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Credit Risk, Default Loss, and the Economics of Bankruptcy

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Abstract

The negotiating strategies of parties to a corporate bankruptcy are shaped by the rules and procedures of bankruptcy law. The rules have an asymmetric impact on the debtor and its creditors. To analyze the effect of this asymmetry, the paper develops a model of bankruptcy negotiation based on a binomial process for firm value. The analysis produces five novel results. First, bankruptcy rules are shown to produce incentives which lead to significant deviations from strict priority even when the costs of bankruptcy are negligible. This result is consistent with observed high levels of deviation from strict priority. Under conditions of pure risk with no uncertainty, the model predicts that a 'pre-packaged' bankruptcy plan incorporating deviations from strict priority will negotiated before any filing. Deviations from strict priority – and creditor losses – are seen to be highly sensitive to firm volatility and to the maximum protection period allowed by bankruptcy rules. Second, in the presence of bankruptcy costs, risk free (or martingale) pricing for claims on the bankrupt corporation is shown to be inappropriate since the requisite hedges cannot be formed. Third, the introduction of uncertainty produces conditions where pre-pack negotiations will fail and where periods of protection will be prolonged. Fourth, the model identifies a shareholder interest in postponing many opportunities for restructuring even where such reorganization raises the value of the firm. Longer allowable protection periods increase the significant deadweight costs arising from this mechanism. Finally, when applied to the pre-filing period, the model allows the timing for a filing to be treated as a choice variable for both the debtor and its creditors. The choice is shown to be crucially dependent on the likely results of any bankruptcy filing, and hence on the volatility and trend in firm value. The model identifies the essential interdependence of bankruptcy strategies of the debtor and its creditors which is typical of most bankruptcies.

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1.   Introduction

The wide variety of corporate bankruptcy outcomes presents a set of unexplained puzzles.[2] Despite the relatively simple objectives of bankruptcy law – the preservation of value and the equitable distribution of this value – the bankruptcy process delivers results which are extremely diverse and largely unexplained by any theoretical model. The time required for resolution of individual bankruptcy cases shows wide dispersion. The literature offers no theory that explains this variation. The extent of creditor losses both at industry and borrower level also shows wide variations. While factors such as seniority, security and debt ratios can go some way to providing an explanation of the variability of losses [3], a high proportion of the variability remains unexplained. This paper outlines the nature of this and other patterns of diversity and proposes an analytical framework through which many of these patterns are explained.

Table 1 shows the distribution of times taken to resolve 705 major corporate bankruptcies under the *Bankruptcy Code* (the *Code*) in the United States in the period 1980 to 2007.[4] In 9% of cases, agreement was reached between the debtor and its creditors on a consensual "pre-packaged" plan before any filing (a 'pre-pack'). Such companies emerged from the bankruptcy court within weeks or a short few months.[5] 14% of the firms attempted to negotiate with their creditors prior to the filing but were unable to reach a pre-pack agreement. On average, these firms managed to reach a

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[2] While the terminology and procedural references used in this paper are drawn from the *Bankruptcy Code* of the United States, 11, USC, §§ 1101 – 1174, the model presented in the paper is applicable to the typical bankruptcy processes of Canada (Companies Creditors Arrangements Act and the Bankruptcy and Insolvency Act) and the parallel legislation in many other free market economies.

[3] See, *inter alia,* Schuerman [2005].

[4] The data is drawn from the Bankruptcy Research Database (BRD) of Professor Lynn LoPucki, UCLA School of Law.

[5] In each case, the plan, along with evidence of the required consenting votes from each class of creditors, is presented to the court as a 'pre-packaged' filing. Court approval is normally routine and the firm emerges quickly from bankruptcy protection. While not specifically recognized in the 1978 U.S. Bankruptcy Code, pre-packs were generated using the standard provisions of the 1978 Code. The 2005 *Bankruptcy Abuse Prevention and Consumer Protection Act* explicitly recognized 'pre-packs'. See §341(e) and §1125(g). See Henry [2005], p 418, which provides the text of the *Act* and includes commentary.

Table 1.   Corporate Bankruptcy Case Outcomes under the Bankruptcy Code
Cases filed 1980 to 2007

	Number of Cases	Percent	Average Months to Disposition	Number of Cases by Years to Disposition					
				<1	1	2	3	4	≥5
Confirmed Plans where the Firm Emerged									
Prepackaged Plans	62	9%	1.9	61		1			
Pre-Negotiated	96	14%	6.1	91	3	1		1	
Not Negotiated before filing	296	42%	19.9	91	114	54	21	7	9
Total	454	64%							
Confirmed Plans where the Firm Did Not Emerge									
§ 363 Sales	57	8%	16.4	27	16	7	5	1	1
Merger	15	2%	16.2	5	7	3			
Liquidation	131	19%	18.0	53	45	17	10	5	1
Total	203	29%							
Cases Converted									
§ 363 Conversions and Liquidations	48	7%	13.2	28	11	5	3		1
	705	100%		356	196	88	39	14	12

Incidence of Refiling: Firms which Successfully Emerged but Subsequently Refiled

	Total of Firms that Emerged	Firms that Refiled	Percent Refiling	Average Years to Refiling
Prepackaged Plans	62	18	29%	3.7
Pre-Negotiated	96	18	19%	2.9
Not Negotiated before filing	296	58	20%	4.1
Total	454	94	21%	3.8

Note: the LoPucki data base for cases filed in the years 1980 - 2007 include 745 cases. Of these, records on 12 cases were incomplete and omitted from this table. A further 28 cases were still pending resolution. 20 of these were filed in the period 2005 - 2007. All cases with pending resolution were omitted from the table. Due to the inclusion of cases completed in recent years, there is a small downward bias in the measure of percent refiling.

Source: Bankruptcy Research Database (BRD) of Prof. Lynn LoPucki, UCLA School of Law, as of October 15th, 2008.

consensual agreement within about 6 months after the filing. A further 42% did not attempt any pre-filing negotiations with creditors, although they ultimately achieved a consensual plan with their creditors and successfully emerged from Chapter 11. These firms took on average 19.9 months before the presented a successful plan to their creditors. Many took three, four and even five years before emerging from Chapter 11. Some explanation is required of the frequency with which so many firms chose to delay substantive negotiations with their creditors and accept the costs of extended bankruptcy rather than avoiding such costs and sharing the benefits.

The time needed for reorganization is given as a primary rationale for extended periods of protection. But the widespread existence of reorganization options with positive present values at the time of filing raises the question of why such opportunities were not fully exploited prior to filing, particularly since such moves could have reduced the likelihood of bankruptcy. Is there some agency problem that leads to profitable options being persistently ignored, or is there some deeper financial mechanism at work that produces incentives for the distressed firm to delay value-enhancing opportunities?

The losses to creditors vary systematically across industries. Data presented by Altman and Kishore [1996] indicate that over a 24 year period bond losses on default in the textile, construction and transportation industries ranged between 62% and 68%. In contrast, losses for the utility sector were averaged 30%.[6] Loss rates in other industries fell between these extremes. Some explanation is required for the persistence of lending practices under which creditors allow higher loss levels to persist over long periods in some industries and not in others.

In a high percentage of plans, senior creditors accepted a distribution under which significant value was allocated to junior creditors and sometimes even equity - even when senior creditors suffered significant losses.[7] Since the *Code* allows creditors to reject

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[6] Data from Altman and Kishore [1996], republished in Schuermann [2005] pp 19-20, which provides a summary of similar data from various studies.

[7] Franks and Torous [1989] provides a detailed analysis of 27 large corporate Chapter 11 cases from the late 1970's until 1986. Of these 27, 21 exhibit deviations from strict priority. In 18 of these cases, equity

such plans and insist on payout according to strict priority, the widespread practice of senior lenders accepting divergences from strict priority needs explanation

These questions raise the more fundamental analytical issue of whether there is an underlying mechanism at work that produces these variations. The fact that over 85% of bankruptcies of public companies result in consensual outcomes points to the existence of some underlying bargaining mechanism between the firm and its creditors. This bargaining mechanism, if it can be identified, should explain a related phenomenon – why the shares of insolvent public firms typically trade at a price well above zero, even though such firms are bankrupt on any economic basis. Clearly the market routinely anticipates recoveries to subordinated debt and equity and applies some calculus to estimate such recoveries. The theory of bargaining under bankruptcy should be able to identify this pricing algorithm. Since prices for securities of the bankrupt corporation continue to trade throughout the bankruptcy period, such an algorithm should apply to securities pricing in a consistent fashion both before and during any bankruptcy.

Despite the importance of these questions, the relevant literature is surprisingly fragmented and unhelpful in explaining these patterns. Four distinct and largely unconnected approaches can be identified. None of these approaches considers the entire credit life cycle of the distressed firm from solvency to pre-bankruptcy workout, through the filing to the period of protection, and then to the ultimate emergence or liquidation of the firm. The first approach examines the period just before and then after the filing through to the completion of the case. Two other approaches focus solely on the period up to and including the filing, with no attention being given to the actual bankruptcy process. Finally, the fourth approach contains some studies that focus solely on filing rates while others focus on ultimate loss rates. Yet any coherent theory of bankruptcy

holders received a payment, even though senior creditors took a loss. 17 of the 21 cases involved holders of "Debt" and "Notes". The holders of these obligations agreed to plans which yielded an average loss of 34% to their claim. Had the distribution to these claimants followed strict priority, the holders of these obligations would have suffered no losses in 10 of the 17 cases. The unweighted average losses for all 17 cases would have been more than halved to 15.8% under strict priority. Such results are typical of consensual plans during subsequent periods. For further data and analysis of deviation from strict priority, see, *inter alia,* Eberhart, *et al,.* [1990], LoPucki and Whitford [1990] and [1991], Daigle and Maloney [1994], LoPuki [2005], and Weiss and Capkun [2006].

should provide a bargaining model that treats the periods before and after the filing as a unified sequence since recovery tactics adopted by the debtor and by its creditors typically are chosen well before the filing and continue in a coherent sequence throughout the period of protection.

The first and largest body of literature focuses on the legal analysis of bankruptcy law, its procedures and practices. This literature puts its primary focus on the period from around the filing until the completion of the case. Legal theorists have laid out the philosophy behind the bankruptcy code.[8] The bulk of the literature focuses on the analysis of legal precedents and processes, and is largely descriptive or normative in character. It contains few studies that propose models useful for analyzing how parties to a bankruptcy formulate their negotiating strategies.[9] A number of legal commentators have argued that bankruptcy law operates in a manner that impedes the flow of corporate assets to higher valued uses. They point to agency problems and the length of time taken under protection and suggest that the costs may be excessive.[10] They also point to the high number of firms which exit Chapter 11 with a consensual arrangement and then subsequently are forced to file for a second period of protection. In the large population of corporate insolvencies shown in Table 1, fully a fifth of the firms that successfully emerge from Chapter 11 are forced to re-file within three to four years. Clearly the plans of arrangement for the initial bankruptcy of such firms should have failed the viability

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[8] In particular, see Jackson [1986], esp. Chapter 1, pp. 1 – 6, which provides the classic exposition of the objectives and limits of bankruptcy law. Also see Baird [2001] for a summary of the *Code* and its operation..

