	-20.07%	-1.80%	-9.24%	***	***
leverage	1.2155	1.4144	0.9994	1.1426	**	**
current ratio-year end	1.2905	0.9959	0.9765	0.7271	*	*
size (log of total assets)	5.7417	6.1904	5.5052	5.9456	**	***
long term debt/total assets	0.3569	0.3588	0.2678	0.1156		
quarters of op losses -da-ei	4.15	5.00	4.00	5.00	**	**
change in assets -1year	0.8533	0.7811	0.8323	0.8056	*	*
change in assets -2years	1.1142	0.8174	0.8780	0.7620	***	***

***, **, * - 1%, 5% and 10% level according to Mann Whitney (MW) or t-test (TT).

Table VIII: Financial variables in DIP and SPIP periods- Economically distressed firms

Financial variables of economically distressed bankrupt firms in Debtor in Possession (DIP=1993-1999) and Secured Party in Possession (SPIP=2002-2004) periods. All financial information was collected from the Compustat database. The list of bankrupt firms was collected from Altman's bankruptcy database, Pacer and SEC and represents US non-financial firms with liabilities in excess of \$ 100 million in the year prior to filing for bankruptcy.

	Mean				Median				TT
	DIP	SPIP	DIP	SPIP	DIP	SPIP	DIP	SPIP	
Number of firms	108	102	108	102	108	102	108	102	
4 quarter operating income	-5.83%	-6.21%	-2.81%	-3.14%	-2.81%	-3.14%	-2.81%	-3.14%	
4 quarter operating income - da	-12.05%	-12.41%	-7.66%	-9.77%	-7.66%	-9.77%	-7.66%	-9.77%	
4 quarter operating income - da-ei	-9.94%	-11.09%	-6.54%	-7.98%	-6.54%	-7.98%	-6.54%	-7.98%	***
8 quarter operating income	0.90%	-11.85%	3.60%	-2.92%	3.60%	-2.92%	3.60%	-2.92%	**
8 quarter operating income - da	-14.36%	-26.33%	-6.94%	-13.40%	-6.94%	-13.40%	-6.94%	-13.40%	**
8 quarter operating income - da-ei	-9.79%	-21.65%	-2.76%	-11.47%	-2.76%	-11.47%	-2.76%	-11.47%	**
leverage	1.2150	1.4727	0.9977	1.1593	0.9977	1.1593	0.9977	1.1593	**
current ratio-year end	1.3409	1.0034	1.0457	0.7396	1.0457	0.7396	1.0457	0.7396	**
size (log of total assets)	5.6739	6.1183	5.4417	5.8827	5.4417	5.8827	5.4417	5.8827	***
long term debt/total assets	0.3385	0.3486	0.2436	0.0910	0.2436	0.0910	0.2436	0.0910	***
number of quarters of oper. losses	3.25	4.80	3.00	5.00	3.00	5.00	3.00	5.00	**
quarters of op losses -da-ei	4.46	5.20	4.00	6.00	4.00	6.00	4.00	6.00	**
change in assets -1year	0.8319	0.7578	0.8209	0.7720	0.8209	0.7720	0.8209	0.7720	
change in assets -2years	1.125866	0.7792528	0.8737652	0.7450558	0.8737652	0.7450558	0.8737652	0.7450558	***

***, **, * - 1%, 5% and 10% level according to Mann Whitney (MW) or t-test (TT).

Table IX: MANCOVA analysis of financial and economic variables

MANCOVA. Independent variable is DIP (1) or SPIP (0) period, and a covariate size (log of total assets). Financial variables of bankrupt firms in the Debtor in Possession (DIP=1993-1999) and the Secured Party in Possession (SPIP=2002-2004) periods were collected from the Compustat database. The list of bankrupt firms was collected from Altman's bankruptcy database, Pacer and SEC and represents US non-financial firms with liabilities in excess of \$ 100 million in the year prior to filing for bankruptcy. Sig is the significance level.