[9] Such bargaining analyses include Baird and Picker [1991] and Gertner and Scharfstein [1991]; Daigle and Maloney [1994]; and for a more recent model see Mooradian [2004]. These papers, however, do not provide models which explain the wide variation in bankruptcy outcomes.

[10] See, *inter alia*, Baird [1986], White [1989], Easterbrook [1990]. In an empirical examination of the effect of the 1978 reform of the Code, Bradley and Rosenzweig [1992] conclude that the changes resulted in a bankruptcy process that increased the frequency of bankruptcies and destroyed wealth for both creditors and shareholders. They conclude that management were the winners, although neither their model nor their empirical data indicate how this wealth was extracted. Warren [1992] vigorously disputed the methodology and data behind Bradley and Rosenzweig's paper. Other analyses arguing the existence of inefficiencies include, Gertner and Scharfstein [1991], Weiss and Wruck [1998], Mooradian [1994] LoPucki [2005], and Adler, Capkun and Weiss [2006].

test required by Chapter 11 before the initial plan was approved by the court.[11] This result is suggestive of substantial resource misallocation.

While the debate among legal commentators has been vigorous, it has produced neither a consensus on the overall degree of inefficiency in the Chapter 11 process - if any - nor the appropriate measures to correct any economic inefficiency. [12] Nor has this strand of the literature provides and explanation of why bankruptcy outcomes show such high variability.

The second major analytical approach has developed around the analysis of capital structure issues and the impact of agency problems. [13] Stiglitz, [1972], identified the incentives for managers to engage in risky projects to take advantage of this asymmetry of returns to bondholders and shareholders. Jensen and Meckling [1976] identified risk shifting as an agency problem and noted that the problem could be exacerbated by bankruptcy. Meyers [1977] identified the inability of shareholders to capture all the benefits of a capital injection into a distressed corporation as a source of underinvestment in the firm. While this strain in the literature illuminates the problem, it focuses on capital structure issues prior to bankruptcy. It has not broadened into the empirical analysis of default and loss probabilities that is essential to an understanding of bankruptcy and the pricing of credit risk.

A third and more useful approach is based on the insight of Merton [1974] who pointed out that corporate securities can be viewed as options on the value of the firm and hence can be priced through options theory. In contrast to the legal literature which focuses on the period around and after the filing, Merton's approach considers solely the period up to and including the filing. Merton and his successors ignore virtually all of the

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[11] Under §1129(11) a plan cannot be confirmed by the court unless it is feasible - *ie.* the plan is unlikely to lead to the need for further reorganization of the firm. See commentary on such refilings in LoPucki [2005], page 107 ff..

[12] Under the Chapter 11 process, issues of efficiency (preservation of value) and equity (appropriate distribution of value) are inextricably interwoven. Bebuchuk [1988] has proposed a process for separating these two issues in a manner that preserves the pre-petition priorities, but the suggestion has not generated acceptance.

[13] For a summary of this literature, see Myers [2001]

legal process surrounding Chapter 11. The approach uses a stochastic Markov process to model the manner in which the value of the solvent firm evolves through time up to the point of default. In Merton's [1974] formulation, if the value of the firm at the time of the debt maturity falls below the face value of the debt, default is assumed to take place immediately. The firm is liquidated and this value is immediate distributed to creditors by strict priority. In such cases, since all creditors' claims cannot be satisfied, equity receives nothing. This basic model, with some structural changes and calibration, has proven to be relatively successful when used as a predictive model of default probability [14] Yet it has been far less successful in predicting expected loss on default and hence in identifying spreads that will adequately compensate for credit risk.[15] While losses are determined endogenously in Merton's [1974] model, there is no allowance for deviation from strict priority. Nor is there any reflection of the fact that most defaults occur well before the maturity of debt. Further, the model is inconsistent with patterns of protracted periods of protection and with the observation that equity prices remain positive and significant for most public corporations under protection.

Various enhancements have been made to this model to reflect these market complexities.[16] Jarrow and Turnbull [1995] recognized that default often pre-dates a bankruptcy filing, and that it can occur independently of the leverage of the firm. Their type of model is often called a 'reduced form' model since the value of the firm does not enter directly into the calculation of the equilibrium bond price. A binomial distribution is used to generate estimates for the timing of a default. The model, however, is not able to generate estimates of loss-on-default rates. Instead, model relies on loss rates drawn from

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[14] The most successful default model is provided by KMV LLC, now a subsidiary of Moody's Investors Service. See Crosbie and Bohn, [2003], Dwyer & Qu [2007] and Korablev and Dwyer [2007]. This model uses data from the market on firm volatility and data from the firm on debt levels to generate estimates of default distributions. Virtually all major banks use data from this model as an imput into their internal risk rating process, and the model is accepted by most financial regulators for this purpose. However, while the model performs well in forecasting default probabilities for firms short of financial distress, with rising default probabilities, the accuracy weakens. When the estimated default frequency exceeds 35%, KMV simply records a bullet "35%", leaving the user to generate its own estimate of the true default probability. Yet it is this portfolio of higher risk credits that most of the loss in any portfolio will lie. KMV can also fail to capture the full extent of correlation in firm default intensities. See Das, *et al*, [2007].
[15] See Jones, and Rosenfeld., [1984] for estimates of the accuracy of loss estimation using a Merton-type model.
[16] For summaries of the various models that have been proposed see Lando [2004] and Altman [2006]

historical data drawn from some comparable portfolio. These loss rates enter as point estimates and, as a result, are not able to reflect the effect of volatility in the firm's value on loss rates for the firm. Subsequent models have been proposed that relax this and other restrictive assumptions. Duffie and Singleton [1999], for example, propose a stochastic loss-on-default function which allows the model to produce 'endogenous' loss estimates. A wide variety of papers have proposed other approaches to improve the identification of appropriate default intensities. This strain of the literature, however, remains focussed on the period prior to the filing.[17] While the use of historical loss rates or some endogenously determined spread of loss-on-default implicitly allows for deviations from strict priority, the approach contains no bargaining model for the parties to a bankruptcy that can illuminate why creditors routinely accept major deviations from strict priority. Moreover, these models have failed to demonstrate sufficient empirical precision to be adopted by the financial industry as a useful operational algorithm for identifying loss distributions.

The fourth major approach directly tackles the problem of forecasting firm-specific default and loss distributions for solvent firms. In contrast to the Merton-type models which rely primarily on two variables – the history in the evolution of the firm's equity prices and the spot leverage of the firm - this approach explicitly considers a wide variety of factors that could affect default and loss probabilities. [18] Altman [1968] identified a wide variety of factors that can lead to default and used statistical techniques to identify those parameters that most effectively predict default. Other models such as "LossCalc" explicitly focus on factors that affect loss levels. [19] Such models have a credible track-record of predicting loss rates at the portfolio level when compared with results produced by trained credit professionals and so have found use as a supplemental credit tool in banks, particularly for estimating the potential loss on loans to non-public companies. Their predictive ability, however, has not proven to be sufficiently robust for

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[17] One notable exception to this is Carey & Gordy [2007] who propose a stochastic model of firm value that carries on from the pre-petition period through the period of protection (see below, footnote 31.).

[18] For a review of papers in this approach, see Altman [2006].

[19] LossCalc [TM] a proprietary service provided by Moody's KMV. See Gupton & Stein [2006].

them to be adopted as a primary tool for portfolio management.[20] Moreover, none of these approaches contains a model of bargaining between the debtor and its creditors in bankruptcy. None sheds light on the variability in the periods taken under bankruptcy and none explains why creditors routinely accept a significant measure of deviation from strict priority.

This paper presents an approach that bridges the theoretical differences between these various strands in the literature. It develops a binomial model of bargaining between creditors and shareholders that reflects the key features of the *Bankruptcy Code* which affect the bargaining between the parties.[21] The model is structured to apply in a consistent manner through both the pre- and post- filing periods. The objective of the model is to provide a plausible explanation of the wide range of observed outcomes to the bankruptcy process and to identify the factors that can lead to these variations. Section 2 sets up the bargaining model. Section 3 applies the model to the period prior to filing and examines the various tactical considerations bearing on decisions by creditors and by the firm to file for protection before a default is declared. Section 4 relates the use of this model to the 'gone concern' analysis typically performed by a distressed firm and by the holders of its securities.

2. Bargaining under Bankruptcy

a) Conditions of Risk but no Uncertainty.

The essence of the negotiating problem for the bankrupt firm and its creditors can be captured in a simple binomial model of negotiation. This model must reflect three key characteristics of the *Code.*

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[20] For a review of the literature, see Altman, Resti and Sironi [2005] and [2005].
[21] A similar model in continuous time producing parallel results is developed in Crean [2008].

First, the model must focus on the recoveries expected by the individual parties. Although a primary purpose of the law is to protect the value of the bankrupt company, the *Code* fails to provide any of the players with any direct interest in maximizing the overall value of the bankrupt company. Key parties often find that it is in their own self interest to frustrate a course of action that maximizes the value of the firm. The negotiating model must therefore focus purely on the returns expected by individual parties to the bankruptcy.

Second, to achieve this focus, the distribution rules in the *Code* must be structured into the model. Under these rules, when a firm is so insolvent that there is no value left to reorganize and no consensual plan can be reached under Chapter 11, the case will be converted to Chapter 7, the firm will be liquidated and the value of the firm will be distributed according to strict priority. [22]However, if sufficient value remains and the requisite majorities of creditors reach a consensual plan under Chapter 11, the value may be distributed according to the scheme proposed in the plan. The *Code* contains no requirement for the distribution arrangements of a consensual plan to reflect strict priority.

Third, the model must reflect a key assumption of the *Code* that the debtor is in most cases the best judge of the proper strategy for managing the company. [23] Bankruptcy procedures typically leave the existing management and its board of directors in control of the operation of the firm. Although this control is subject to oversight by creditor committees and the court,[24] the "debtor-in-possession" retains wide latitude in deciding the appropriate strategy for the firm. This latitude allows management, directors and shareholders significant opportunities for adopting strategies that maximize their own expected recoveries.

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[22] §726 sets out the obligatory distribution by strict priority in Chapter 7.

[23] Under § 1104 of Chapter 11 a Trustee may be appointed by the court to run the firm. However, before an appointment is made by the court to replace the debtor-in-possession, a convincing case must be made to the Court that the appointment is in the best interests of the creditors, shareholders *and* other interests of the estate. As a result, such appointments are rarely made in Chapter 11 cases of large public corporations. See, *inter alia,* Broude [1995], p. 3-24.

[24] Provisions for these committees is made in §705 of the Code, and their appointment and powers are specified in §1102(a)1 and §1103(c).

At the time of the filing, the bankruptcy court will impose a stay of proceedings that prevents creditors from taking steps to recover amounts owed to them prior to the filing. This stay continues automatically until it is raised by the court, usually at the point where there is a successful plan or arrangement or a conversion to a Chapter 7 liquidation. Further, the *Code* provides the firm with the exclusive right to propose a plan of reorganization during the first 120 days; and if the firm proposes a plan, it has another 60 days to secure acceptance of the plan. This prevents creditors from proposing a reorganization plan that might bring an earlier end to the stay. In the past, courts have typically extended exclusivity as long as the stay remains in place. While amendments to the *Code* in 2005 limit exclusivity to 18 months from the point of filing, it is far from clear that this change will do much to limit prolonged periods of protection for complex insolvencies. [25]

Creditors may apply to the court for the stay and exclusivity to be lifted on a variety of grounds.[26] Secured creditors may request, for example, that the stay be lifted on the assets covered by their security. If they can successfully argue that the asset in question is not necessary for an "effective reorganization" (*i.e.* a consensual plan of reorganization), the secured creditors have grounds for relief. In rebuttal, debtors typically argue that assets covered by security are essential for their ongoing business, and courts tend to be sympathetic to such arguments. Further, if management can be shown to be unnecessarily eroding value, or if the secured creditors can demonstrate that a successful plan of arrangement is unlikely to be achievable, creditors have grounds to have the stay lifted. Courts, however, typically exhibit reluctance to lift a stay since a

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[25] Provisions for the automatic stay is set out under §362 of the Code. Exclusivity is set out in §1121. See Baird [2001], p 19-20, for a commentary on exclusivity. In the 2005 amendments to the *Code* contained in the *The Bankruptcy Abuse Prevention and Consumer Protection Act*, a limitation of 18 months was placed on exclusivity. For comment, see Henry, [2005], p. 417. Lifting exclusivity, however, may not bring a prolonged bankruptcy to a close - it only allows creditors to propose a plan of arrangement. Such a plan then must meet the tests set out in §1123 and §1124 of the *Code* to be successful. Where the structure of a corporation's liabilities is complex, achieving agreement between the various layers of creditors with competing interests can be difficult and the period under protection will be prolonged. See Williams [2009], pp 6-7. Even where a plan acceptable to creditors is formulated, it is not clear that bankruptcy courts - which are courts of equity - will easily allow a plan to come to a vote, especially when the debtor may argue that the plan will diminish the ultimate value of the firm.
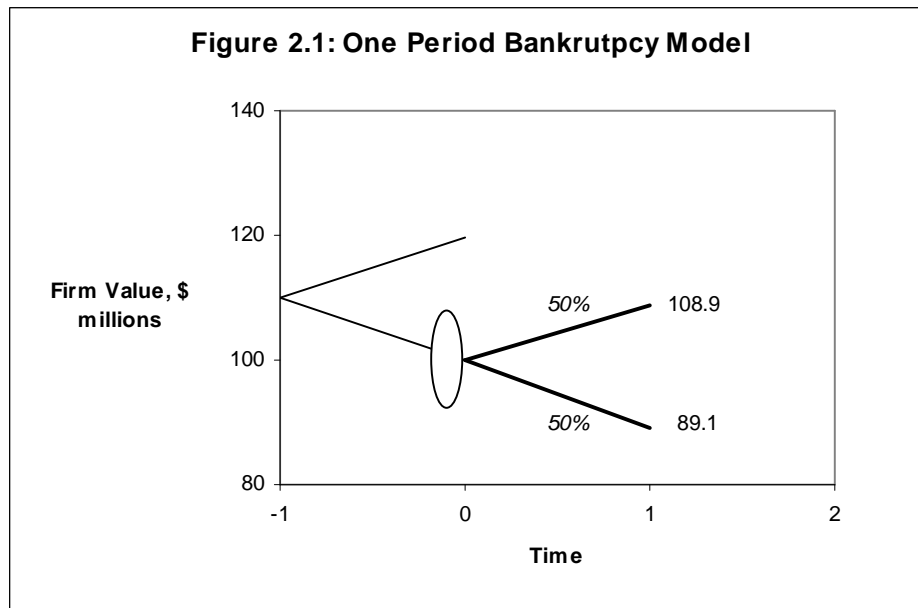[26] For an overview, see Baird [2001], pp. 173-181

consensual plan normally appears more effective in preserving value than does liquidation. [27] As a result, motions by creditors to lift the stay and exclusivity cannot be frivolous and they are normally infrequent. The result is that the debtor can be left for extended periods of time without a significant challenge to its direction of the firm's activities.

Despite the customary leniency of courts, however, the debtor cannot expect unlimited time under bankruptcy protection. As Table 1.1 shows, 97% of cases are resolved within less than four years; only the most unusual cases take 5 years or more. It seems likely, then, that most corporate debtors can count on at least three to four years of protection during which they can pursue their restructuring - unless they reach an earlier agreement on a consensual plan.

Taken together, these provisions set the key ground rules within which the debtor and its creditors will structure their respective bargaining positions.

For simplicity, we start with the assumption that the bankruptcy regime allows only a single period of protection. At the end of this period, the stay will be lifted, the firm will be liquidated and creditors will achieve distribution by strict priority. Consider a firm whose debt is $100 million and whose value evolves according to the binomial process shown in Figure 2.1 and in Table 2.1. The firm and its creditors are considering their options in the time shown by the bubble just before t_0 in Figure 2.1. At this point, the firm's t_0 statements have not yet been released, but it is known that the firm's value at t_0 will be shown to be $100 million. Its covenants will be tested and, since the firm's value will not exceed its debt it will be placed into bankruptcy for one period - absent a consensual agreement between the firm and its creditors on a pre-pack.

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[27] The bankruptcy case of Eastern Airlines, while egregious, shows extent to which courts can allow value to be eroded as the debtor holds off creditors during a protracted bankruptcy protection. At a series of points during a protection period lasting over five years, the court was persuaded that more value would be preserved by extending protection in the hope of an early consensual agreement that would avoid the costs of an immediate forced liquidation. At filing, Eastern had assets that could have largely repaid creditors. When the firm emerged from protection over five years later, nearly 70% of the value of the firm had been destroyed. See Jensen [1991], page 29, footnote 64, and the LoPucki data base cited above in Footnote 4. For a detailed account of the value destruction in this case see Weiss and Wruck [1998]

Figure 2.1: One Period Bankrutpcy Model

Firm Value, $ millions

140			
120			
100	50%	108.9	
80	50%	89.1	

Time: -1, 0, 1, 2

In this example, the potential value movements of the firm are well known, as are the probabilities attached to these movements. Following Knight [1921, pp. 19-20] such a conditions can be said to reflect 'risk' (which is measurable and can be characterized by known probability distributions) but no 'uncertainty' (where the probabilities are of 'a non-quantitative type' that can be estimated only with judgement.) In such circumstances, the debtor, its shareholders and creditors share identical outlooks for the firm. In the example shown in Table 2.1, each group knows that the company's value will either rise by 10% or will fall by 10% during each period, and they know there is an equal 50% probability for each of the two movements. They also know that bankruptcy costs will impose a negative 1% cost per year. All parties face a risk free rate of interest of 5% for the period and are risk neutral.

During the brief time indicated by the bubble just before t_0, the company and its various creditors must each decide on its negotiating strategy. The company's realizable value, were it to be sold at t_0, is $100 million. With such a realization, all the debt could be repaid, although no value would remain for shareholders. The firm,

15

Table 2.1

Expected Liquidation Payouts Payouts to Creditors and to Equity
Under a 1 Period and under a Two Period Bankruptcy Regime

$'millions

Variables

Value of Firm at Default	100.0
Value of Debt	100.0
Up Movement per period	10%
Down Movement per period	-10%
Probability of an Up Movement	50%
Probability of a Down Movement	50%
Bankruptcy costs per period	-1%
Risk Free Interest Rate	5%

			Value of Firm		
Potential Value Paths:	t_1	t_2	t_0	t_1	t_2
No. 1	Up	Up	100.0	108.9	118.6
No. 2		Down			97.0
No. 3	Down	Up		89.1	97.0
No. 4		Down			79.4
Expected Firm Values			100.0	99.0	98.0
Present Expected Firm Values			100.0	94.3	88.9

Payouts under Absolute Priority

	Bond Payouts			Equity Payouts	
Time of Liquidation:	t_1	t_2		t_1	t_2
No. 1	100.0	100.0		8.9	18.6
No. 2		97.0			0.0
No. 3	89.1	97.0		0.0	0.0
No. 4		79.4			0.0
Expected Payout Values	94.6	93.4		4.5	4.6
Expected Values at t_0	90.0	84.7		4.2	4.2

however, has the option of filing in t_0 for one period of protection at the end of which the value of the company will either have risen to $108.9 million or have dropped to $89.1 million. A filing drops the present expected value of the firm to $94.3 million. Despite this drop, shareholders hold a credible threat of postponing distribution until the end of the one period of bankruptcy since their expected recovery is $4.2 million (50%

16

probability of achieving a $8.9 million payout, discounted at 5%). [28] The filing has the effect of providing the shareholders with an increase in their expected recoveries.

Creditors expect a recovery of only $90.0 million under a one period bankruptcy protection. The large drop from the face value of the debt is due to the 50% probability that firm value will drop to $89.1 million, in which case creditors will lose $10.9 million. Moreover, unsecured creditors lose the time value of their money for one period.[29] Creditors can improve on this loss position if, by negotiating a pre-pack at t_0, the decline in expected firm value is avoided. Creditors have a rational interest in a pre-pack that will allow them to 'purchase' the option held by shareholders for a one period bankruptcy. A pre-pack will allow an immediate sale of the company at $100 million. The calculus underlying the negotiations is straight forward. Shareholders will be better off for any purchase price greater than $4.2 million. Creditors will not offer more than $10.0 million (50% probability of a recovery of only $89.1 million, or a loss of $10.9 million, with the recovery discounted at 5%). These two values form a band for the price negotiations. Since there is no disagreement about the potential future values of the firm, absent bargaining inefficiencies, a successful pre-pack will emerge. The deviation from strict priority will be between 4.2% and 10.0%. Creditors will agree to this result even though their debt is fully covered by the value of the firm in t_0 since the automatic stay prevents them forcing an immediate liquidation of the firm.

The positive price accorded to equity in a bankrupt firm is identified by the model as a rational valuation placed on the option held by shareholders to choose a period of bankruptcy protection. The model explains why the shares in firms that are hopelessly bankrupt on any economic basis will continue to trade at positive values even though the value of the firm has dropped below the value of the debt.