All Firms				
MANCOVA				
	Hotelling's Trace	F	Sig.	Partial Eta Squared
Size	0.226	8.450	0.000	0.184
DIPorSPIP	1.030	19.150	0.000	0.340
N	194			

Between Subject Effects				
	Dependent Variable	F	Sig.	Partial Eta Squared
Model	quarters of operating losses	67.224	0.000	0.514
	leverage	231.188	0.000	0.784
	current ratio	36.787	0.000	0.366
	2-year operating loss	4.489	0.005	0.066
	2-year change in assets	144.709	0.000	0.694
Size	quarters of operating losses	2.624	0.107	0.014
	leverage	39.982	0.000	0.173
	current ratio	0.183	0.670	0.001
	2-year operating loss	6.658	0.011	0.034
	2-year change in assets	9.397	0.002	0.047
DIPorSPIP	quarters of operating losses	11.086	0.000	0.104
	leverage	69.268	0.000	0.420
	current ratio	3.070	0.049	0.031
	2-year operating loss	4.261	0.015	0.043
	2-year change in assets	8.510	0.000	0.082

Economically distressed firms				
MANCOVA				
	Hotelling's Trace	F	Sig.	Eta Squared
Size	0.276	7.121	0.000	0.216
DIPorSPIP	1.278	16.360	0.000	0.390
N	136			

Between Subject Effects				
	Dependent Variable	F	Sig.	Partial Eta Squared
Model	quarters of operating losses	127.344	0.000	0.742
	leverage	165.729	0.000	0.789
	current ratio	22.551	0.000	0.337
	2-year operating loss	4.638	0.004	0.095
	2-year change in assets	79.027	0.000	0.641
Size	quarters of operating losses	0.408	0.524	0.003
	leverage	35.566	0.000	0.211
	current ratio	0.038	0.846	0.000
	2-year operating loss	3.539	0.062	0.026
	2-year change in assets	5.009	0.027	0.036
DIPorSPIP	quarters of operating losses	16.307	0.000	0.197
	leverage	58.098	0.000	0.466
	current ratio	2.707	0.070	0.039
	2-year operating loss	5.437	0.005	0.076
	2-year change in assets	5.104	0.007	0.071

Table X: Quarterly operating losses prior to bankruptcy filing in DIP and SPIP periods

Quarterly operating losses of bankrupt firms prior to bankruptcy filing in Debtor in Possession (DIP=1993-1998) and Secured Party in Possession (SPIP=2002-2004) periods. -8 to -1 are quarters relative to bankruptcy filing. DIP and SPIP are numbers of firms with operating losses before depreciation and amortization. N is the total number of firms in the quarter and % is the percentage of firms with operating losses with respect to the total number of firms. List of bankrupt firms was obtained from Altman's bankruptcy database, Pacer and SEC filings. Data on operating income was collected from the Compustat database.

	DIP	N	%	SPIP	N	%
-8	23	112	20.54%	38	133	28.57%
-7	18	111	16.22%	40	129	31.01%
-6	35	114	30.70%	47	133	35.34%
-5	33	118	27.97%	50	136	36.76%
-4	35	117	29.91%	52	127	40.94%
-3	45	117	38.46%	60	131	45.80%
-2	55	117	47.01%	57	134	42.54%
-1	65	120	54.17%	58	137	42.34%

Table XI: Bankrupt firms by industry in DIP and SPIP periods

Sample of 443 US based firms that filed for bankruptcy in the January 1993-March 2004 period. Firms in the sample have total liabilities that exceed \$ 100 million. Industry classification is based on 2-digit SIC codes. DIP is the Debtor in Possession period from 1993 to 1998 and SPIP is the Secured Party in Possession period from 2002 to 2004. The sample was obtained from Altman's bankruptcy database, and information about SIC codes from the Compustat database.