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[28] Empirical evidence on the role of delay being used as a tactic to improve outcomes for shareholders is given in Lopucki, e*t al.*, [1990], p 146. For an example of exaggerated use of delay as a bargaining tactic, see Weiss and Wruck [1998], *op. cit.*.

[29] The *Code* contains no provision under which unpaid interest period can be added to their claim by unsecured creditors. Under §506(b), the *Code* secured creditors are allowed to include a claim for interest not received during the protection period.

The size of the deviation from strict priority is highly sensitive to the scale of the up and the down movements - or the 'volatility' - of the firm's value process. Were the movements in the firm's value per period only +/- 5%, the band within which deviation from strict priority is negotiated would narrow to 1.9% and 7.6%. Were the movements to be as high as +/- 15%, the band would widen to between 6.6% and 12.3%. This result is consistent with the observation that losses tend to be higher for industries[30] and firms which exhibit higher volatility. [31] As with the standard options model, increased volatility adds to the value of the option.

While shareholders' interest in the upside has long been recognized [32], the interest of equity in the downside faced by creditors - which is typically far more significant to shareholders - has not been recognized in the literature.

It should be noted that this explanation for deviations from strict priority does not depend on the existence of bankruptcy costs. If the trend in expected value of the firm equalled the rate of interest so that the expected present value of the firm did not deteriorate during the period of protection, and if there were no direct costs associated with bankruptcy, the deviation from strict priority would still be significant at 7.1% in this one period bankruptcy example. Deviations from strict priority stem purely from the operation of the asymmetric distributional rules of bankruptcy law and the normal variability in the movement of the firm's value over the bankruptcy protection period.

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[30] For industry data see Schuermann [2005], *op. cit.,* p. 19. The utility industry, with its regulated rates, exhibits both low volatility and low loss on default. The textile and construction industries, in contrast, are well known to be volatile, and their loss rates are also high. The loss percentages on loans to high tech firms in the 2002-2002 tech industry turn-down, most of which firms exhibited very high volatility, were exceptionally high. The model developed in Crean [2009] predicts that in equilibrium - when lenders charge a spread sufficient to cover expected losses - loss levels and spreads will be higher for firms and industries with higher volatility.

[31] Bradley and Rosenzweig [1992], note 34 on page 1052, recognize the dependence of the option value of equity on volatility, although they do not attempt a direct estimation of the link between volatility and equity value. The model proposed in Cary and Gordy [2008] implicitly recognizes the link between volatility and losses, although the paper plays down the implications for deviations from strict priority (see especially Footnote 15, page 29.)

[32] Stiglitz, [1972], identified the incentives for managers to engage in risky projects to take advantage of this asymmetry of returns. See also Jensen and Meckling [1976] who referred to this as 'the agency cost of debt' (p. 333).
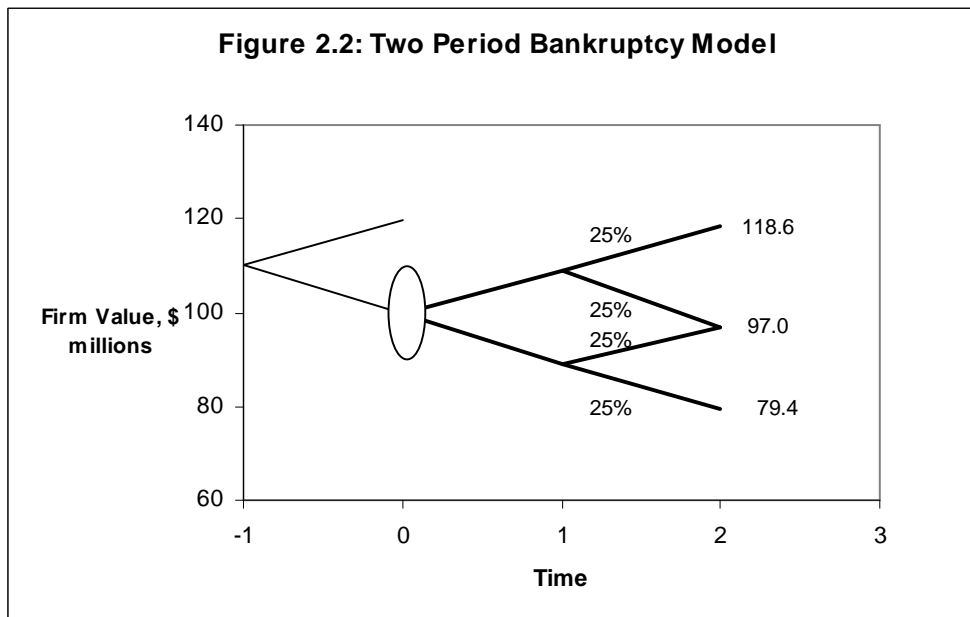
This explanation for deviations from strict priority is much more plausible than the standard rationalization which maintains that the deviations are driven by some ill-defined 'bankruptcy costs' threatened by shareholders. [33] A shareholder threat to increase bankruptcy outlays (other than the minimum running costs associated with extensions to the protection period) as a means of driving an increased deviation from strict priority is unlikely to be credible. With one major exception discussed below (the avoidance of restructuring options which both increase value and decrease volatility), a shareholder threat to increase costs and hence increase potential creditor losses would simultaneously decrease expected shareholder recoveries.[34] Shareholders would lose a far higher percentage of their expected recoveries for a given increase in costs than would creditors. Indeed, the rationale for leaving the debtor in charge of the firm's operations is based on the supposition that the debtor is best placed and has proper incentives to minimize costs and maximize the firm's value.

The extent of deviation from strict priority is very sensitive to the maximum period of protection allowed by the bankruptcy regime. If the regime allows two periods of protection as shown in Figure 2.2, the upper bound of the range of deviation from strict priority rises from 10.0% to 15.3% as is shown in Table 2.1 (the expected present value of a creditor payout of $84.7, for a loss of $15.3). Extensions in the number of periods allowed under the regime will further widen the band. As with the standard options model, increased term adds to the value of the option.

The division of the pre-pack 'dividend' produced by avoiding the need for one or more periods of protection will depend on the relative bargaining power of the debtor and its creditors. This model provides no guidance on how the pre-pack 'dividend' will be

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[33] See below, pages 31-34 for an analysis of the different types of 'bankruptcy cost' that appear in the literature.

[34] This would not be true in a case where shareholders of a distressed firm had zero expectations of any recovery and the courts allowed the firm an extended period of protection. The occurrence of such a situation, however, is unlikely. If the firm's debt were so high that there were no potential recoveries to shareholders under any plausible outcome, creditors would be able to credibly argue to the court that there is no potential consensual agreement. The case would then be converted to a Section 363 auction, a Chapter 7 liquidation, or a combination of the two. In such cases, the debtor would be unable to threaten increased costs as a bargaining tactic for achieving a recovery.

Figure 2.2: Two Period Bankruptcy Model

Firm Value, $ millions (y-axis: 60, 80, 100, 120, 140)

Time (x-axis: -1, 0, 1, 2, 3)

25% — 118.6
25% — 97.0
25% —
25% — 79.4

split. To close this gap, it is tempting to turn to arbitrage free pricing. While the 'underlying' firm value is not traded, a trading position composed of the requisite percentage of the bonds and an identical percentage of the shares can be used to simulate the price of the underlying firm. In a one period bankruptcy regime, if there were no possibility of a pre-pack emerging in the moments just before the filing, application of the binomial model indicates that proper hedging strategy would result in bonds being priced for a total market value of liabilities of $93.2 million. Shares would be priced to give a market capitalization of $6.8 million. These values fit within the negotiation band of Table 2.1.

These calculated values, however, do not reflect prices that are free of risk. The possibility of a pre-pack agreement at t_0 frustrates the establishment of the risk free hedge just before t_0. A risk free hedge depends on there being only two possible outcomes - the two potential values of the firm at t_1. With the possibility of a pre-pack being arranged simultaneously with the filing at t_0, investors in the time just before t_0 face three potential outcomes - not the two outcomes of the standard binomial model. Moreover, the payoff

structure of a pre-pack agreement is not determinate. As a result, the requisite hedges cannot be established on a risk free basis.

The underlying problem faced by 'risk free' (or martingale) pricing of securities in a distressed firm is that the automatic stay suspends any maturity provisions contained in the agreements underlying the firm's liabilities, and any consensual reorganization plan will rewrite the underlying 'contract claims' for repayment incorporated in the original terms of the bonds and other liabilities. As a result, before the terms of the pre-pack agreement are settled, the allocation of value between creditors and equity is indeterminate. In other words, the payoff structure of the debt and of the equity cannot be known until any consensual plan negotiations are complete and the resulting plan confirmed by the Court. In multi-period bankruptcy regimes, consensual plans can arise at any time during the period of protection. Since the timing and value allocation of any plan that achieves consensus cannot be predicted, no generalized risk free pricing algorithm can be developed for the securities of corporations operating under a Chapter 11 regime.

This model provides an explanation for the rarity of rights issues as a solution to corporate financial distress. When a company launches a rights issue to raise new capital, existing shareholders face the option of either accepting dilution or of investing the required capital. At the same time, the rights issue provides creditors with zero cost benefits of lowered probability of default and lowered potential loss on default. In other words, a rights issue represents a solution through which shareholders bear the full costs of solving the financial difficulties and creditors reap a cost-free benefit. As a result, most firms opt for bankruptcy instead of a rights issue as a solution to financial distress.

This simple negotiation model under bankruptcy produces results that are consistent with a range of observable outcomes. It predicts that where there is variability in the possible movements in the firm's value, creditors will vote in favour of a consensual plan that allows shareholders some measure of recovery. This deviation from strict priority will be larger the greater the volatility in the firm's value. It will also be

larger the longer the period of protection allowed by the bankruptcy regime. The model also predicts that corporations will pursue their restructuring through bankruptcy rather than through rights issues. In one important respect, however, the model predicts a pattern that is inconsistent with market outcomes. Because of its assumption that creditors and the debtor share a common outlook on the likely movements in the firm's value - an unrealistic assumption for most bankruptcies - the model predicts that a pre-pack will be the outcome in all cases. Since only around 9% of firms achieve a pre-pack, the assumption of shared views of the future for the firm by creditors and the debtor needs to be relaxed.

b)　Conditions of Risk plus Uncertainty

Uncertainty is the norm for corporate bankruptcies. The usual product of uncertainty is disagreement about the future of the firm. Differences in view are typically driven by different business experiences. Shareholders and management rarely have any personal experience with corporate insolvency. They are often surprised that 'events' have forced them into a bankruptcy filing. With their long record of managing solvent operations, they are generally over-optimistic about the firm's performance in distress. In contrast, professional bond and credit managers are familiar with insolvency, and have few illusions about the difficulties of recovery. [35]

The binomial model can be used to analyze the effect of divergences of opinion. Table 2.2 shows a firm similar to the one in Table 2.1, but with a down movement equal to 5% (instead of 10%) in firm value. The shareholders of this firm optimistically believe that there is an 85% probability of the upside movement per period, and hence expect that present value of the firm will rise over the period of protection. In a one-period bankruptcy regime, equity now expects a return with a present value of $7.2 million. Creditors attach a 50% probability to each of the value movements, and expect the

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[35] As the model shows, when shareholders were generally too pessimistic about the outcome of bankruptcy and creditors are too optimistic, pre-packs would emerge in a high number of filings – a result that is inconsistent with the data.

Table 2.2 **Expected Liquidation Payouts to Creditors and to Equity**
When Expectations of Creditors and Equity Vary
and Liquidation occurs either at t_1 or at t_2

$'millions

Variable	Value of Firm at Default	100.0
	Value of Debt	100.0
	Up Movement per period	10%
	Down Movement per period	-5%
	Bankruptcy costs per period	-1%
	Risk Free Interest Rate	5%

				Value of Firm		
Time of Liquidation:		t_1	t_2	t_0	t_1	t_2
Possible Paths	No. 1	Up	Up	100.0	108.9	118.6
	No. 2		Down			102.4
	No. 3	Down	Up		94.1	102.4
	No. 4		Down			88.5

		Bond Payouts			**Equity Payouts**	
	t_0	t_1	t_2	t_0	t_1	t_2
No. 1	100.0	100.0	100.0	0.0	8.9	18.6
No. 2			100.0			2.4
No. 3		94.1	100.0		0.0	2.4
No. 4			88.5			0.0

A. Creditors' View

| Probability of an Up Movement | 50% |
| Probability of a Down Movement | 50% |

			Value of Firm		
		t_0	t_1	t_2	
Expected Values		100.0	101.5	103.0	
Expected Values at t_0		100.0	96.6	93.4	

	Bond Payouts			**Equity Payouts**		
	t_0	t_1	t_2	t_0	t_1	t_2
Expected Payout Values	100.0	97.0	97.1	0.0	4.5	5.9
Present Expected Values	100.0	92.4	88.1	0.0	4.2	5.3

B. Equity's View

| Probability of an Up Movement | 85% |
| Probability of a Down Movement | 15% |

			Value of Firm		
		t_0	t_1	t_2	
Expected Firm Value		100.0	106.7	113.8	
Expected Values at t_0		100.0	101.6	103.2	

	Bonds			**Equity**		
	t_0	t_1	t_2	t_0	t_1	t_2
Expected Payout Values	100.0	99.1	99.7	0.0	7.6	14.1
Expected Values at t_0	100.0	94.4	90.5	0.0	7.2	12.7

present value of recoveries will be $92.4 million for losses of $7.6 million. The result is still a pre-pack with creditors paying shareholders $7.2 million in value, but the range for bargaining has narrowed very substantially to $0.4 million. Had the up movement been as little as 1 percentage point higher, the bargaining range would have collapsed and no pre-pack deal would be achieved. Similar results are obtained when there is a divergence in view about the scale of the movements in firm value. This example shows how divergences in views about the likely path in the firm's value can lead to the failure to reach a consensual agreement. [36]

If the bankruptcy regime allows two periods of protection, no pre-pack will emerge. Equity has a markedly higher expected recovery of $12.7 million. Creditors expect losses of no more than $11.9 million and will refuse to meet equity's requirement for a pre-pack transfer of value. This example illustrates how, when there is uncertainty, the adoption of a longer allowable period for bankruptcy protection can lead to the failure of pre-pack negotiations.

When shareholders and creditors are unable to reach agreement in t_0, they will re-examine their outlook in t_1, the end of the first period of bankruptcy. The analytical approaches for estimating the potential recovery values will be identical to those used in t_0, even though the specific forecasts will have changed. In some cases, a consensual plan will emerge. On others, there will be no consensus and the period of bankruptcy protection will be prolonged. The same type of negotiation will be pursued each period when the bankruptcy regime allows multiple periods of protection.

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[36] This section emphasizes the applicability of a choice theoretic model of bankruptcy. Decisions are made by the players on a strict opportunity cost basis. In such an environment, costs are strictly subjective. They exist only in the minds of decision makers up until the time a decision is made. See Buchanan [1969], especially p 43. *Ex post* analysis of the rational behind particular bankruptcy outcomes is difficult in such situations particularly when substantial uncertainty exists and where the data used by the players is rarely directly observable. This makes empirical analysis of the reasons behind particular bankruptcy outcomes extremely difficult.

The model can be extended to include subordinated debt. The *Code* requires that a plan of reorganization divide creditors into classes of similar exposure.[37] While the *Code* calls for each class to vote on the plan, a plan may be confirmed when a specific class of junior creditors has voted against the plan (a 'cram down') as long as creditors in the class obtain "not less than the amount such holder would receive .. if the debtor were liquidated under chapter 7…" under absolute priority. [38] To meet this test, an outside valuation must be prepared. Such valuations " …are expensive and unreliable". [39] Since there is normally a range of conceivable outcomes and since there is no objective way of measuring the *ex ante* probabilities of any particular outcome, a range of plausible valuations is the likely result. Since the interests of many of the parties are strictly antithetical, there is likely to be much disagreement on whether a particular valuation that meets the strict requirement of this section. Use of this 'cram down' provision therefore becomes a time-consuming process with little certainty that the valuation chosen in the proposed plan will be acceptable to the bankruptcy court. [40] As a practical result, recourse to this procedure is rarely attempted. This result puts creditors of various classes back into the bargaining framework outlined above with two main options - a consensual plan or a prolongation of the period of protection. To achieve a consensual outcome, shareholders and senior creditors will have to be prepared to offer subordinated creditors at least the recoveries they expect after a liquidation.

To this point, the model has assumed that the maximum period that the court will allow for protection is known with precision in advance. Such foreknowledge, however, is not present in the Chapter 11 bankruptcy regime. The uncertainty can lead to inefficient bargaining outcomes. Bankruptcy courts are courts of equity. They follow no formal rules under which the maximum permissible protection period is announced in advance. They seek to protect the interests of all the various parties to the bankruptcy. They tend to extend exclusivity protection where there remains a possibility for a

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[37] §1122 specifies that a plan shall divide claims by creditors into classes of similar claims. §1126 sets out the voting rules.
[38] § 1129 (7)(A)(ii).
[39] See Baird [2001, p. 200].
[40] If the process for firm value is indeed stochastic under a typical frequency distribution, there will always exist a small finite probability that the debt can be fully repaid. In such a case, creditors can never achieve a cram down.

consensual agreement that avoids liquidation. The forbearance of bankruptcy courts, however, is not unlimited. If the debtor keeps returning to court with successive requests for extensions in exclusivity, at some point the court is likely to listen to creditors claims that value is being destroyed. As the data of Table 1 show, bankruptcy courts ultimately ensure that cases are brought to an end. The result of this process, however, it to generate substantial *ex ante* uncertainty about the maximum period of protection the court will allow in specific cases.

The impact of this *ex ante* uncertainty on bargaining outcomes can be substantial. This can be illustrated through the example in Table 2.2**.** When both the firm and creditors believe the court will allow only one period of bankruptcy, a pre-pack will result. However, if the firm at t_0 believes that at t_1 it will be able to convince the court to grant it an extra period of protection, it will refuse the pre-pack. If at t_1 the court accepts creditor claims of value destruction and rejects a second period of protection, an inefficient decision will have been made by the firm. Both creditors and shareholders will receive a lower share than under a pre-pack because of the needless deterioration in the value of the firm. [41]

The difficulty faced by the courts stems from a time inconsistency problem. While courts are not unaware of the problem, in the absence of a workable process to examine the preservation of the firm's value inhibits the ability of the courts to contain this problem. Public concern at unnecessary value destruction through prolonged periods of protection lay behind the provision in the 2005 bankruptcy reform which puts a hard limit of 18 months on permissible periods of exclusivity.

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[41] This is a classic case of the application of the Coase Theorem. Coase [1960] argued that when the rights of counterparties are ill defined, bargaining outcomes are likely to be inefficient. For a comment on the economic impact on the lending market, see below, pages 31-34.

c)   Downsizing Opportunities and Agency Problems

To this point, the examples have assumed that the evolution in the value of the firm is exogenously determined. Such an assumption, however, is inappropriate for many corporate bankruptcies. A significant percentage of firms enter bankruptcy with a range of restructuring options such as the closure of facilities and the sale of assets. Indeed, the existence of these restructuring options provides the rationale for the allowance of extended protection periods under the *Code*. The implementation of such restructurings will change the path along which the firm's value evolves.

The fact that corporations routinely enter bankruptcy with unexploited opportunities for enhancing value raises the question of why such opportunities were not fully exploited prior to the filing. In many cases, implementing the restructurings at an earlier date would have lessened the likelihood of a filing. Asset sales can provide liquidity for the troubled firm. While downsizing may consume cash to cover termination packages, improved cash flow can often provide rapid recovery of such outlays. Lenders are often prepared temporarily to increase their loans to cover such expenses with a view to improving their own expected recoveries. A theory of bankruptcy should provide some explanation for why troubled firms delay these advantages until after their filing. [42]

The answer to this puzzle lies in the nature of these unexploited opportunities. Many firms file for protection after a period of declining revenues that has left them with divisions operating at below capacity and at a loss. Such divisions have operating leverage that contributes significantly to the firm's volatility. If the firm's revenues rebound, the divisions will generate significant profits. If the revenues stagnate, these divisions will impose costs. Due to the asymmetric nature of bankruptcy distribution

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[42] John, *et al.*, [1992] provide data showing that the typical operational restructuring for solvent firms usually takes one and sometimes up to two years. 30% of the corporate bankruptcies shown in Table 1 that filed without any prior negotiation with creditors - presumably those firms that expected long protection periods - required two years or more to complete their restructuring and reach a consensual agreement with creditors. Such protection periods are well in excess of the periods required to complete most restructuring programs outside of bankruptcy. Asset divestitures take a much shorter time to complete. This evidence suggests that a significant number of bankrupt corporations delay profitable restructurings until they achieve bankruptcy protection, and often well beyond the date of filing.

rules, the shareholders will reap much of the benefit of potential profits from retaining the divisions while the creditors will bear most of the potential costs.

An example of such a firm is set out in Table 2.3. The example assumes the existence of risk but not of uncertainty. In the absence of an operational restructuring, the nominal value of the firm rises over time at an underlying trend at 4%. As this is less than the rate of interest at 5%, the real value of the company is expected to decline without a restructuring. The potential restructuring would divest underutilized divisions, resulting in an increase in the underlying trend to 5%, and a dampening of the up and down movements to +/- 4%.