2-digit SIC code	DIP #	DIP %	SPIP #	SPIP %	
01: Agricultural Production Crops		0.00%		0.00%	
10: Metal Mining	1	0.76%		0.00%	
12: Coal Mining	2	1.52%		0.00%	
13: Oil And Gas Extraction	6	4.55%	2	1.40%	
14: Mining And Quarrying Of Nonmetallic Minerals, Except Fuels		0.00%	2	1.40%	
15: Building Construction General Contractors And Operative Builders	2	1.52%		0.00%	
16: Heavy Construction Other Than Building Construction Contractors	1	0.76%		0.00%	
17: Construction Special Trade Contractors	1	0.76%	2	1.40%	
20: Food And Kindred Products	2	1.52%	3	2.10%	
22: Textile Mill Products	4	3.03%	4	2.80%	
23: Apparel And Other Finished Products Made From Fabrics And Similar Materials	5	3.79%	2	1.40%	
24: Lumber And Wood Products, Except Furniture		0.00%	2	1.40%	
25: Furniture And Fixtures		0.00%	1	0.70%	
26: Paper And Allied Products	2	1.52%	1	0.70%	
27: Printing, Publishing, And Allied Industries	2	1.52%		0.00%	
28: Chemicals And Allied Products	2	1.52%	7	4.90%	
29: Petroleum Refining And Related Industries	1	0.76%		0.00%	
30: Rubber And Miscellaneous Plastics Products		0.00%	2	1.40%	
31: Leather And Leather Products		0.00%	1	0.70%	
32: Stone, Clay, Glass, And Concrete Products	1	0.76%	1	0.70%	
33: Primary Metal Industries	2	1.52%	10	6.99%	
34: Fabricated Metal Products, Except Machinery And Transportation Equipment	1	0.76%	2	1.40%	
35: Industrial And Commercial Machinery And Computer Equipment	7	5.30%	2	1.40%	
36: Electronic And Other Electrical Equipment And Components, Except Computer Equipment	3	2.27%	9	6.29%	
37: Transportation Equipment	3	2.27%	3	2.10%	
38: Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks	2	1.52%	1	0.70%	
39: Miscellaneous Manufacturing Industries	2	1.52%		0.00%	
41: Local And Suburban Transit And Interurban Highway Passenger Transportation	1	0.76%		0.00%	
42: Motor Freight Transportation And Warehousing	2	1.52%	1	0.70%	
44: Water Transportation	1	0.76%	1	0.70%	
45: Transportation By Air	1	0.76%	4	2.80%	
47: Transportation Services		0.00%		0.00%	
48: Communications	13	9.85%	28	19.58%	
49: Electric, Gas, And Sanitary Services	3	2.27%	9	6.29%	
50: Wholesale Trade-durable Goods	4	3.03%	4	2.80%	
51: Wholesale Trade-non-durable Goods		0.00%	2	1.40%	
52: Building Materials, Hardware, Garden Supply, And Mobile Home Dealers	7	5.30%	1	0.70%	
53: General Merchandise Stores	8	6.06%	1	0.70%	
54: Food Stores	6	4.55%	1	0.70%	
56: Apparel And Accessory Stores	6	4.55%	2	1.40%	
57: Home Furniture, Furnishings, And Equipment Stores	4	3.03%	2	1.40%	
58: Eating And Drinking Places	4	3.03%	5	3.50%	
59: Miscellaneous Retail	4	3.03%	2	1.40%	
70: Hotels, Rooming Houses, Camps, And Other Lodging Places		0.00%		0.00%	
72: Personal Services	1	0.76%		0.00%	
73: Business Services	2	1.52%	10	6.99%	
75: Automotive Repair, Services, And Parking		0.00%	2	1.40%	
78: Motion Pictures	1	0.76%		0.00%	
79: Amusement And Recreation Services	5	3.79%	2	1.40%	
80: Health Services	5	3.79%	6	4.20%	
83: Social Services		0.00%	1	0.70%	
87: Engineering, Accounting, Research, Management, And Related Services	1	0.76%	2	1.40%	
99: Nonclassifiable Establishments	45	1	0.76%	0.00%	
		132	100.00%	143	100.00%

Table XII: MANCOVA of industry adjusted financial variables on DIP and SPIP periods

MANCOVA. Independent variable is DIP (1) or SPIP (0) period, and covariate size (log of total assets). Industry median adjusted financial variables of bankrupt firms in the Debtor in Possession (DIP=1993-1999) and the Secured Party in Possession (SPIP=2002-2004) periods were collected from the Compustat database. The list of bankrupt firms was collected from Altman's bankruptcy database, Pacer and SEC and represents US non-financial firms with liabilities in excess of \$ 100 million in the year prior to filing for bankruptcy. Sig is the significance level.

All Firms				
MANCOVA				
	Hotelling's Trace	F	Sig.	Eta Squared
Size	0.264	9.699	0.000	0.209
DIPorSPIP	0.683	12.492	0.000	0.254
N	191			

Between Subject Effects				
	Dependent Variable	F	Sig.	Partial Eta Squared
Model	quarters of operating losses	66.227	0.000	0.514
	leverage	78.372	0.000	0.556
	current ratio	20.377	0.000	0.245
	2-year operating loss	70.687	0.000	0.530
	2-year change in assets	11.200	0.000	0.152
Size	quarters of operating losses	2.268	0.134	0.012
	leverage	43.251	0.000	0.187
	current ratio	1.114	0.293	0.006
	2-year operating loss	9.673	0.002	0.049
	2-year change in assets	8.529	0.004	0.043
DIPorSPIP	quarters of operating losses	10.558	0.000	0.101
	leverage	46.494	0.000	0.331
	current ratio	3.633	0.028	0.037
	2-year operating loss	18.100	0.000	0.161
	2-year change in assets	8.941	0.000	0.087

Economically distressed firms				
MANCOVA				
	Hotelling's Trace	F	Sig.	Eta Squared
Size	0.338	8.523	0.000	0.253
DIPorSPIP	0.972	12.151	0.000	0.327
N	133			

Between Subject Effects				
	Dependent Variable	F	Sig.	Partial Eta Squared
Model	quarters of operating losses	126.852	0.000	0.745
	leverage	62.636	0.000	0.591
	current ratio	11.576	0.000	0.211
	2-year operating loss	78.530	0.000	0.644
	2-year change in assets	5.673	0.001	0.116
Size	quarters of operating losses	0.218	0.642	0.002
	leverage	39.794	0.000	0.234
	current ratio	0.751	0.388	0.006
	2-year operating loss	5.154	0.025	0.038
	2-year change in assets	4.607	0.034	0.034
DIPorSPIP	quarters of operating losses	14.933	0.000	0.187
	leverage	42.525	0.000	0.395
	current ratio	2.267	0.108	0.034
	2-year operating loss	14.518	0.000	0.183
	2-year change in assets	4.952	0.008	0.071

Table XIII: Bankruptcy prediction model results in DIP and SPIP periods

Begley et al.(1996) bankruptcy prediction model results in DIP and SPIP periods. WC = working capital, RE = retained earnings, EBIT = earnings before interest and taxes, ME = market value of equity, S = sales, TL = total liabilities and TA = total assets. TT and MW are significance levels according to the t-test and the Mann-Whitney test. ***, ** and * are 1%, 5% and 10% significance levels.

All firms								
	DIP			SPIP			TT	MW
	N	Mean	Median	N	Mean	Median		
Score	85	-5.4212	-3.4849	92	-9.3884	-6.6283	**	***
WC/TA	123	-0.3396	-0.1333	133	-0.5936	-0.4595	***	**
RE/TA	125	-0.7455	-0.3520	135	-1.4095	-0.5957	***	***
EBIT/TA	110	-0.0880	-0.0558	121	-0.0790	-0.0385		
ME/TA	108	0.2018	0.0619	114	0.0839	0.0260	***	***
S/TA	126	1.1412	1.0014	137	0.9069	0.7710	**	**

Economically distressed								
	DIP			SPIP			TT	MW
	N	Mean	Median	N	Mean	Median		
Score	71	-5.7995	-3.5355	64	-10.6554	-7.6955	***	***
WC/TA	101	-0.3398	-0.1191	96	-0.6284	-0.4841	***	***
RE/TA	104	-0.8024	-0.3639	98	-1.6616	-0.6346	***	***
EBIT/TA	87	-0.1215	-0.0784	81	-0.1241	-0.0977		
ME/TA	92	0.1956	0.0655	83	0.0938	0.0254	**	***
S/TA	97	0.9916	1.0855	103	0.7506	0.9414		*