If the restructuring is immediately applied at t_0, the firm's real value is stabilized, and the position of creditors is improved. However, the expected returns to shareholders drop due to the loss of the upside provided by the closed divisions. If only one period of protection is allowed, without a restructuring the shareholders will recover $6.9 million. In contrast, if the restructuring is implemented at t_0, shareholder returns will drop to $5.8 million. Shareholders therefore have a credible threat to postpone the restructuring, even though this choice produces a destruction of firm value. The incentive to postpone the restructuring is even stronger in the case of a two period maximum protection period. In each case, a pre-pack will result and the lower bound for the price negotiations will be set by equity's expected return in the absence of a restructuring.

This example, and its pre-pack result, depended on there being no disagreement between the firm and its creditors about the possible future paths of the firm's value and the associated probabilities. However, in the presence of uncertainty, there may well be a failure to achieve an early consensual plan. Should the bankruptcy regime allow multiple periods of protection, shareholders will have a continuing interest in delaying the restructuring in the periods after filing. Such an prediction is consistent with long periods of protection shown in Table 1 where the debtor is able repeatedly to convince the court to rebuff creditor petitions for a lifting of the stay because there remain untapped restructuring opportunities that could enhance the value of the firm and because creditors

Table 2.3　　　　　　　**Potential Bankruptcy Payouts to Equity**
When there is an Option for an Operational Restructuring
and Liquidation Occurs either at t_1 or at t_2

$'millions

		Base	Restructured
Variables	Value of Firm at Default	100.0	100
	Value of Debt	100.0	100
	Up Movement per period	10%	4%
	Down Movement per period	-10%	-4%
	Probability of an Up Movement	50%	50%
	Probability of a Down Movement	50%	50%
	Trend in Firm Value	4.0%	5.0%
	Risk Free Interest Rate	5.0%	5.0%

No Restructuring - Base Case

Base Case Value of Firm

Time of Liquidation:		t_0	t_1	t_2
Possible Paths:	No. 1	100.0	114.4	130.9
	No. 2			107.1
	No. 3		93.6	107.1
	No. 4			87.6
Expected Firm Values		100.0	104.0	108.2
Present Expected Values		100.0	99.0	98.1

		Payout to Creditors				**Payout to Equity**		
		t_0	t_1	t_2		t_0	t_1	t_2
Possible Paths:	No. 1	100.0	100.0	100.0		0.0	14.4	30.9
	No. 2			100.0				7.1
	No. 3		93.6	100.0			0.0	7.1
	No. 4			87.6				0.0
Expected Recovery		100.0	96.8	96.9		0.0	7.2	11.3
Expected Values at t_0		100.0	92.2	87.9		0.0	6.9	10.2

Payouts when the Restructure is Implemented

Base Case Value of Firm

		t_0	t_1	t_2
Possible Paths:	No. 1	100.0	109.2	119.2
	No. 2			110.1
	No. 3		100.8	110.1
	No. 4			101.6
Expected Firm Values		100.0	105.0	110.3
Present Expected Values		100.0	100.0	100.0

		Payout to Creditors				**Payout to Equity**		
		t_0	t_1	t_2		t_0	t_1	t_2
Possible Paths:	No. 1	100.0	100.0	100.0		0.0	9.2	19.2
	No. 2			100.0				10.1
	No. 3		100.0	100.0			0.8	10.1
	No. 4			100.0				1.6
Expected Recovery		100.0	100.0	100.0		0.0	5.0	10.3
Expected Values at t_0		100.0	95.2	90.7		0.0	4.8	9.3

remain likely to accept a consensual plan - when it is finally put forward by the firm. Such a prediction is also consistent with the high number of firms that enter protection with a backlog of unexploited restructuring opportunities since the incentives to postpone such restructurings begin well before any filing.

Restructurings which involve assets sales face a further hurdle under the *Code*. Both subordinated debt holders and shareholders may expect higher returns if asset sales which increase firm value but reduce volatility are delayed, with the costs being borne by creditors. Court precedents hold that, absent a 'good business reason', 'equity interests' should be able to block the sale of a major asset, or the company itself, even when both the board and the creditors are in favour of a sale. The courts are reluctant to accept valuation arguments when there is a dispute about what constitutes a 'good business reason'. [43] The result is the destruction of value.

To this point the examples have assumed that 'the firm' and shareholders have an identity of interest. This assumption, however, is inappropriate for many troubled corporations. Both executives and board members may have interests different from those of shareholders and creditors. This binomial model can be used to identify key ways in which these divergent interests can lead to inefficient results for shareholders and for creditors.

Managers of troubled firms may have a stronger interest in prolonging the existing operations of the corporation – and their employment – than in maximizing equity value.[44] Downsizing and divestitures may cut the base for their compensation. Since the primary responsibility for the evaluation of the reorganization options for the firm rests with management, management is in a position where it can slant the analysis in ways that favour its interests. The preparation of overly optimistic forecasts, for

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[43] See Baird [2001], pp. 195-7. Baird provides the illustration of a company that had concluded that a sale of a major division was appropriate and the creditors committee agreed. The committee of equity-holders, however, objected that the sale should wait. The Circuit court, to which the issue was appealed, concluded that under Chapter 11, 'the equity interest [is] required to be weighed and considered.' In other words, the effect of the sale on the overall firm's value was not the determining factor, and the sale was blocked.
[44] *Inter alia*, see Hotchiss [1995]

example, can serve as the basis for preventing a pre-pack, as shown in of Table 2.2. Reorganization proposals for the sale or closure of divisions as in the example of Table 2.3 may simply be ignored. The result is a bias away from socially efficient outcomes.

Controlling these adverse interests at practical level is difficult due to problems of asymmetric information. Corporate boards, while the best source of countervailing influence to management, are not free from agency problems. Board members often suffer from considerable information asymmetries. They may feel themselves unable or unwilling to challenge management, particularly when the chairman is also the chief executive. This problem is compounded when individual board members feel their personal best interests lie in prolonging their tenure. [45] To this extent, boards may identify their interests with management, and prove ineffective in ensuring the primacy of creditor or shareholder interests. Non-bankruptcy law is said to require that when a firm becomes insolvent, the fiduciary duty of directors shifts to the protection of value. The debtor-in-possession "…must maximize the value of the estate rather than promote the interests of any particular group." [46] However, there is little evidence that boards of insolvent companies feel obliged conduct active due diligence independent of management to assess the potential for major divestitures that may enhance value. Nor is there much evidence that Boards ensure they are aware of the destruction of potential value arising from a prolonged period of protection. The result is a bias away from socially efficient outcomes.

This analysis allows a disentanglement of the several different "costs of bankruptcy" that have been proposed in the literature. In popular parlance, the 'costs of bankruptcy' conflate two separate notions - the costs of business decline and the costs arising from a filing under the bankruptcy code. To identify the costs specifically arising because of the filing of a particular firm, a 'hypothetical alternative' must be constructed under which bankruptcy is avoided because of the some counterfactual circumstance such

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[45] See Gilson (1990) whose data suggest that 46% of directors manage to remain in place through a bankruptcy and into the corporation exiting from Chapter 11. This is a significant percentage. See also Hotchkiss [1995].
[46] See Baird [2001], p 182.

as a reduced level of debt that allows the firm to escape the need for a filing. Analysis of this hypothetical alternative will identify the path of the firm's value and the costs of its business decline in the absence of a filing. [47] When the path of the firm's value under this hypothetical alternative is compared to the actual path of the firm's value under bankruptcy protection, the costs attributable to the filing can be isolated. In most cases, the preponderance of value loss will be attributable to business decline rather than to the costs attributable to a filing.

There are several kinds of costs engendered by a filing or a potential filing. The direct costs include the costs of the professionals such as lawyers and accountants, and other related out-of-pocket cash costs. While these can be substantial in absolute terms [48], they are unlikely to be large in relation to the total value of the bankrupt corporation. Of more significance are the costs arising from the loss of important customers and key staff due to the uncertainty that surrounds the future of the bankrupt firm. In addition, there may be some costs that are external to the firm. Competitors of the bankrupt firm, for example, may suffer losses due to aggressive product pricing by the bankrupt firm which, since it does not have to pay the full costs for the capital it uses, may price below full cost.

The largest set of bankruptcy costs arises from the two major incentives for resource misallocation and value destruction faced by management and shareholders: the incentive to enter into long, value-destroying periods of protection, and the incentive to avoid or postpone value accretive reorganizations which reduce volatility. Analysis of the extent of these costs can effectively be done only on a case by case basis using fundamental analysis that identifies the extent of resource misallocation due to adverse incentives. However, the data in Table 1 are suggestive. They indicate that over 30% of the bankrupt firms which emerged but did not negotiate with creditors before the filing took over 2 years under protection. As has been pointed out above, such a delay is far

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[47] There may be costs to financial distress short of a bankruptcy. See Opler and Titman, [1994] Such costs should not be included within the 'costs of bankruptcy'.
[48] Miller [2008], p. 147, estimates that for large corporate bankruptcies billings can top $100 million per year. For a survey of professional costs in bankruptcy see Lubben [2007].

longer than required for the normal company reorganization outside of bankruptcy. Around 42% of firms that were ultimately converted for sale or liquidation took over a year before the disposition. The delays in achieving agreement on such liquidations appear excessive. We are left with a presumption that the perverse incentives arising from the Chapter 11 rules do lead to material resource misallocation.

Bankruptcy leads to significant redistribution of value. The allocation of the costs of bankruptcy is included within this value redistribution. As this paper has argued, that equity may benefit significantly from bankruptcy rules through its ability to threaten a long period of protection. Equity's gain plus the deadweight efficiency costs of bankruptcy are funded by losses imposed on other parties. Creditors bear a large portion of these losses. [49] Employees and suppliers are likely to bear some of the losses. Holders of rejected executory contracts may also face costs when the assets that are returned to them prove to be less profitable than under their original use. When the bankrupt firm rejects pension obligations, employees and the Pension Benefit Guarantee Board will also suffer costs. [50] The total of value that is redistributed may often exceed the direct and indirect costs due the bankruptcy filing since these redistributional costs include the distributional gains made by equity through the consensual agreement.

The nature of the bankruptcy regime has a high impact on the scale of bankruptcy costs and the extent of value redistribution. The earlier sections of this paper have shown how extending allowable periods of bankruptcy protection leads to delays in value enhancing reorganizations, to value destroying extensions to the stay and to increases in the degree of deviation from strict priority. When the analysis is put into this framework, it is possible to analyze the costs and redistributional effects of particular provisions of the bankruptcy regime, and to examine how changes to these provisions will affect the scale of costs and redistributional effects of particular bankruptcies. Increasing allowable

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[49] Creditors may also bear a large share of the costs of business decline - costs that would have been borne by equity had there been no insolvency. These costs of business decline that are absorbed by creditors are not properly 'costs of bankruptcy.' If there had been an early pre-pack, distribution by strict priority, and no direct or indirect costs resulting from the failure, any losses that would have been left to creditors would be losses due to the business decline.

[50] See White [1989, p. 144] for a comment on the Pension Benefit Guarantee Board.

periods of protection will increase loan losses. Lenders, however, will react by tightening their lending standards for solvent firms both by increasing spreads and by decreasing the amount of credit available. Lending standards will be tightened to the point that expected losses are covered and lenders can maintain their expected rates of return. The advantages reaped by shareholders in bankrupt firms by the increase in the protection period will be shifted by lenders back to the shareholders of solvent firms through an increase in the cost of capital. While jobs in insolvent firms may be preserved by increasing the stay period, jobs creation among solvent firms will be harmed. [51]

There are two further conclusions that can be drawn from the analysis of this section.

First, the achievement of a consensual agreement at some point after the filing cannot be taken as evidence that there was no postponement of value-enhancing restructurings or that bankruptcy rules produced the efficient outcome that preserved maximum value.

Second, the standard assumption of credit models that there exists an exogenous process for the evolution in the firm's value is false for many bankrupt firms. The usefulness of much of the statistical credit theory is inherently impaired.

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[51] Crean [2009] derives supply curves for bonds at a market equilibrium where lenders price to ensure spreads cover expected losses. Raising the maximum periods of protection allowed in the *Code* will substantially reduce the supply of loanable funds and increase the spreads. The threat of higher loan losses through loosened provisions leads lenders to tighten their lending standards and reduce loan supply. Williams [2009] argues that the 2005 changes to the *Bankruptcy Code* which provided lenders with a greater measure of control led to the failure of Chapter 11 to save 34,000 jobs in the case of the recent bankruptcy of a large retailer. The analytical structure for assessing the implications of particular bankruptcy provisions on employment levels proposed in this paper is incomplete and conclusions about the overall job impact cannot be sustained. To reach a conclusion about the impact of the 2005 bankruptcy reform on employment levels, an analysis must be made of the changes to bank loan origination standards as a result of the reform. In market equilibrium, providing debtors with more flexibility will, *ceteris paribus*, lead to reduced lending which, in turn, will lead to reduced job creation by increasing the cost and lowering the availability of borrowed capital for solvent employers. The net effect of the 2005 reform on employment cannot be determined without completing this analysis.

3.   Tactics and Bargaining Before a Filing.

The binomial model can be extended to consider another choice variable – the timing for a filing. The *Code* offers wide latitude in the point at which a firm may file. [52] Creditors often benefit from a violated debt covenant allowing them to force a filing long before the company becomes illiquid or insolvent. In practice, a filing will occur only when creditors or the firm reaches the point when a filing serves their best interest, whether or not the firm is in default and whether or not it is insolvent. A successful theory of bankruptcy must capture how investors, the firm and its shareholders identify the points at which filing becomes beneficial to their interests. It must provide a negotiation model that applies consistently through the pre-filing workout period and during the period of protection. An application of the binomial bargaining model to the pre-filing workout period meets these tests. [53]

Consider the firm with the pure risk (and no uncertainty) value process illustrated in Table 3.1. At time t_{-1} the firm's value is \$111.1 million after paying the interest and dividends owing at that time. The potential up or down movements in firm value per

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[52] The relevant sections, §101 and §109, set few criteria that must be met by a corporation prior to filing. See also Baird [2001], p. 8.

[53] Various models have been developed to model the decision process of players prior to any filing. Anderson and Sundareson [1996] present a binomial model that assumes that a filing leads to an immediate liquidation. Value – less some known bankruptcy cost – is distributed according to strict priority. The value process is therefore known. There is risk but no uncertainty, and martingale pricing can be developed. Under the model, the shareholder is given scope for 'underperforming' his payment obligations. The shareholder will under-perform at each stage in the process to an extent just below the threshold that induces the creditor to file the firm in bankruptcy. The model, however, fails to recognize the link between firm volatility and loss on default. Mella-Barral and Perraudin [1997] develop a continuous time asset pricing model with perpetual debt that permits strategic debt service. Equity holders are allowed to inject capital to cover cash flow shortfalls and hence are assumed to control the timing of any default. In this model as well bankruptcy costs are assumed to be known in advance. Martingale pricing is developed and optimal strategic debt service identified. As with Anderson and Sundareson [1996], however, there is no link drawn between asset volatility and creditor losses in bankruptcy. In effect, such models maintain that the effect of asset pricing volatility on security values ends with a filing – an assumption that does not accord with market practice. Further, these models rely on martingale pricing which, as this paper argues, is inappropriate. Neither does either model consider the bargaining environment following the filing. Neither of the models allows for the analysis of the effects of uncertainty. Aivazian & Callen [1983] propose a sophisticated game-theoretic approach under which bond holders and equity holders negotiate the optimal timing of a possible default. The model correctly structures the decision process as stretching from initial concerns about a potential filing until the debt matures and repaid, or is satisfied through a plan of reorganization or liquidation. The filing decision is shown to involve valuation of a lottery over cooperative games rather than a lottery over specific monetary outcomes.

Table 3.1: Expected Present Values at t_{-1} for Creditors and for Shareholders of Various Alternative Strategies for Bankruptcy Filings.

Case 1 Variables.

Beginning Firm Value at t_{-1}	111.1
Firm Income at t_{-1}	5.6
Debt	100.0
% Up Movement	10.0%
% Down Movement	-10.0%
Probability of Up Movement	50.0%
Probability of Down Movment	50.0%
Risk Free Rate	5.0%
Debt Interest Rate	5.0%
Firm's Rate of Return	5.0%
Rate of Bankruptcy Cost	-1.0%

Strategy 1. Base Case: No Bankruptcy in either t_{-1} or t_0.

Creditors	105.0
Shareholders	11.7
Total Firm Value	116.7

Strategy 2. Bankruptcy in t_0 only on a down movement in Firm Value:

		Change from Strategy 1
Creditors	102.1	-2.9
Shareholders	13.6	1.9
Total Firm Value	115.7	-1.0

Strategy 3. Bankrupty at t_{-1}

		Change from Strategy 1
Creditors	102.0	-0.1
Shareholders	10.4	-3.2
Total Firm Value	112.4	-3.3

Case 2 - Changed Variables.

Probability of Up Movement	40.0%
Probability of Down Movment	60.0%

Strategy 1. Base Case: No Bankruptcy in either t_{-1} or t_0.

Creditors	105.0
Shareholders	9.4
Total Firm Value	114.4

Strategy 2. Bankruptcy in t_0 only on a down movement in Firm Value:

		Change from Strategy 1
Creditors	100.8	-4.2
Shareholders	11.3	1.9
Total Firm Value	112.1	-2.3

Strategy 3. Bankrupty at t_{-1}

		Change from Strategy 1
Creditors	101.4	0.6
Shareholders	8.3	-3.0
Total Firm Value	109.7	-2.4

period are known to be +10% and -10% of the firm's value. A downward movement brings the firm's value to $100.0 million, exactly the value of its debt. A known probability of 50% is attached to each potential movement in the firm's value. The firm generates income at the end of the period equal to 5% of the value of the firm. In the absence of bankruptcy filing, the firm pays the creditors' interest and any principal that comes due at the end of the period. The remainder of the income is distributed in a dividend to shareholders. The debt of $100 million matures one period later in t_0. This debt is secured on the firm's assets so that interest during any bankruptcy period can be claimed by creditors. Interest is payable at the end of each period at the rate of 5%. Finally, the applicable indenture or loan agreement contains a financial covenant requiring that debt cannot exceed 85% of the firm's value. Since the level of the firm's debt at t_{-1} already exceeds this level, creditors have the right – but not the obligation – to declare a default, accelerate the debt and force the company into bankruptcy at t_{-1}. The applicable bankruptcy law allows a single period of protection after which the firm is sold and assets distributed according to strict priority. Should the creditors declare a default and precipitate a filing at t_{-1}?

Consider the alternative bankruptcy strategies as viewed by the players at t_{-1} set out in Table 3.1. Both creditors and shareholders can provoke a filing at t_{-1}. In the absence of a filing at t_{-1}, creditors will be able to provoke a filing at t_0 if there has been a downward movement in the firm's value. The debtor can file at any time. As we are dealing with a case of pure risk with no uncertainty, creditors and shareholders will make identical calculations of the net benefits attaching their own and their opponent's potential bankruptcy strategies. These estimates form the basis for negotiation between the parties 'in the shadow of bankruptcy'.

Under Strategy 1, if there is no filing in either t_{-1} or t_0, creditors will be paid the interest owed during the period ending at t_{-1} and then will be paid interest and full principal at t_0. The t_{-1} present value to creditors of these expected cash flows is $105 million ($5.0 million interest at t_{-1} and $105 million interest and principal at t_0, discounted to t_{-1}.). Strategy 1, however, provides no return to shareholders should the

37

value of the firm drop since the full value will be paid to creditors on maturity of the debt in t_0. Shareholders achieve a return only if the firm's value moves upward to $122.2 million. The present expected value to shareholders from Strategy 1 is $11.7 million, arising entirely from the potential for an up movement in the firm's value during the period ending in t_0.

Under Strategy 2 with a prospective filing in t_0, the discounted expected returns at t_{-1} for shareholders improve to $13.6 million. Creditors will therefore expect that shareholders will adopt the strategy of a t_0 filing. The result of this strategy, however, is a drop in the firm's expected value at t_{-1} by $1 million to $115.7 million and a drop in creditors' expected returns by $2.9 million to $102.1 million. Creditors will not chose Strategy 3 since they cannot improve their expected recovery by calling a default in t_{-1}, even though the firm is in a clear violation of the financial covenant in its debt agreement.

Such an analysis by interested parties provides the basis for pricing the firm's securities at t_{-1}. Under the initial set of variables in Table 3.1, in t_{-1} creditors have a discounted expected present value of recoveries of $102.1 million composed of an interest payment of $5.0 million at t_{-1} and a present value of recoveries from a t_0 bankruptcy of $97.1 million. They therefore face a loss of $2.9 million on the value of the debt. Under applicable accounting rules they will have to recognize this loss at t_{-1}. Where replacement lenders are satisfied with earning the risk free rate of return, as has been assumed in this simplified example, the debt may be sold or refinanced at $97.1 million. Similarly, in t_{-1}, equity has a value of at least $13.6 million.

Under conditions of pure risk and no uncertainty, in the absence of bargaining inefficiencies, there will always be a negotiated settlement that avoids the cost of bankruptcy and divides the dividend from avoided bankruptcy costs between the parties. An agreement may emerge in t_{-1} under which the value of the debt is cut to $97.1 (at which point shareholders no longer have any credible threat to bankrupt the firm at t_0) and interest of $5 million is paid plus the negotiated creditors' share of the dividend. The

equity value will be \$13.7 million plus equity's negotiated share in the dividend from avoiding the costs of bankruptcy. The model indicates that in the period before any filing the value of the debt will be priced to reflect the expected gains from deviations from strict priority net of the costs of any potential bankruptcy, and the value of equity will rise to reflect the value of the option held by equity to pursue a single period of bankruptcy in t_0.

The choice of optimal filing strategy is highly dependent on the values of the variables as viewed by the players. The bottom panel of Table 3.1 shows the effect of a drop in the probability of an up movement to 40% and a corresponding increase in the probability of a down movement to 60%. Under these circumstances, the preference of shareholders remains Strategy 2. Creditors, however, now can improve their position under Strategy 3 by exercising their right to call a default at t_{-1} which yields an improvement in their position of \$0.6. They will therefore choose the strategy of a threatened filing at this point. The result will be a pre-pack in t_{-1} with creditors recovering at least \$101.4.

This example shows how securities of distressed firms will be priced in the periods before any actual filing in a manner that reflects the ability of the firm or its creditors to force a filing at a time of their choosing.

This binomial model of bargaining 'under the shadow of bankruptcy' can be extended in three further directions.

First, uncertainty can be handled in the same manner as in the post-filing period by directly modelling the diverging views of creditors and shareholders and exploring whether a consensual agreement can be reached within the parameters resulting from their beliefs about the firm's future value.

Second, the model can be used to explore the implications of restructuring options on filing decisions. Creditors may be prepared to waive defaults and extend further credit

in return for the firm committing to promptly undertake options which improve creditor recoveries. By comparing payouts to creditors and to equity with and without the restructuring, the model will indicate whether or not there is mutual interest in the firm committing to the restructuring in a period before any filing in return for creditor concessions. The model thus captures this standard type of negotiation between a banker and a firm in financial distress.

Finally, the binomial model can be extended to incorporate tranches of debt and equity carrying various levels of seniority. The holders of each of these classes of security would perform their own analysis to identify their interest in the various bankruptcy options that are open to them under the terms of their securities.

From this analysis, it is clear that the binomial model can be extended to the pre-filing period in a manner that allows the tactical options of the various players to provoke a filing to be captured by the analysis. The approach therefore provides a bargaining model that applies consistently through the pre-filing periods and into the post filing periods of protection, and meets a key criterion for a successful model of bankruptcy negotiation.

This analysis indicates that bankruptcy models or security pricing models which assume a mechanistic default threshold based on ratios such as debt-to-equity or cash flow coverage tests will miss the effect of strategic decision-making by the firm and its creditors. Neither creditors nor the debtor can be expected automatically to file for bankruptcy when some pre-determined threshold has been reached. In many cases, the filing will take place before the threshold is reached; in others it will take place after the threshold is breached. Using a deterministic model for the default threshold will result in inaccurate estimates of default and loss-on-default rates and of securities prices.

4.   "Gone Concern" Analysis in the Real World

While firms and investors do not use the binomial model to establish their workout tactics or to price securities in distressed firms, their bargaining strategies are formed using the logic that has been developed using the binomial model. The analytical approach to estimating firm values in the market place is sometimes called "gone concern" analysis. It generates estimates of the likely range of values of the firm at the end of a potential period of bankruptcy protection and the estimates of the related probabilities.

The starting point for estimating the potential for paths for the firm's value is the past operating history of the firm, along with a consideration of the firm's competitive position in the marketplace. Potential programs of asset sales and downsizing programs, along with an estimate of their potential impact on firm value and volatility are identified. The tax implications and the potential accounting treatments for the various options must be analyzed. The liquidity position of the firm, including requirements for committed new spending and the effect of any debt maturities or potential debt defaults, must be evaluated.

While the method for estimating the cash flows and firm values differ radically from the lattice of the binomial model, the end product is similar. The results of 'gone concern' analysis are typically presented with a 'most likely' case, plus an 'up-side' and a 'down-side', along with estimated probabilities attached to each case. Such results look like the outcomes pictured at Time 2 in Figure 2.2. This puts the analysis of negotiating strategies back into the framework developed in previous sections of this paper. The firm, its shareholders and its creditors will each use their forecast of these values to evaluate the recoveries they can expect to receive in liquidation. From this analysis, each group will establish its tactical bargaining position. The analysis follows the logic outlined in the previous sections. The results parallel the outcomes generated by the binomial model developed in Sections 2 and 3.

Typically, the firm, its creditors and its shareholders will commence 'gone analysis' when the probability of financial distress becomes significant - and in any case well before any filing. In the periods before any filing, the bargaining positions will be established in the manner outlined in Section 3.

Because of its intimate knowledge of the firm, its risks and opportunities, management has a considerable advantage in conducting gone concern analysis. Management is fully aware of any potential default conditions and of the firm's liquidity position. Since the firm typically initiates any petition in bankruptcy, it can control the timing of the filing. This provides it with a range of options to improve its position prior to any filing. The firm, for example, can draw down of unused committed lines of credit to maximize available cash. It can place excess cash with a bank that is outside of its group of lending institutions to avoid any rights of set-off by existing lenders. The firm can maximize of both inventory and accounts payable before the point of filing.

In contrast, firm that wishes to postpone a filing can curtail any unnecessary spending to conserve liquidity. It may be able to securitize assets or use other financing mechanisms that subordinate the position of existing creditors and supply the firm with extra liquidity. Such firms stretch applicable accounting principles to minimize the impression given to markets of its degree of financial stress and to preserve access to supplier and other credit.

Creditors also have options to protect their position. In forming their views of the company, creditors must assess the likelihood of such maneuvers by management as well as the other factors that can affect the firm's value and their recoveries. Creditors can reduce uncommitted exposures. Trade creditors can tighten the conditions of their shipments. [54] Term creditors will closely watch for any potential defaults in their lines and those of other creditors. Since the recoveries by any one creditor are affected by the recovery tactics of other creditors, tactical plans by individual groups will be formed with a close examination of the likely tactics of other groups.

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[54] See Smith [1987] and Ng, Smith and Smith [1999] for a models of credit control by trade creditors.

In an ideal world, agreement on a financial restructuring should be completed without the need a formal filing with its attendant costs. Such agreements, however, are rare. When the do occur, hold-out groups of creditors typically insist on minimal debt reduction. The result is that companies which opt for an informal financial restructuring often fail to shed sufficient debt for them to become viable.[55] As a result, restructurings typically take place through formal bankruptcy procedures which, with their voting rules, allow the consenting majorities of creditors to bind the 'hold-out' minorities to a plan of financial reorganization that achieves a more viable level of debt reduction.

Significant leverage can often be exercised by investors who attain one of other of two key control thresholds - either a one third blocking position in the value of one or more classes of debt, or a two thirds controlling position in the value of one or more classes of debt plus 50% of the votes in such classes. Achieving such voting control improves the credibility of creditors in their petitions to the court about the likelihood of a consensual plan. The result can be an improvement in the recoveries to creditors. Funds and other investors who specialize in the analysis and purchase of distressed securities frequently base their strategies on achieving control of one or more classes of the distressed corporation's securities. The past couple of decades have seen the development of a deep market for the debt and shares of distressed companies. [56]

In summary, the basic conclusions reached using the binomial model - deviations from strict priority, the occurrence of extended period of protection, and the likelihood of substantial resource misallocation arising from the incentives embedded in bankruptcy rules - all apply when the firm's terminal values are estimated through the standard type of 'gone concern' analysis found in the marketplace.

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[55] Gilson [1997] provides evidence that firms which try to reorganize outside of bankruptcy fail to shed sufficient debt and a significant percentage subsequently face financial distress. The high percentage of re-filings for pre-packs shown in Table 1 suggests that these negotiations frequently result in inadequate debt conversion.

[56] See Rosenberg [1990] for some examples. See also Hotchkiss and Mooradian [1997]

4.   Conclusion

This paper started with a look at the patterns of bankruptcy outcomes that are inadequately explained by the current literature – widespread and significant deviations from strict priority, significant equity prices for companies that are insolvent, and highly variable and frequently long periods of bankruptcy protection. A review of the literature bearing on these issues indicated four major strands of analysis which were largely unconnected. The large body of legal analysis focusing on bankruptcy objectives and processes contains few models of bargaining and provides little explanation for the observed patterns of bankruptcy outcomes. The papers on agency theory containing implications for bankruptcy processes provide insight into bargaining incentives, but contain no analysis of broad patterns of outcomes. The literature of stochastic models of credit risk focussing almost exclusively on the period prior to the filing provides little guidance on bargaining process or loss on default outcomes. Finally, the multivariate statistical models of credit risk are useful predictors of default and loss, but contain no bargaining models that can assist in explaining the reasons for the wide variation in outcomes.

The paper developed a simple binomial model of bargaining under the shadow of bankruptcy. The model departs from earlier finance studies in rejecting the assumption of a stopped value process at the point of filing in favour of running the process through the pre-bankruptcy period until the maturity of the debt or the finalizing of a bankruptcy process. The model is structured to reflect those provisions of the *Code* that affect the management of the bankruptcy process and the ultimate allocation of value. The model predicts that significant deviations from strict priority will be accepted by senior creditors in consensual agreements because it is in their interests to do so. This result arises because of the interaction of the volatility in the firm's value and the bankruptcy process rules included in the *Code*. The does not rely on some reference to the 'costs of bankruptcy' to achieve this result. The analysis points out that most of the statistical models of credit risk that are based on 'risk free' arbitrage cannot be complete in a Chapter 11 environment and martingale pricing for credit risk cannot be achieved.

The model predicts that the losses will be higher for firms or industries with higher volatility, a result that is consistent with market observations. The model also predicts that rights issues will generally be an unattractive solution to financial distress for shareholders compared to the results obtainable from a Chapter 11 filing – again a result that corresponds to market observations. Addition of uncertainty to the model leads to a prediction that debtors and their creditors may well be unable to achieve a consensual restructuring agreement before a filing, and that periods of bankruptcy protection may be prolonged – again a result that is consistent with observed outcomes. The model identifies potential shareholder interest in delaying restructurings or asset sales which lower the volatility of firm value even though they increase firm value. The model thus explains why so many firms enter bankruptcy with a backlog of un-started reorganization plans. The introduction of uncertainty and the identification of this class of restructurings in which shareholders may wish to delay ties into the analysis proposed by papers on agency theory. Finally, the model provides strong support for the notion advanced in a variety of legal studies of bankruptcy that the process is structured in a way that provides strong incentives for management and shareholder behaviour that destroys firm value.

When extended to the pre-filing period, the model meets the criterion of providing single, consistent bargaining model that can be applied both before and after any filing. It allows for an analysis of the interplay of interests which generate optimal bankruptcy strategies for the players. It allows for estimates of the minimal discounted expected values for the various securities which produce lower bounds for the pricing of the securities of the distressed firm, and it identifies the range of savings that can be achieved by a negotiated settlement which avoids the costs of a bankruptcy.

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